# An Empirical Study of Group Stewardship and Learning: Implications for Work Group Effectiveness

**Richard L. Groesbeck**

**Dissertation submitted to the Faculty of the**
**Virginia Polytechnic Institute and State University**
**in partial fulfillment of the requirements for the degree of**

**Doctor of Philosophy**
**in**
**Industrial and Systems Engineering**

**Dr. Eileen M. Van Aken (Chair)**
**Dr. Diane E. Bailey**
**Dr. C. Patrick Koelling**
**Dr. Steven E. Markham**
**Dr. Konstantinos P. Triantis**

**November 27, 2001**
**Blacksburg, Virginia**

Keywords: Group Stewardship, Group Learning, Work Group Effectiveness

# An Empirical Study of Group Stewardship and Learning: Implications for Work Group Effectiveness

**Richard L. Groesbeck**

## ABSTRACT

This research studies the effects of group stewardship and group learning on permanent work groups performing the core work and service processes in their organizations. Stewardship has been proposed as a potentially significant form of intrinsic motivation that causes people to act collectively in the best interests of their organization's stakeholders. However, stewardship has not been operationalized nor have its antecedents and consequences been empirically tested in prior field research. After defining group stewardship, the construct is shown to be distinct from related concepts such as psychological ownership and identification with the organization.

While previous research has studied the concepts of individual and organizational learning, the concept of group learning is just emerging in the group effectiveness literature. Group learning is shown to be a multidimensional concept including integration of external perspectives, within-group collaboration, and practical application through experimentation.

Within and between analysis (WABA) is utilized to determine which task, group and organizational constructs relate to the development of group stewardship at the individual, group and organizational levels of analysis. Four constructs, the need for analysis in doing the group's work, group potency, affective trust, and identification with the organization, are shown to be especially significant in developing group stewardship. Additionally, each of these four factors is shown to support different aspects of group learning. Finally, group stewardship is shown to be highly correlated with the presence of group learning, proactive behaviors, group performance, and employee job satisfaction.

# ACKNOWLEDGEMENTS

I would like to acknowledge the guidance and support from my committee members. Each has offered meaningful support. Their guidance has been helpful in defining and limiting the scope of this research. Their patience as I worked my way through a number of methodological issues associated with field research and multiple levels of analysis issues has been greatly appreciated. To Dr. Van Aken I express special gratitude for her encouragement, time spent reading through many drafts, the opportunity to work on projects that supported my research, and her help in protecting my time during the final stages of my dissertation.

I have been impressed by the responsiveness of many researchers working in areas related to my research topics and the methodologies I have used. Virtually every researcher I have contacted has shared insights, advice and encouragement. Bradley Kirkman was very helpful in sharing the research scales and factor analyses supporting his team empowerment research. Thomas Becker shared his field research instruments relating to identification and internalization of values. Tatiana Kostova shared the scales used to assess psychological ownership and insights from their use over the past ten years. Jon Pierce provided helpful insights into testing group stewardship and psychological ownership. James Davis offered encouragement and support for my definition of group stewardship. David Holman was especially helpful in offering suggestions to adapt the individual learning scales for group learning. He encouraged dialog and provided suggestions through the exploratory and confirmatory factor analysis stages of my work. Fred Dansereau, David Kenny, and Francis Yammarino offered helpful advice to deal with methodological issues.

Perhaps most of all, I gratefully acknowledge the support and sacrifice of my family. As intended, our move to Blacksburg has enabled me to be home more after years of corporate travel and pressures. However, I imagine none of us realized the length of time the dissertation process would require. My wife and children have sacrificed to adapt to our new lifestyle. Jackie has created a home where we all want to be. My four children have each accepted the responsibility to finance their own college educations as we became a family of students. To Jackie, Jef, David, Rebecca, and Sarah I say thanks for joining me in the journey, sharing the anticipation of completing this milestone, and, most of all, persistently working to become a family that will enjoy being together forever.

# TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

# An Empirical Study of Group Stewardship and Learning: Implications for Work Group Effectiveness

## CHAPTER 1 INTRODUCTION AND SCOPE OF RESEARCH

The purpose of this chapter is to introduce the research topic and the scope of the research. Following a review of the need for this research, the research questions, model, and hypotheses will be presented.

### 1.1 BACKGROUND

A review of the extent of adoption of innovative work practices concludes "a majority of contemporary U.S. businesses now have adopted some forms of innovative work practice aimed at enhancing employee participation such as work teams, contingent pay-for-performance compensation, or flexible assignment of multiskilled employees" (Ichniowski, Kochan, Levine, Olson, & Strauss, 1996, p. 325). From 1987 through 1996, the proportion of Fortune 1000 organizations utilizing some form of job enrichment or job redesign grew from 60 to 87% and the proportion utilizing self-managing work teams grew from 28 to 78% of organizations responding to the survey. The researchers compiling the study conclude "corporations consistently believe employee involvement produces positive results and that, . . . the more practices they use, the more positive are the results" (Lawler, Mohrman, & Ledford, 1998, p. 110).

While redesigning jobs so that employees are involved in managing their work through groups is one of the most common forms of work redesign being implemented, many groups experience problems and not all implementations are successful (Polley & Ribbens, 1998). While there do not appear to be studies of work group or team failure rates, some practitioners estimate the failure rate is about fifty percent (Fisher, 1994, also K. Fisher, personal communication, July 21, 2000). Similarly, depending upon the group involvement design used, 32 to 45% of respondents in Lawler et al.'s (1998) study reported they were undecided about the success of their redesign efforts. The researchers concluded these relatively high rates of undecided respondents indicated the difficulty of implementing the system-wide changes necessary for successful work groups and other employee involvement practices.

Researchers have conducted many studies attempting to explain the conditions necessary to implement and sustain the development of effective work groups, but have reached inconsistent conclusions. Cappelli and Rogovsky (1998) reviewed research on work reform designed to increase employee involvement. They found the studies are voluminous with considerable debate about the conclusions to be drawn. Many studies showed some improvement in employee satisfaction. However, the effects on performance ranged from no effect to strong effects.

## 1.2 CONTRIBUTIONS OF THIS RESEARCH

This research will contribute to the understanding of how work groups can be successfully implemented and maintained in two ways. First, this research aims to further the development of two group-level constructs, group stewardship and group learning, which should contribute to understanding how work groups function effectively. Secondly, several methodological issues contributing to apparently inconsistent findings in group effectiveness research results will be addressed. Appropriate use of research methodologies should enable researchers to better generalize their results while enabling other researchers to replicate or extend the original work.

### *1.2.1 Group Stewardship*

The rapid deployment of work groups into organizations to increase employee involvement and decision making and increased spans of control caused by organization de-layering create an increasing need for organizations to rethink traditional top-down, command and control systems (Spreitzer & Mishra, 1999) used to direct and align the efforts of employees. Given their knowledge of the work being performed, employees close to the work should have the ability to potentially make better decisions than their supervisors (Lawler, 1992a). However, managers face the question of how they can be confident employees will act in the best interest of the organization as they relinquish traditional forms of monitoring and controlling.

Numerous studies have been published relating to the factors that motivate employees and influence the basis and focus of their commitment. Agency theorists propose that employees act in their own self-interest to maximize their economic gains (Albanese, Dacin, & Harris, 1997; Davis, Schoorman, & Donaldson, 1997b). Graham and Organ (1993) propose a continuum of organizational relationships between employees and their organizations. At one

end of the proposed continuum, the transactional relationship is similar to agency theory; employees enter into an agreement specifying what services are to be rendered in exchange for benefits to be received. At the other end of their continuum in the covenantal relationship parties commit to the welfare of each other. The covenantal relationship is based more upon commitment to values and relationships than upon reciprocity or fairness. Such relationships tend to be of long duration and would be expected to result in employees working to improve the organizational context as well as perform the specified duties of their jobs. Stewardship theory (Davis et al., 1997b; Donaldson & Davis, 1991), a form of the covenantal relationship, posits that employees aligned with their organization through common values, commitment to the organization's welfare, and identifying with the organization will act in the best interests of the organization.

While some have written about individual stewardship, no work appears to have been published regarding group stewardship, a collectively held sense of responsibility to oversee and improve performance in the group's area of responsibility in accordance with the best interests of the organization. Such groups would be expected to learn, adapt to changing needs, and align themselves to work proactively. While Davis et al. (1997b) propose antecedents expected to promote development of stewardship, no empirical testing has been done to verify the proposed relationships. This research addresses the need to define and operationalize the concept of group stewardship and test a set of antecedents and consequences of group-level stewardship.

### *1.2.2 Group Learning*

Employee involvement through work groups is believed to be a means of helping organizations respond to turbulent markets where the need for new product features and pressures to reduce costs are increasingly common. Work groups can enable flexibility, coordinated efforts, and faster responses by moving decision making to the point where information is received and action must be taken.

Given the current rapid rate of technological change, effective organizations must be able to both generate learning and generalize it across the organization (Yeung, Ulrich, Nason, & Von Glinow, 1999). When ideas are not developed to their full potential or when learning is not generalized appropriately throughout an organization, knowledge "stockpiles" develop. Organizations that avoid knowledge "stockpiles" between individuals, groups, and the organization level through the free flow of learning are more effective (Bontis & Crossan, 1999).

Work groups can enable both the generation and generalization of learning. While cognition or intuiting is an individual activity, groups can facilitate the interpretation and integration of individuals' ideas to enable knowledge generation. Further, groups are often the means through which individuals have "voice" to generalize their ideas outward to the organization. The organization's role is to institutionalize learning and assure it is passed from the organizational level to work groups and individuals (Crossan, Lane, & White, 1999). Work groups can play a key role in effectively generalizing learning received from their organization. It is in work groups that group members collectively interpret new ideas and integrate them into their mental models and work practices.

Given the need for organizations to become more flexible and adaptive to change, it seems appropriate to determine to what extent the learning research can add to our understanding of how work groups can be more effective. Yet despite the apparent relevance of group learning to team effectiveness, to date little work has been done to explicitly build learning into models of work group effectiveness. The group effectiveness and learning literatures utilize "markedly different approaches and . . . lack . . . cross-fertilization between them" (Edmondson, 1999b, p. 350). A review of team effectiveness models from 1990 to 1996 (Cohen & Bailey, 1997) shows an emphasis on structure of work design, context (e.g., rewards and supervision), group composition, and to some extent, psychosocial traits (e.g., cohesiveness and norms). In contrast, a review of organizational learning literature from 1965 to 1993 (Crossan, Lane, White, & Djurfeldt, 1995) finds an emphasis on links between cognition and behavior as well as the interactions among people that lead to learning.

Although the role of work groups is critical in supporting organizational learning (Crossan et al., 1999), our understanding of learning in work groups remains limited (Edmondson, 1999b). Until recently, most researchers focused on the roles of individuals and/or organizations in learning. Some who did mention the group's role in learning considered its role primarily as a means of information transmission (Daft & Huber, 1987; Simon, 1991).

Recently work group learning has been more fully defined. Group learning has been defined as "a process through which a group creates knowledge for its members, itself as a system, and for others. . . .[It is] an interrelated set of processes in which collective thinking and action play a central role" (Kasl, Marsick, & Dechant, 1997, p. 229). Similarly, Watkins and Marsick define team learning as "the mutual construction of new knowledge and the capacity for

concerted, collaborative action" (Watkins & Marsick, 1996, p. 6). These definitions of group learning suggest the idea that learning includes both cognitive and action-oriented behaviors.

Given the need to integrate learning research into models of work group effectiveness, additional research is needed in several areas. First, further work is needed to operationalize the concept of group learning in a way that explicitly considers the cognition and action processes believed to be involved in group learning. Second, while Edmondson (1999b) tested a model relating group learning to group effectiveness, she calls for additional work to establish construct validity for psychological safety, control for the effect of both task and team types on learning outcomes, and study of a wider range of contextual and managerial factors influencing group learning. This research will address several of these research needs.

### *1.2.3 Group Research Methodological Issues*

The apparently inconsistent findings obtained from studies of work group effectiveness at least partially result from a failure to control for what is being studied or a failure to apply appropriate group-level research methodologies. This research is expected to contribute to group-level research methodology by addressing three needs evident in the group research.

1. Assuring the collection of people being studied is a true work group. Building upon the work of Hackman (1987), Guzzo and Shea (1990), and Bailey, Van Aken and Cohen (Bailey, Van Aken, & Cohen, 1998), the term work group could be limited to groups with task interdependence, shared responsibility for outcomes, and the sense of being an intact social entity. In this research, operational measures will be tested to screen work groups for "admission" to the research data set.
2. Describing work groups and the context within which they work. The type of group being studied needs to be described. Further, the context within which a group works may influence the way in which individuals work and group processes occur. A systematic way to describe the work groups do and the context within which they work (in addition to self-report survey data) would help researchers conduct follow-on research, assess generalizability, and potentially reduce analysis problems such as common method variance. As part of this research, a descriptive work group observation form will be developed and utilized. Data gathered from this form will be used to provide complimentary data not available from the survey as well as provide data from another source to cross-check and calibrate survey data.

3. Utilizing group-level analysis techniques. When individual responses are utilized to study group-level relationships, ideally two requirements should be met: justification for aggregating data to the group level of analysis and assurance that group-level correlation is being studied. Failure to do so could result in false conclusions that group level phenomena are being studied when in reality the hypothesized group-level relationship being studied is a lower (i.e., individual or dyad) or higher (i.e., work site or organizational) level effect.

   There is considerable debate over the best methodology to determine the appropriate level for aggregation. However, multi-level research methodologists concur with respect to the need to assess the degree of homogeneity among unit members prior to aggregation. Data with strong unit-level properties (i.e., $r_{wg}$, ICC(1), ICC(2), eta-squared) are presumed to reflect underlying characteristics of the level of unit being studied (Bliese & Halverson, 1998; Dansereau, Alutto, & Yammarino, 1984; James, 1982; James, Demaree, & Wolf, 1993).

   WABA will be utilized to determine the appropriate level of aggregation. The inferences drawn from the use of WABA will be contrasted with those made by utilizing $r_{wg}$ and ICC(1). A recent review seeking studies utilizing WABA analysis to assess relationships among group-level properties found only a few articles (Dansereau & Yammarino, 2000). The intent of using WABA in this research to assess the appropriate level of aggregation and test relationships among constructs is to contribute to understanding of the WABA methodology as well as the benefits of utilizing WABA versus other techniques.

### 1.3 RESEARCH PURPOSE

The primary purpose of this research is to further the development of two group-level constructs, group stewardship and group learning, that are believed to be critical to increasing our understanding of how work groups can be successfully implemented and maintained. To this end, these constructs will be developed, operationalized, and the research will be conducted to test hypotheses about the antecendents and consequences of these two constructs. To achieve this purpose, four underlying objectives need to be met.

- *Operationalize the concept of group stewardship for assessment using a field survey instrument.* A survey scale to assess stewardship at the group level of analysis will be developed and tested. Stewardship theory has been proposed as an individual-level

construct. Synthesizing findings from research studying commitment and work group effectiveness, stewardship theory will be extended to the group level of analysis.

- *Operationalize the concept of group learning for assessment using a field survey instrument.* While some work has been done to develop a group learning construct, current instruments do not differentiate between the two components of collective learning: cognition (e.g., creation of collectively held knowledge) and action (e.g., information gathering and experimentation to develop knowledge).
- *Propose the antecedents and consequences of group stewardship and group learning within the framework of a model of work group effectiveness.* This research will study the relationship between antecedents, group processes through which work groups function, and group effectiveness outcomes. In selecting antecedents, primary emphasis will be given to those suggested by the stewardship and learning literature.
- *Test the proposed constructs and related antecedents and consequences.* Data will be gathered from a sufficient number of "true" work groups performing the core work process in their organizations to validate the new constructs and test hypothesized relationships.

A second purpose of this research is to contribute to the methodology of group-level research. As suggested in section 1.2.3, a set of questions will be developed to assure the groups being studied are true work groups. Within and between analysis (WABA, Dansereau et al., 1984), an underutilized approach to testing multi-level theories, will be utilized to test several relationships.

## 1.4 RESEARCH QUESTIONS

The following questions will be addressed to achieve the research purposes.

**1)** How can group-learning theory inform group effectiveness theory?

Models of work group effectiveness and learning tend to utilize different approaches and lack cross-fertilization. The learning literature stresses the cognition-action link and antecedent conditions leading to effectiveness that could contribute to models of work group effectiveness

**2)** What is group stewardship?

An individual-level theory of stewardship has been proposed and discussed to a limited extent in the academic literature (Albanese et al., 1997; Davis, Schoorman, & Donaldson, 1997a; Davis et al., 1997b; Preston, 1998). Intrinsic motivation of

individuals to act in a way that is aligned with the best interests of the principals of an organization is a defining characteristic of stewardship that differentiates it from individuals acting as agents in their own self-interest (Davis et al., 1997b). However, neither a clear definition nor a means to operationalize stewardship for field testing has been developed. A definition of group stewardship is needed.

**3)** How can the concept of group stewardship inform group effectiveness theory?

Individual stewardship theory suggests several conditions likely to promote the development of stewardship. If the presence of group stewardship can be found in organizations studied in this research, the means and extent (e.g., direct, indirect, or insignificant) to which stewardship influences work group effectiveness processes and outcomes will be examined.

**4)** Under what circumstances is the presence of group stewardship and group learning associated with increased levels of work group effectiveness?

The effect of group stewardship and learning on group effectiveness is likely to depend upon task, group, and organizational design factors. For example, where work is highly routine with little need for creativity, the extent of group learning capability may not be correlated with work group effectiveness. Similarly, the degree of opportunity for group members to meaningfully impact either core job processes or the context surrounding job processes is likely to affect the extent to which group stewardship significantly influences effectiveness outcomes.

**5)** What are the relationships among factors supporting the development of group learning and stewardship?

For example, which factors act directly to promote learning and which factors work indirectly through stewardship to promote group learning?

**6)** To what extent are group stewardship and the perceived performance-recognition linkage correlated with group effectiveness?

Stewardship theory suggests intentions to perform are based primarily upon affect and commitment to act in the best interest of the organization vesting responsibility to act. Agency theorists posit the perceived performance-recognition linkage activate the motivation of agents to act in ways that maximize their personal return for work rendered (Davis et al., 1997a; Davis et al., 1997b).

## 1.5 THE OPERATIONAL RESEARCH MODEL

Many models of work group effectiveness may be characterized as input – process-output models. For example, Gladstein's (1984) model of work group effectiveness proposed group and organizational input variables influence group effectiveness directly as well as indirectly through group process variables. Task design (e.g., task complexity, environmental uncertainly, and interdependence) was proposed as a variable that moderates the effect of group process on group effectiveness.

Moving away from the relatively simple input-process-output models, Cohen and Bailey (1997) suggested a heuristic model of group effectiveness with input variables influencing outputs directly, but also indirectly through both processes and group psychosocial traits such as norms and shared mental models. See Figure 1.1. Their model suggests group processes influence and are influenced by psychosocial traits, what people feel and think.

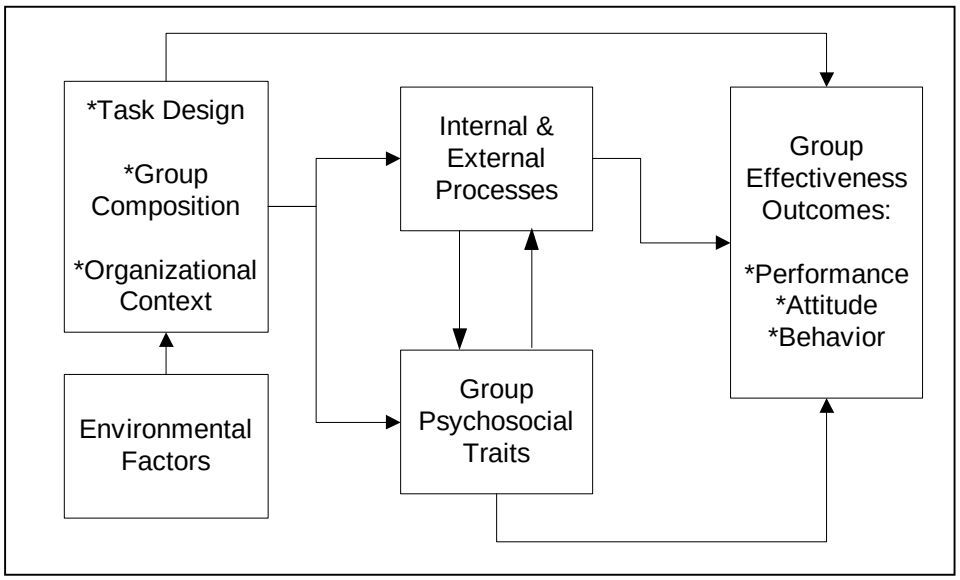



**Figure 1.1. Heuristic Model of Group Effectiveness** (Cohen & Bailey, 1997, p. 244)

Similar to earlier models of work group effectiveness, the model to be tested in this research proposes that task design, group, and organizational factors primarily act indirectly to influence effectiveness outcomes. Several research streams suggest antecendent conditions work together to create expectations which influence the behaviors that drive group effectiveness. Reasoned action theory posits that attitudes, norms and perceived behavioral control are antecedents leading to the formation of intentions to act (Ajzen & Fishbein, 1980). The theory

also posits that when intentions are clearly formed, intentions will influence behaviors (Bagozzi & Yi, 1989). Shared mental models create shared expectations about what a group will do and how it will act. Research found group processes fully mediate the effect of shared mental models on group effectiveness (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000). Similarly, commitment research reports generally small correlations between employee commitment and job performance. Mowday, Porter and Steers (1982) concluded that commitment is likely to influence the effort or behaviors of employees which in turn should lead to improved effectiveness.

Figure 1.2 shows the proposed research model tested in this research. The decision box (is it a true work group?) show the decision criteria proposed to screen the groups for inclusion in this study. The model suggests that task design, group and organizational context support the development of group stewardship, a collectively held sense of responsibility to oversee and improve performance in the group's area of responsibility in accordance with the best interests of the organizational. Group stewardship in turn is posited to lead to two group behaviors: group learning and proactive behaviors. Group learning and proactive behaviors are expected to lead to higher levels of group effectiveness including performance, customer satisfaction, and employee job satisfaction.

## 1.6 RESEARCH HYPOTHESES

The research questions lead to several research hypotheses to be tested in the proposed research. The hypotheses are noted in Figure 1.2 and described below.

***Research Hypothesis 1: Supportive task, group, and organizational context are positively associated with the presence of group stewardship.***

Clearly additional antecedents could be added to those shown in the research model. The task, group, and organizational context factors chosen were selected from the most prominent factors indicated in the group effectiveness, stewardship, and learning literature. While the model tested needs to be multifaceted, the number of factors chosen needs to be constrained so that the statistical power of the research methods used will be able to detect significant factors.

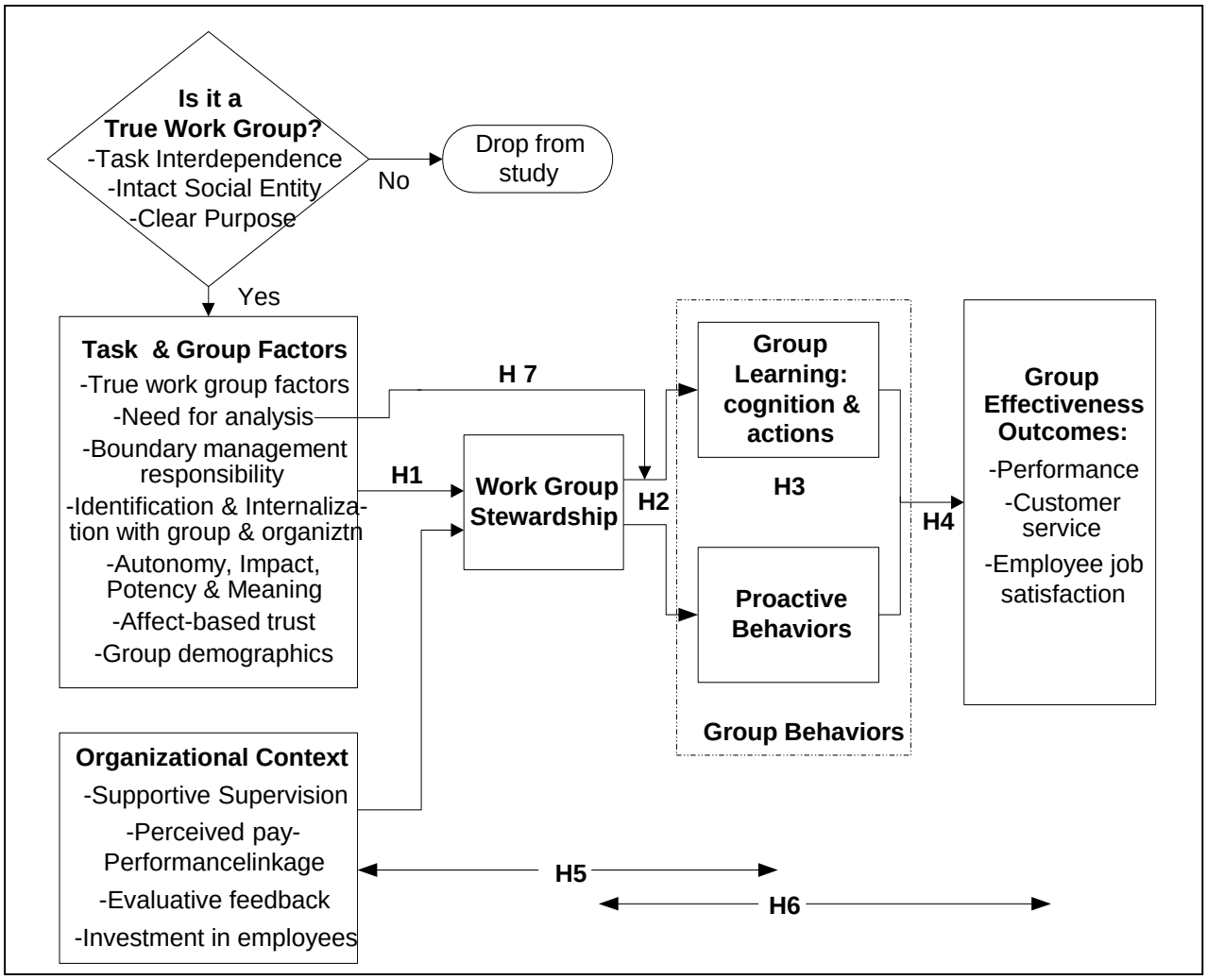



**Figure 1.2. Proposed antecedents and consequences of group stewardship and learning**

Stewardship theory (Davis et al., 1997b) proposes antecedents that will support development of intrinsic motivation and affective relationships. Kirkman and Rosen's (1999) model of self-directed team effectiveness proposes that group empowerment is comprised of four related dimensions: autonomy, meaning, impact and potency. In this model these four task and group design factors are treated as antecedents that support development of intrinsic motivation as suggested by Thomas and Jansen (1996). When coupled with other antecedents such as internalized group and organization values and internalized values (Becker & Billings, 1993; Becker, Billings, Eveleth, & Gilbert, 1996), it is proposed that these factors will support development of the group acting collectively as stewards and engaging in concerted, collective learning behaviors.

***Research Hypothesis 2: Group stewardship is positively associated with the presence of group learning and proactive behaviors.***

Group stewardship does not appear to have been defined in the scholarly literature. The proposed definition of stewardship is drawn from theories of stewardship at the individual level of analysis (Davis et al., 1997b) and two-way covenental relationships (Deckop, Mangel, & Cirka, 1999; Van Dyne, Graham, & Dienesch, 1994) as well as practitioner stewardship literature (Block, 1996; Covey, 1998). For purposes of this research, group stewardship will be defined as a collectively held sense of responsibility to oversee and improve performance in the group's area of responsibility in accordance with the best interests of the organization. Stewards feel a clear charge to act in behalf of those in the organization who have entrusted them with their responsibilities. The greater the presence of group stewardship, the greater the likelihood a work group's effort will be applied toward it's responsibilities. The increased effort is expected to manifest itself through collaborative learning and proactive behaviors.

***Research Hypothesis 3: Group learning consists of two distinct but related dimensions.***

As described in section 1.2.2, several researchers have proposed that group learning consists of cognition and action processes. Group learning has been defined as "a process through which a group creates knowledge for its members, itself as a system, and for others . . .. [It is] an interrelated set of processes in which collective thinking and action play a central role" (Kasl et al., 1997, p. 229). Watkins and Marsick define group learning as "the mutual construction of new knowledge and the capacity for concerted, collaborative action" (Watkins & Marsick, 1996, p. 6). These definitions build on an early definition of organizational learning as "the process of improving actions through better knowledge and understanding" (Fiol & Lyles, 1985).

***Research Hypothesis 4: Group learning and group proactive behaviors are positively associated with group effectiveness outcomes.***

Research has shown that group learning is associated with higher group performance levels (Edmondson, 1999b; Kirkman & Rosen, 1999). This is to be expected, as learning is associated with the creation of new ways to do work and concerted collective actions. Research has also found that proactive group behaviors are correlated with group performance, job satisfaction, and customer service (Kirkman & Rosen, 1999).

***Research Hypothesis 5: Group stewardship mediates the relationship between antecedent factors and both learning and proactive behaviors.***

The task design, group and organizational conditions in the model work together to create a shared mental model of group stewardship. Shared mental models create collectively held expectations about how a group will perform teamwork processes (Mathieu et al., 2000). The antecedent conditions work through group stewardship mental models to increase the level of group learning and proactive group behaviors.

***Research Hypothesis 6: Group learning and proactive group behaviors mediate the relationship between group stewardship and effectiveness.***

Expectations and commitment do not work directly to influence outcomes (Mowday et al., 1982). Recent research found shared mental models increase group effectiveness by improving work group processes (Mathieu et al., 2000). Hence, shared mental models of stewardship would be expected to increase the level of group effectiveness indirectly through more effective group processes such as learning and proactive behaviors.

***Research Hypothesis 7: Task design moderates the effect of group stewardship on group learning behaviors.***

When work is highly repetitive and complexity is low, there may be relatively little opportunity for improvement. Group activities require group members to spend time away from their core work in collaborative activities causing group process losses (Polley & Van Dyne, 1994). While shared mental models of stewardship will increase group efficiency (Klimoski & Mohammed, 1994), with routine tasks requiring little analysis in a stable work environment, gains improved group processes may not be sufficient to offset the time spent away from work in group activities.

## 1.7 PREMISE AND DELIMITATIONS

This section lists the assumptions made in developing the research questions. Then the delimitations, what the research will not attempt to accomplish, will be described.

### *1.7.1 Premises*

- There is an opportunity to inform models of work group effectiveness through integration of ideas from the learning literature.
- Given changes in organizational structuring such as delayering and the increased use of work groups, there is a need to understand how stewardship fits into models of work group effectiveness.
- Stewardship theory has been developed as a construct at the individual level of analysis. Research is needed to define and operationalize the construct at the group level of analysis.
- Field-based survey research should be used to assess natural work groups, those that exist independent of the researcher's activities and purposes (Guzzo & Shea, 1990) rather than lab experimentation.

### *1.7.2 Delimitations*

One reason studies of groups fail to find expected results or produce conflicting conclusions is the failure to delimit the collectives called groups and the type of work performed by the group. This research will be limited to natural work groups meeting a group definitional requirement. A distinction between the terms group and team will not be drawn although the term group will be used.

- Group definition. Drawing from the work of Hackman (1987) and reviews by Cohen and Bailey (1997) and Guzzo and Shea (1990), in this study the term group will be limited to groups that meet three criteria:
    1. Group members are interdependent in their tasks. "A group is two or more persons who are interacting with one another in such a manner that each person influences and is influenced by each other person" (Shaw, 1981, p. 8).
    2. Group members share responsibilities for outcomes. "Our interest is in *real* groups with a *task* to perform in an *organization*" and "Central to any group, according to Bion (1961), is its primary task. Every group, however casual, meets to do

something, to fulfill some function or set of functions, and this primary task provides the reason for the group's existence" (Guzzo & Shea, 1990. p. 272 and 274).

3. Group members are perceived to be an entity by the group's members and those familiar with it. "As long as members perceive that they are in a group, issues of norms and expected behaviors come into play" (Love & Macy, 2000, p. 4).

While some researchers have added the requirement that groups must manage work across organizational boundaries (Cohen & Bailey, 1997), this requirement will not be a criteria used to "admit" groups to the study. Rather, the extent of managing across boundaries will be assessed as part of task design that in turn is expected to influence group processes.

- The study will be limited to natural work groups (called work teams in Cohen & Bailey, 1997) involved in performing the core work process (or service) in their organization. Other group types, management, design, cross-functional, and ad hoc teams will not be studied.

## 1.8 JUSTIFICATION FOR THIS RESEARCH

Justification of this research for an Industrial Engineering dissertation requires demonstrating that the research will contribute to the body of knowledge being studied and that the problem being studied is an industrial engineering problem. The need to integrate group learning, establish a group level definition of group stewardship, and consider how stewardship fits into models of group effectiveness has already been described. The nature of this research as an industrial engineering problem and a management systems engineering problem will be presented next.

> Industrial engineering is concerned with the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy. It draws upon specialized knowledge and skill in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design to specify, predict, and evaluate the results to be obtained from such systems (Turner, Mize, Case, & Nazemetz, 1993, p.18).

Clearly the problem being studied is a multi-disciplinary problem dealing with the integration of systems, people, information, and task design. Completion of the research will contribute to improving models of work group effectiveness that can be applied to engineering human-machine-information systems to improve the effectiveness and satisfaction of work groups. The management systems engineering model (Kurstedt, Pedro, & Kwang, 1988)

describes a process through which the engineering philosophy can be applied to engineer information requirements, decision tools, and work processes.

# CHAPTER 2 REVIEW OF THE BODY OF KNOWLEDGE

This research studies the effectiveness of permanent work groups performing the core work processes within their organization. The study of the potential roles of group stewardship and group learning differentiate this research from earlier group effectiveness research. As the construct of group stewardship is being proposed and group learning is an emerging construct, this chapter will serve several purposes:

- Review the work group effectiveness literature (Section 2.1).
- Review relevant literature and propose the concept of group stewardship with its expected antecedents and potential contributions to group effectiveness (Section 2.2).
- Refine the concept of group learning and its role within the organization. The roles of individual, group and organizational learning will be described. Finally, needs for further research in group learning, including refinement of the construct, will be described (Section 2.3).

## 2.1 GROUP EFFECTIVENESS LITERATURE

This section reviews the prevalence of work groups and the purposes groups are expected to achieve when organizations utilize them. Following a description of what constitutes a work group and the types of work groups, the focus will narrow to models of effectiveness for the type of groups being studied. Based upon the current state of group effectiveness models, research needs for group effectiveness arising from contemporary management issues will be identified. The overall organization of this section is shown below.



### *2.1.1 The Prevalence of Work Groups*

Four major studies of organizations have contributed to our understanding of the extent to which employee involvement practices are being utilized in the U.S., the rate at which practices are increasing, and the types of organizations most likely to adopt them. The Center for

Effective Organizations conducted a series of studies of U.S. Fortune 1000 companies in 1987, 1990, 1993, and 1996. These studies are summarized in their 1998 publication (Lawler et al., 1998). Osterman (1994) published results from a 1992 study of 694 U.S. manufacturing establishments as well as a follow up survey in 1997 (Osterman, 2000). Gittleman, Horrigan, and Joyce (1998) examined 1993 U.S. Bureau of Labor Statistics data from 5,987 establishments. Hunter (2000) used 1994 data from the U.S. National Establishment Survey from 2,285 establishments. As the studies used different sampling techniques and gathered different data, they cannot be directly compared. However, taken together they do give a reasonably consistent view that the use of employee involvement practices including work groups is widespread and growing.

Lawler et al.'s (1998) study of Forturne 1000 companies focused on three management paradigms: employee involvement, total quality management, and process reengineering. Approximately 50% of the companies studied were from the manufacturing sector. The average organization size monotonically increased from 9,200 in 1987 to 14,749 in 1996. The response rates for these surveys were 51% in 1986, 32% in 1990, 28% in 1993, and 22% in 1996. The surveys were completed by senior managers who responded for the entire organization.

The use of employee involvement practices in Fortune 1000 companies appears to be increasing over the period covered by the surveys. The study reviewed the use of both parallel structures where employees have input into problem-solving and power-sharing structures where employees have varying degrees of responsibility to influence the work done by their group. As shown in Table 2.1, the use of parallel and power-sharing work structures has been increasing.

While a majority of firms appear to be using some form of employee involvement, the proportion of employees covered by the practices remains much lower. For example, in 1996 while 78% of the organizations surveyed were using self-managed teams, only 9% of firms responding had 41 percent or more of their employees involved in self-managing teams. Overall, 17% of employees were in job involvement groups such as self-managing teams. (See Table 2.2.) The researchers suggest that while the percentage of firms utilizing employee involvement is large and growing, the relatively low proportion of employees involved may indicate that organizations are still experimenting with how to utilize these forms of involvement. Additionally, at least in the Fortune 1000 organizations responding, the less complex forms of involvement requiring the least amounts of organizational change were most frequently used.

**Table 2.1. Use of Employee Involvement Practices in Fortune 1000 Companies**

| Type of Practice | Year | % Organizations Using the Practice | % with >40% Employees Covered by Practice |
|---|---|---|---|
| **Parallel-structure** | | | |
| Quality Circles | 1987 | 61 | 10 |
| | 1990 | 66 | 13 |
| | 1993 | 68 | 15 |
| | 1996 | 68 | 12 |
| Employee Participation Groups other than Quality Circles | 1987 | 70 | 15 |
| | 1990 | 86 | 22 |
| | 1993 | 91 | 35 |
| | 1996 | 94 | 38 |
| **Power-Sharing Practices** | | | |
| Job Enrichment or Redesign | 1987 | 60 | 11 |
| | 1990 | 75 | 9 |
| | 1993 | 82 | 18 |
| | 1996 | 87 | 25 |
| Self-managing Work Teams | 1987 | 27 | 1 |
| | 1990 | 47 | 1 |
| | 1993 | 68 | 5 |
| | 1996 | 78 | 9 |
| Minibusiness Units | 1987 | 25 | 2 |
| | 1990 | 28 | 2 |
| | 1993 | 44 | 8 |
| | 1996 | 60 | 12 |
| Source: (Lawler et al., 1998, Tables 6.1 and 6.2) | | | |

**Table 2.2. Percentage of Employees Covered by Different Involvement Approaches**

| Type Involvement | Description | 1993 | 1996 |
|---|---|---|---|
| None | No significant involvement | 37 | 36 |
| Improvement Teams | Groups that recommend improvements to management | 31 | 26 |
| Job Involvement | Highly motivating designs such as self-managed work teams responsible for their work processes. | 12 | 17 |
| Business Involvement | Employees heavily involved in the management of mini business units. Reward innovations are used. | 10 | 12 |
| Other forms of involvement | Other than described above | 9 | 10 |
| Source: (Lawler et al., 1998, Table 7.1) | | | |

Osterman (1994; 2000) utilized 1992 and 1997 surveys of establishments in the private for-profit section with 50 or more employees to assess the prevalence of four innovative work practices. Within an organization, an establishment was a location at which work processes were

performed. For example, each automobile assembly plant within GM was a separate establishment. Those conducting the survey worked to identify a knowledgeable person within each establishment, not necessarily the senior manager, to complete the survey. The response rates were 65.0 % in 1992 and 57.7 % in 1997.

Table 2.3 shows the degree to which each labor practice was found in 1992. Self-directed work teams had the highest level of use. Overall there was no consistent set of practices that tended to be used together. In non-manufacturing establishments in which the core employees were not blue-collar there was evidence of an "anchoring" practice; 71.7% of those using at least one practice were using teams. However, among blue-collar manufacturing employees there was no clear anchor practice; job rotation came the closest to being an anchoring practice with 56.3% of respondents using job rotation when one or more practices were used. Finally, only 37% of respondents were using more than one innovative practice.

**Table 2.3. The extent of Use of Innovative Work Practices in 1992**

| | Percentage at Any Level of Penetration | | Percentage at 50% or Higher Penetration | |
|---|---|---|---|---|
| Type of Practice | All Establishments | Manufacturing Establishments | All Establishments | Manufacturing Establishments |
| Self-directed Work Teams | 54.5 | 50.1 | 40.5 | 32.3 |
| Job Rotation | 43.4 | 55.6 | 26.6 | 37.4 |
| TQM | 33.5 | 44.9 | 24.5 | 32.1 |
| Problem-solving Groups (Quality Circles) | 40.8 | 45.6 | 27.4 | 29.7 |
| None | 21.8 | 16.0 | 36.0 | 33.2 |
| Source: (Osterman, 1994, Table 2) | | | | |

Osterman (2000) found the penetration of innovative work practices generally increased between 1992 and 1997. Of the 787 establishments participating in the 1992 survey, 457 also participated in 1997. For the establishments participating in both surveys, while the use of all innovative work practices increased, the use of self-directed work teams increased only very slightly while the use of other practices approximately doubled (see Table 2.4). Osterman also found that of the establishments with at least half of their employees involved in self-directed work teams in 1992, only 48.4% had maintained that level of involvement in 1997. In contrast,

of those with at least 50% of their employees involved in quality circles and TQM in 1992, 85.8 % and 76.0 % respectively had maintained that level in 1997. At least for those participating in Osterman's study, it would appear that both the rate of initiating the use of self-directed work teams as well as the extent to which they are maintained is lower than for other work practices studied.

**Table 2.4. The Use of Innovative Work Practices in 1992 versus 1997.**

(The percentage of establishments with 50% or more of employees using a work practice for establishments responding to the survey in both 1992 and 1997.)

| Type of Practice | 1992 | 1997 |
|---|---|---|
| Self-directed Work Teams | 39.8 | 41.4 |
| Job Rotation | 23.8 | 47.3 |
| TQM | 23.6 | 51.1 |
| Problem-solving Groups (Quality Circles) | 29.3 | 58.7 |
| None | 35.2 | 14.6 |
| Source: (Osterman, 2000, Table 1) | | |

Gittleman et al. (1998) utilized the most comprehensive set of respondents to assess the extent of what they called alternative work practices. They used Bureau of Labor Statistics data from a survey assessing training provided by private non-agricultural establishments. The unit of analysis was the establishment rather the parent organization. The sample was stratified by industry size to permit nationally representative estimates within size or industry categories. The response rate was 71.3% for the 12,000 surveys mailed out resulting in 5,987 surveys containing information about organizational work. Line or training managers completed the survey. The following definitions were given for each work practice.

- Worker teams: small intact groups of workers whose members have the authority to handle internal processes as they see fit to generate a specific product, service or decision.
- TQM: an approach in which the core ideas include doing things right the first time, continuous improvement, and meeting customer needs.
- Quality Circles: generally voluntary groups brought together to come up with solutions to problems.

- Peer review of employee performance. A system in which employee's work performance is evaluated at least in part by co-workers.
- Employee involvement in technology and equipment purchase decisions: employees have a say in technology and equipment-purchase decisions that affect them.
- Job rotation: employees rotate between different jobs.

The survey results provided a view of work practice prevalence across industry types and establishment size. Manufacturing establishments were most likely to utilize alternative work practices with 56% utilizing one or more practices. Penetration of practices also increased with organization size (see Table 2.5). The presence of a union did not influence the degree of practice usage. Worker teams were used by 14.2% of all establishments and 32.0% of establishments with 50 or more employees. Only 21.5% of all respondents used more than one practice. Among establishments with 50 or more employees, 44.7% used two or more practices. Cluster analysis failed to find any noteworthy sets of practices that tended to be used in conjunction with each other.

Hunter (2000) obtained data from a survey of 4,000 establishments. The response rate was 72% with 2,285 usable surveys. The sampling frame oversampled establishments with over 100 employees. The primary respondent of the phone survey conducted by U.S. census workers was the plant manager. The study found the following percentages of establishments utilizing each of five innovative work practices: TQM 56.5%, teams 41.3%, job rotation 48.8%, job sharing 26.6%, and flextime 34.8%. Teams were used in 46.1% of manufacturing establishments versus 33.8% of service sector establishments.

Looking across these four studies, some conclusions can be drawn. First, it appears that larger establishments are more likely to be utilizing employee involvement practices than smaller establishments. The Lawler et al. (1998) study appears to show a much higher incidence of involvement practices than the other two studies. This presumably occurred because of the large size of organizations in the sample and because the Lawler study used the organization level unit of analysis while the establishment was the unit of analysis in the other surveys. The prevalence of employee involvement practices may not be as wide spread as suggested by the Lawler study.

**Table 2.5. Alternative Work Practices by Establishment Size Using Sample Weights**

| Establishment Size | % with Any Practice | Average Number Practices | % of Establishments (N=5,987) |
|---|---|---|---|
| All | 42.0 | 0.80 | 100.0 |
| 1-49 employees | 39.8 | 0.74 | 92.5 |
| 50-99 employees | 64.3 | 1.36 | 3.9 |
| 100-499 employees | 74.9 | 1.73 | 3.2 |
| 500-999 employees | 72.2 | 1.78 | 0.3 |
| 1,000 + employees | 80.0 | 2.29 | 0.2 |
| Source: (Gittleman et al., 1998, Table 3) | | | |

Secondly, it appears that organizations may still be experimenting with the implementation of employee involvement practices, or the use of work groups may not be deemed appropriate for all situations. This conclusion may be supported by the fact that while a high percentage of organizations report use of problem-solving or self-managed teams, the actual proportion of employees involved appears to be much lower.

Third, it appears that organizations are more likely to utilize the easier-to-use employee involvement practices rather than these requiring deeper, system-wide changes. Suggestion programs, parallel teams, and job rotation are more frequently utilized across manufacturing and services organizations regardless of establishment size.

Fourth, and most important for this research, it does not appear that there is a clearly understood approach for the establishment and maintenance of employee involvement work practices. This appears to be indicated by the lack of consistency in the sets of work practices and enabling human resource practices being used, even within the same industry or size class (Gittleman et al., 1998). Establishments engaged in benchmarking (Hunter, 2000) and those that are engaged in international markets (independent of the level of competition) (Osterman, 1994) are more likely to utilize work groups – possibly because they are more aware of what other companies are doing and trying to imitate successful practices. However, the general failure to use complementary sets of work practices and provide a supportive human resource context would seem to indicate that organizations have not learned how to effectively utilize work groups.

### *2.1.2 Factors Influencing the Prevalence of Work Teams*

Several factors appear to correlate with the presence of innovative or flexible work practices. Gittleman et al. (1998) found the use of flexible work practices was significantly and positively related to the implementation of new technology within the previous year. Osterman (1994) found the use of flexible work practices was most strongly correlated with establishment managers who valued employees' social and economic welfare. Other factors Osterman found with a significant positive correlation to flexible work practices included selling in international markets and the need for relatively high skill levels. Lawler et al. (1998) studied the correlation of business strategy with the presence of employee involvement practices. They found organizations with a strong customer focus, the need to increase speed in bringing products to market, build knowledge and intellectual capital, ensure high quality levels, and be a technology leader were more likely to utilize employee involvement.

However, while organizations do use employee involvement to improve the way they execute their strategies, they do not seem to be using employee involvement practices to develop new strategies. Lawler et al. (1998) found organizations seeking to respond quickly to market changes are using reengineering but not employee involvement practices. Similarly Hunter (2000) found the extent to which establishments compete on the basis of innovation was correlated with benchmarking but not with the use of work groups.

The lack of use of work groups to facilitate creative learning for innovation may reflect an emergent problem with the use of groups that calls for further research. A diversity of ideas within groups can lead to creativity. However, without adequate training and supportive structures, groups are often beset by the problems of diversity without gaining its benefits. Further, work groups can become inwardly-focused closed systems that do not adequately incorporate external or environmental information (St. Clair, Quinn, & O'Neill, 2000, p. 260).

While some work has been done on the effect of boundary spanning activities (Ancona & Caldwell, 1992), apparently no work has been done on feedback at the group level of analysis (Stewart, 2000). There is a need to understand how groups can be structured and developed to be aware of their environment and respond quickly to changes in the marketplace. Study of feedback to create situation awareness and creation of shared mental models within work groups to enable rapid, effective decision making are emerging areas of study that address this need (Muniz, Bowers, Stout, & Salas, 1998).

### *2.1.3 Types of Work Groups*

There are many types of employee involvement practices that bring employees together into work groups. For example, Lawler et al. (1998) use the term employee involvement to include a variety of group processes including quality circles, suggestion involvement, improvement teams, self-managed teams, and minibusiness units. Other terms used include participative management, empowerment, semi-autonomous teams and high commitment teams or workgroups. Many of these terms are used interchangeably. Employee involvement does imply involving employees in decision making whether or not the authority to actually make the final decision is delegated to the individuals being consulted.

This research is intended to further our understanding of employee involvement through the use of work groups or teams. The definition of what a work group is has evolved over the past twenty-five years. Many definitions tracing their roots back to the definition offered by Alderfer (1977). Several definitions that have been proposed by researchers beginning with Alderfer are listed in Table 2.6.

As the interest in employees involvement has increased, the use of the terms team and work group have been loosely applied to many types of collections of individuals resulting in confusing and conflicting results in studies. The domain being studied needs to be delimited to specify the type of collective being studied so that more consistent research findings will obtained (Stout, Salas, & Fowkles, 1997). Building on these definitions, the definition of groups that will be used in this research was given in section 1.7.2: *A collection of individuals that are interdependent in their tasks, share responsibilities for outcomes, and are perceived to be an entity by the group's members and those familiar with it.*

Some researchers have suggested a collection of individuals begin working together as work group and develop into a real team as they become more effective (Jones & Bearley, 1994; Katzenbach & Smith, 1993). Others suggest that work groups who meet the definitional requirements of task interdependence, shared outcomes and recognition as an entity but do not interact dynamically or interdependently are still teams – they are simply ineffective teams (Stout et al., 1997). In this research, no distinction between the terms work group and team will be made. The term work group will be used to describe collections of individuals who meet the work group definitional criteria presented in section 1.7.2.

**Table 2.6. Team and Work Group Definitions**

| Term | Definition | Source |
|---|---|---|
| Real Team | Bounded social systems whose members are interdependent for a shared purpose, and who interact as a unit with other individuals and groups in achieving that purpose. | (Alderfer, 1977) |
| Work Team | An identifiable social system in which members have interdependent relations with one another, in which differentiated roles develop over time, and which is perceived as a group both by members and non-members…has a defined piece of work to do that results in an identifiable product, service or decision for which the group is held accountable…has the authority to manage it's own internal processes to generate the group product, with members planning and laboring collectively to get the group task accomplished. | (Hackman & Oldman, 1980) |
| Real Group | Perceived to be an entity by its members and by nonmembers familiar with it; its members have significantly interdependent relations and are dependent upon one another to realize shared outcomes; members have differentiated roles in the group. | (Hackman, 1982) |
| Work Teams | Small groups of interdependent individuals who share responsibility for outcomes for their organization. | (Sundstrom, De Meuse, & Futrell, 1990) |
| Team | A distinguishable set of two or more people who interact, dynamically, interdependently, and adaptively toward a common and valued goal/objective/mission, who have each been assigned specific roles or functions to perform, and who have a limited life-span membership. | (Salas, Dickenson, Converse, & Tannenbaum, 1992) |
| Team | A small number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they hold themselves mutually accountable. | (Katzenbach & Smith, 1993) |
| Tea m | A group of individuals who work together to produce products or services for which they are mutually accountable. | (Mohrman, Cohen, & Mohrman, 1995) |
| Team | A collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems, and who manage their relationships across organizational boundaries. | (Cohen & Bailey, 1997) |

Work groups can further be delimited to specify features such as the type of work being done, the level of individuals involved and the duration of the group's existence. Table 2.7 provides three of many typologies that are helpful in describing work groups. While these typologies are helpful is describing a work groups, it is not always possible to clearly place a group into one of the group typologies. For example, groups may have more than one type of interdependence. Classifying groups as temporary or permanent may be difficult. However the typologies do provide a set of terms that can be used to specify the type of group being studied while recognizing that in some cases measuring along a continuum between factors may be necessary. Using these factors, the groups studied in this research will be permanent work groups dedicated to producing their organization's core product or service. The type and level of interdependence will be one of the factors assessed.

**Table 2.7. Types of Groups** (Adapted from Shaw & Schneier, 1995, p. 36)

| Factors | Types | Source |
|---|---|---|
| ▪ Type of work<br>▪ Sharing of power & information with teams<br>▪ Duration & longevity | **Parallel** – perform problem-solving & improvement tasks.<br>**Project –** diverse knowledge workers conducting projects for a defined, extended period.<br>**Work** – self-contained unit producing product or services<br>**Management** – coordinate & provide direction to sub-units. | (Cohen & Bailey, 1997; Lawler & Cohen, 1992) |
| ▪ Task interdependence<br>▪ Level of supervision<br>▪ Diversity of task requirements | **Pooled group** – roles of members equivalent (e.g., word-processing pool)<br>**Sequential team** – roles are in a prescribed order (e.g., assembly line)<br>**Reciprocal teams** – roles are complementary (e.g., R&D) | (Montemayor, 1994) |
| ▪ Amount of work done on a team<br>▪ Duration of team | **Permanent/dedicated** – focus on common core process, customer base<br>**Temporary/dedicated** – address urgent issues, solving specific problem<br>**Permanent/nondedicated** – cross-functional issues requiring on-going, part-time attention<br>**Temporary/nondedicated** – ad hoc team for solving problem | (Saunier & Hawk, 1994) |

### *2.1.4 Measures of Work Group Effectiveness*

Definitions of work group effectiveness suggested by researchers generally fall into three categories: the group's productive output, contribution to the growth or well-being of group members, and the degree to which the process of carrying out the work increases the viability or capability of group members working together in the future (Campion, Papper, & Medsker, 1996; Cohen & Bailey, 1997; Cohen, Ledford, & Spreitzer, 1996; Hackman, 1990). Measures of productive output typically include quality, productivity, costs, cycle time, and safety. Output may be subjectively assessed by employees or managers. When available, objective measures of performance for quality, quantity, and etc. may be utilized. However, obtaining objective comparable measures across work groups is often difficult. Measurements of contribution to the well-being of group members or quality of work life may include assessments of job satisfaction,

growth needs satisfaction, and commitment to or trust in management. Measures of group viability may include withdrawal behaviors such as short-term absenteeism or turnover.

Bowen and Lawler (1995) suggest the most significant reason to redesign work to empower employees is to create sustainable competitive advantage. They suggest the advantage to be gained comes not from product or service characteristics, but from the way the product is delivered to satisfy customers. Objective indicators related to customer satisfaction include response times or the proportion of on-time deliveries. Subjective measures related to customer satisfaction include perceptions of the extent to which customer problems are worked out in a timely manner, the proportion of complaints and requests are resolved, and overall perceptions of customer service (Kirkman & Rosen, 1999).

Dunphy and Bryant (1996) and Pasmore (1988) suggest innovation may be one of the greatest competitive advantages potentially resulting from the use of work groups. Innovative capability is indicated by strategic and operational flexibility, problem-solving capability, and development of new technology. Objective innovation indicators could include time from concept to manufacture, the proportion of sales from products or services less than three years old, or savings from problem-solving group projects. Subjective assessments of innovation could include perceptions of the extent to which a group develops new ideas, procedures, or solves problems (Quinn, 1988).

### *2.1.5 Group Effectiveness Models*

There are many bodies of literature relevant to groups that could be reviewed and form the basis for a research study. For example, sociotechnical theory considers joint optimization of the technological systems used in production and the social systems linking the operators of the system within an open system (Taylor & Felton, 1993). Sociopsychological research focuses on the interaction patterns among group members and their task performance (Steiner, 1972); the interaction process is the key mediator between member inputs and group outputs within a closed system. The work group effectiveness literature places emphasis on effectiveness as the key dependent variable. Many group effectiveness models have their roots in other bodies of literature such as the sociotechnical or sociopsychological schools of thought.

Guzzo and Shea (1990) note the appearance of work group effectiveness models marked an important shift in group dynamics research. Much earlier research focused on what could be learned from social psychological research that would be useful in understanding the

effectiveness of groups. The group effectiveness literature seeks to identify the features of organizations, jobs design, and group design that influence the effectiveness of groups.

The purpose of this section is to briefly review the most significant models of group effectiveness relevant to the types of work groups to be studied in this research. Section 2.2 on group stewardship and section 2.3 on group learning will review other bodies of literature to see what can be added to complement current group effectiveness models to meet pressing needs in today's workplace.

Hackman (1982) proposed an early group effectiveness model. The model utilizes an input-process-output format. The model has three key inputs: organizational context, group design, and group process interventions. Organizational factors including reward, education and information systems are posited to form the context that supports and reinforces competent task work. The group design factors (e.g., structure of the task, composition of the group, group norms) are believed to prompt and facilitate competent group work on the task. Group process interventions relate to the support given to group members to coordinate efforts, utilize member skills, and develop performance strategies. The mediating or intermediate variables in the model include the level of effort, the degree of knowledge and skill applied to task work, and the appropriateness of performance strategies used. The effectiveness criteria include productivity, quality, healthy group processes, and satisfaction of group member wants and needs.

Hackman refined his model in his later work (Hackman, 1987). In his later work, task design is posited to influence the motivation of group members. Motivating design features included the use of varied skills, important tasks, whole rather than fragmented tasks, provision of group member autonomy, and feedback. Hackman also expanded on the role of organizational context in promoting group effectiveness to include technology, human resource management practices, and control practices. In Hackman (1987), the mediating variable is group interaction processes including the concept of positive and negative synergy. Positive synergy is hypothesized to lead to creative and innovative behaviors. Sufficiency of resources is proposed as a factor moderating the effect of processes on effectiveness. Hackman (1990) provides case studies to illustrate the importance of concepts in his 1987 model.

Gladstein's (1984) model is frequently cited in the group effectiveness literature. It is also an input-process-output model with a moderating variable. Many of the factors are similar to Hackman's models (1982; 1987). However, different causal roles are given to some variables.

Organizational resources is an input variable. Group task design is proposed to moderate the influence of group processes on group effectiveness. Additionally, input variables were posited to act directly on outputs as well as through group processes.

Gladstein tested her model using structural equations modeling. Both leadership and structuring activities (e.g., role and goal clarity, work norms, task control) were significantly correlated with intragroup processes and boundary management activities. Only two factors significantly influenced subjectively-rated effectiveness: leadership and intragroup processes. None of the factors were significantly related to sales revenue, a quantitative measure of effectiveness for the sales teams studied.

Gladstein's (1984) research supported the significance of boundary management as an element in models of group effectiveness. While earlier models contained group processes as a single variable, Gladstein's study found that inwardly-focused group processes are perceived differently from externally-oriented processes that span across group boundaries.

Sundstrom, De Meuse and Futrell (1990) proposed a modified input-process-output model of group effectiveness. Their model contains many of the same factors included in earlier models grouped into four variables. In their model, organizational context influences boundary factors which in turn influence group development. Each of these three variables is posited to act on group effectiveness. A contribution of this model is the concept that each of the proposed relationships is hypothesized to act reciprocally. For example, while group development should influence effectiveness, group effectiveness is also hypothesized to influence group development. The reciprocal nature of causal relationships also suggests change over time. Using the group development example, the effect of boundary conditions on groups as well as the interactions groups have across boundaries may be expected to change as groups develop.

Shea and Guzzo (1987) proposed a four-factor model of group task effectiveness. In this model outcome interdependence (with respect to reward and recognition systems) influences group task effectiveness. Potency, the belief of group members that the group can be effective, also influences task effectiveness. Potency in turn is influenced by feedback from results and the degree of task interdependence. Task interdependence is posited to moderate the influence of outcome interdependence on effectiveness. This model continued the idea of dynamic influences among variables. While earlier models included the sufficiency of skills and resources, Shea and Guzzo's model explicitly added the concept of group potency.

Building on the work of Thomas and Jensen (1990), Kirkman and Rosen (1997) developed a model for group empowerment. The model proposed empowerment as comprised of four factors: potency, meaningfulness of work, impact on organizational outcomes, and autonomy. Subsequent field testing verified the multidimensionality of empowerment (Kirkman & Rosen, 1999). Kirkman and Rosen's group effectiveness model retained many elements of earlier input-process-output models. Input factors were clustered using factor analysis into four variables: external group leader behaviors, production/ service responsibilities across group boundaries, supportive human resource practices, and supportive social structures including factors such as access to needed resources, information, and support for decision making. Outcomes in their model continued the trend in group effectiveness literature to consider performance outcomes as well as satisfaction and group viability.

Current models of group effectiveness typically include multiple categories of predictors with considerable overlap in the variables considered (Cohen et al., 1996). The proposed relationships among variables are also becoming more complex, suggesting a movement beyond the simple input-process-output models. Following their review of group effectiveness research from 1990 to 1996, Cohen and Bailey proposed a heuristic model with multiple relationships among factors including recursive relationships between internal processes and group psychosocial traits (1997, see Figure 1.1). Their review found most research models included task design, group composition factors, organizational context, internal processes and several outcome measures including performance, satisfaction, and behavioral outcomes such as turnover and absenteeism.

Stewart (2000) conducted a meta-analysis of work group research published between 1977 and 1998. Variables found in ninety-four studies were clustered using an input-process-output framework. The input clusters were external processes, motivating task characteristics, autonomy, interdependence, aggregate team member characteristics, team diversity, team size, and team context/leadership. The intrateam processes cluster included constructs related to positive relationships and facilitating interactions (e.g., open communication, high cooperation, high cohesiveness, optimal solution strategy). The output, performance measures, included two clusters: indicators of performance (e.g., supervisor ratings, output levels, financial indicators) and self-ratings of team member satisfaction. Path analysis was used to assess the extent to which intrateam processes mediated the influence of inputs on both outcome measures.

The meta-analysis provided interesting insights and confirmations regarding factors associated with group performance. All inputs showed meaningful positive associations with performance except for team diversity and team size. Diversity had a small negative relationship with performance while team size had a small positive relationship with performance. The effects of task characteristics and autonomy developed about 60% of their influence on performance indirectly through intrateam processes while 33% of the effect of leadership/context acted through intrateam processes. Large moderator effects present with leadership/context and autonomy indicated the influence of these inputs can be expected to vary depending of the context. Intrateam processes had the largest direct effect on performance outcomes with no significant moderation effects.

Stewart's (2000) meta-analysis of factors influencing group member satisfaction showed several of the same relationships found in previous research, but with some meaningful differences. Again all inputs showed positive meaningful associations with performance except for group diversity and group size. Both diversity and group size had moderate negative associations with satisfaction. The negative effects of diversity and group size on satisfaction did not show moderation by other factors and none of their influence was mediated through intrateam processes. About half of the effect of individual characteristics and leadership/context were mediated by intrateam processes. Relatively large moderator effects (>40%) were present for task characteristics, interdependence, and individual characteristics indicating that their influence on satisfaction is greatly dependent upon the levels of other factors. Intrateam processes had a large positive effect on group member satisfaction although its effect was significantly moderated by the levels of other factors.

Stewart's (2000) meta-analysis leads to several interesting implications.

- Improved group processes lead to higher performance. The lack of moderating effects suggests that improved intrateam processes appear to be beneficial regardless of tasks or environments.
- Autonomy, leadership/context, and task characteristics are design factors with potentially large positive influences on effective intrateam processes. However, the presence of moderator effects indicates the degree of autonomy and the types of leadership/context factors used must be fit to a group's work.

- Autonomy had large positive effects on both performance and satisfaction outcomes. However the majority (58%) of the effect of autonomy on performance is through intrateam process while it primarily has a direct effect on group member satisfaction. Stewart (2000) suggests this adds to our understanding of how autonomy and performance are related. Kirkman and Rosen's (1999) input-process-output model proposed that empowerment, including autonomy as one of the subdimensions of empowerment, is a process directly influencing performance. However, a model more consistent with Stewart's meta-analysis findings would be to suggest autonomy can act to influence performance through improved group processes such as increased levels of cooperation and motivation within groups. If empowerment is defined as a proactive orientation toward one's work (Mishra, Spreitzer, & Mishra, 1998), then autonomy could be a factor leading to proactive behaviors. Stewart (2000) calls for additional empirical research to define the factors that influence the relationship between autonomy and performance.
- Intrateam processes had a large positive correlation with group member satisfaction. However, the strength of the relationship varied across studies suggesting that intrateam processes may work synergistically with other factors to produce group member satisfaction.
- Task characteristics and autonomy were the inputs displaying the largest correlation with group member satisfaction. Little of the relationship was mediated by intrateam processes. This finding supports Hackman and Oldham's (1980) model which strongly relates work design with job satisfaction.

In concluding this section describing group effectiveness models, it should be noted that at least until recently, most research methods used assumed linear relationship among the constructs being studied. Recent research also develops the concept that relationships among factors in group effectiveness models are not only dynamic over time, but may have curvilinear relationships. Rather than more of an input simply resulting in a consistent increase or decrease in the dependent variable, a curvilinear relationship between variables means that the optimum may be at an intermediate point along the range of available choices. For example, Kirkham and Rosen (1999) propose the need for balance between individual and group autonomy. Continuously increasing the level of group autonomy could reduce the level of individual autonomy to the point of adversely impacting the ability of individuals to exercise discretion in their decision making. Similarly while some degree of diversity among members enhances

group creativity, too much diversity may raise the level of conflict to a point that group performance decreases (Pelled, Eisenhardt, & Xin, 1999). Polley and Van Dyne (1994) reviewed group research and identified several other factors with curvilinear relationships to group effectiveness including stress, cohesiveness, and the relative levels of commitment to the organization versus the group.

### *2.1.6 Contemporary Issues in Management Consistent with this Research*

Given the rapid rates of change due to new technology, heightened customer expectations, globalization and downsizing, organizations increasingly need employees to exhibit initiative to seek out opportunities and respond to customers' needs (Spreitzer & Mishra, 1999). Employees who are in touch with customers while performing core processes should be in an ideal position to take responsibility and make better decisions than their managers with respect to how their work is performed (Lawler, 1992a).

However, corporate responses to profitability pressures including downsizing and shifting production to low-cost labor markets have changed the employee-employer relationship. These changes appear to be bringing about what is possibly the first significant change in internal labor markets since the depression (Osterman, 1988). In exchange for their loyalty to the company, employees once expected the opportunity for lifetime employment with one employer. Downsizing and restructuring resulting in massive layoffs coupled with the current tight labor market have contributed to a change in what employees want from their employers. Employees indicate that secure employment is fifth on their list of job attributes desired from an employer. Interesting work, open communications, and opportunities for development are the top three items employees generally desire (Cappelli, 2000).

Researchers are recognizing a new set of social psychological issues that need to be addressed to establish more effective and satisfying workplaces. Among issues relevant from the employee's perspective, researchers are dealing with issues such as breach of psychological contracts (Robinson, 1996) and development of a sense of home (e.g., identity) in meaningful work when single-employer careers are no longer the norm (Pratt & Dutton, 2000). Research issues significant from employers' perspective include determining how to manage in an environment without commitment (Cappelli, 2000), whether investment in employees pays off (Tsui, Pearce, Porter, & Tripoli, 1997), how to develop substitutes for trusting relationships

(Spreitzer & Mishra, 1999), and how to align employee or manager actions with the best interests of the organization (Davis et al., 1997b).

These social psychological issues have been studied primarily at the individual rather than at the group level of analysis. However, researchers are suggesting that many cognitive and affective traits traditionally studied at the individual level of analysis can be viewed at the group level of analysis. For example, sensemaking, the act of understanding or framing one's experiences, has traditionally been viewed an individual cognitive activity. Weick and Roberts (1993) have found evidence of collective sensemaking. Cohen and Bailey (1997) conclude their review of team effectiveness by calling for further empirical field studies to increase our understanding of group cognition and group affect and their impact on effectiveness.

The following two sections of this literature review consider cognitive-affective concepts proposed for further development at the group level of analysis. First, literature related to stewardship will be reviewed in section 2.2. Then learning literature relevant to the concept of group learning will be reviewed in section 2.3. These reviews support the operationalization of group stewardship and group learning used in this research.

## 2.2 GROUP STEWARDSHIP

In this section the construct of group stewardship will be developed. First, the need for a group stewardship construct will be presented. Next, roots of the stewardship concept in the literature will be reviewed. The concept of stewardship will be further defined by contrasting it with agency theory. In the fourth subsection, recent research concepts including shared mental models and psychological ownership that lead to a formal definition of group stewardship will be presented. The fifth subsection defines and distinguishes group stewardship from related constructs. The final subsections develop sets of expected antecedents and consequences of group stewardship. The overall organization of this section is shown below.



### *2.2.1 The Need for Group Stewardship*

A sense of trustworthiness and commitment to the organization are the two employee traits most valued by managers (Cappelli, 2000). When work requires development of relationships and working across organizational boundaries, employers need people who will stay in their jobs long enough to learn the responsibilities of their jobs and those with whom they work. Employers need employees they can trust when large spans of control and temporal or geographical separation make traditional hierarchical overseership difficult or impossible. Trust is also needed with employees who will be given responsibility to manage relationships with customers or make real-time decisions to control quality and safety.

However, at least in corporate America, and increasingly throughout the world, shareholders are the stakeholders to whom leaders give their primary allegiance (Waddock, 2000). The concerns of other parties are subjugated when leaders too narrowly focus on

shareholder wealth. As a result, employee loyalty, commitment, and morale have suffered through downsizing, management restructuring, relocation of production to countries with cheaper labor, and re-engineering.

Given these changes, employees have increasingly developed a sense of loyalty to their profession or personal careers rather than to a specific employer. At least three forces have brought about this change (Cappelli, 2000; Waddock, 2000). First, many corporate actions have broken the sense of a psychological contract between employers and employees for lifetime employment. Employers who break the employer-employee psychological contract at will in search of better opportunities find employees also feel free to terminate the relationship in search of better opportunities. Secondly, portable pension plans and skills with value across many employers tend to unlock the golden handcuffs keeping employees with a single employer. Third, the prolonged economic expansion and resultant personnel shortages for many jobs have shifted the labor market in favor of the employee.

Development of a supportive context in which groups work as stewards in behalf of their organizations may fill an important need for both employees and employers. Employers are increasingly involving employees in work groups hoping to improve decision making, innovation, and responsiveness to customers (Hunter, 2000; Lawler et al., 1998). If structured appropriately, work groups can provide many employees with what they seek: interesting work, open communications, and opportunities for development (Cappelli, 2000). Similarly, a job design and organizational context supporting development of a collective sense of partnership with the organization may provide organizations what they need: committed, trustworthy employees.

Creation of a condition in which employees work with a sense of stewardship in behalf of the best interests of their organizations would avoid several of the problems potentially emerging from the use of work groups. For each of the following emerging work group problems noted by Quinn et al. (2000) the potential contribution of stewardship is noted.

- Groups acting as owners may lead to unintegrated efforts across the organization. Stewards work in the best interest of their organizations rather than self interest. While ownership is about "what's mine," stewardship is based on service to the organization. It promotes business-focused solutions and maintains accountability to organization stakeholders who influence or set objectives.

- Teamwork may promote an inward focus leading to collusion and a blockage of information flow. Group stewardship grows out of internalized organizational goals and values. It requires identification with both the organization and group values resulting in a balance of priorities across the organization and work group.
- The continuous challenge of new ideas within groups may lead to unresolved conflict. Stewardship is based on commitment to relationships and service that permits the development of collectively held mental models of teamwork and heedful interactions. The presence of shared mental models enhances the speed and efficiency of group decision making (Klimoski & Mohammed, 1994).
- The replacement of supervision by self-managed or coached work groups may lead to unproductive discussions and low expectations. The development of stewardship requires clear definition of performance expectations, roles, and authority within a relationship that develops intrinsic motivation.

### *2.2.2 The Roots of Stewardship*

The concept of stewardship is several thousand years old. Ancient households of distinction or of sufficient wealth had stewards. The steward was empowered to act in behalf of his master during the master's absence. He was fully accountable to his master and rendered an account when called upon to do so. Several words from early languages are translated into the English word steward. For example the Greek words *epitropos* (trustee, guardian) and *oikonomos* (overseer) have a clear relationship to the term stewardship (Stavropoulos, 1988).

A steward is one who manages another's property, finances, or other affairs (Soukhanov, 1984). At least in Judeo-Christian tradition, stewardship includes two noteworthy responsibilities that may not be obvious from the word's definition. First is the responsibility to manage the assets placed in the steward's trust for the good of the owner and not for personal gain. This responsibility includes the idea of service to another as opposed to mastery over that which is managed. Second, stewardship carries the responsibility to improve or increase the assets being managed. Caretaking or maintenance alone do not meet the requirements of stewardship (Genesis 1 & Matthew 25, 1979).

Steven Covey has promoted the concept of stewardship delegation (Covey, 1989). According to Covey, stewardship delegation gives the steward a choice of method while holding

him/her accountable for results. This style of delegation is based upon a common vision, mutual trust, and joint commitment in five areas:

- Clear mutual understanding of the desired results. The steward must be able to see, describe and make a quality statement of what results will look like and when they will be accomplished that matches the manager's expectations.
- Guidelines or parameters within which the individual should operate.
- Human, financial, technical or organizational resources that may be used to accomplish the desired results.
- Standards of performance and reporting. Clear accountability requires specifying the criteria used to evaluate results as well as the times when reporting and evaluation will take place.
- Receipt of good and bad consequences that could result from the evaluation. Consequences could include financial rewards, psychic rewards, job assignments, and expected natural consequences tied to the overall mission of the organization.

Covey contrasts stewardship with the "me and mine" perspective of ownership (Covey, 1998). Covey proposes an ownership attitude is typified by use of freedom to maximize personal wealth without concern for other stakeholders. In contrast, stewardship implies representing or being part of something else. It is a clear expression of interdependence, feeling "we're in this together," and is consistent with a social contract in which employees are guided by a shared vision, mission, and value system.

Peter Block wrote a well-known practitioner book about stewardship (Block, 1996). Block says stewardship is holding something in trust for another. To Block stewardship is not only being accountable for ones specific area of responsibility, but includes willingness to be accountable for the well-being of the larger organization of which one is a part. Stewards act in service of rather than in control of those around them. Their objective is building the capacity of future leaders to govern themselves. Block argues stewards choose authentic service over self-interest through four practices.

- Empowerment of partners versus control through patriarchy. Patriarchy embodies a parent-child relationship between the leader and the governed. The key values of patriarchy are consistency, control and predictability. Partnership implies a balance of power between the leader and those within his responsibility. Partnership values placing control close to where

the work is done and yielding consistency of centralized management to support for local units in creating policies and practices that fit local needs.

- Commitment to a larger community. Block believes focusing attention on the individual or small work group breeds self-centeredness and feelings of entitlement.
- Shared purpose and meaning. Employees join leaders to determine purpose and culture.
- Balanced and equitable distribution of rewards. As every level in the organization shares in wealth creation, the results of success in the marketplace are equitably distributed. The distribution of rewards demonstrates integrity with respect to the expressed value of contributors.

Block writes "What is difficult is that we need commitment from people when we can no longer offer them much security. . . . The environment is too unstable to promise a future. . . . We need to create a workplace that evokes commitment that is not based on false promise" (Block, 1996, p. 21). However, leaders can commit themselves to create stewardship-based organizations to pursue purposes that transcend short-term self-interest. Those working in such organizations can discover what it means to commit themselves to acts of service in a part of an organization that is theirs to create. "With the element of service at its core, stewardship creates a form of governance that offers choice and spirit to core workers so they, in turn, can offer the same to their marketplace" (Block, 1996, p. 22).

### *2.2.3 Stewardship Contrasted with Agency Theory*

Organizational researchers have studied what motivates managers and how to achieve alignment between managers' behaviors and the interests of principals. Within this field of research, agency theory is frequently used. Agency theory deals with situations in which principals and managers have differing goals and risk preferences. It analyzes the contract between principal and agent. Agency theory operates under the assumptions that humans will behave in ways that maximize their self-interest and will tend to be more risk averse than their principals (Eisenhardt, 1989).

Stewardship theory has been proposed to explain what causes manager-principal interests to be aligned. Managers are said to act as stewards when they are motivated not by individual goals, but rather by motives that are aligned with the objectives of their principals. Managers are said to act as stewards when they believe that personal needs are best met by working toward the best interests of the organization's collective needs (Davis et al., 1997b).

Agency theory can be contrasted with stewardship theory. Some have argued that agency theory is broad enough to accommodate the conditions described by stewardship theory as proposed by Davis et al. (Albanese et al., 1997). However, given the difference in the core motivations assumed to drive manager behaviors (Preston, 1998) as well as the difference in governance structures used, contrasting agency with stewardship theory is useful in defining stewardship. Six key factors which Davis et al. (1997b) propose differentiate stewardship from agents who seek to maximize their personal gain are described in the following paragraphs.

Motivation is the primary difference between stewardship and agency. Extrinsic rewards are used in agency theory: tangible, exchangeable commodities that have market value. In contrast, stewardship theory relies more heavily on intrinsic motivation. In terms of the job characteristics model, work designed to provide meaningfulness, responsibility for outcomes and knowledge of results should mediate the relationship between tasks and work motivation (Hackman & Oldham, 1976). Thomas and Velthouse (1990) developed the four-factor model for intrinsic motivation that is the basis for most current individual and group-level empowerment work. Their model posits that meaningfulness, autonomy, impact and self-efficacy are keys to intrinsic motivation. More recently the intrinsic motivation model has been revised by replacing impact with sense of progress through feedback systems (Thomas & Jansen, 1996; Thomas & Tymon, 1997). The expected outcomes of increased intrinsic motivation are expected to be higher levels of effort and attention to doing the task well (Thomas & Tymon, 1997).

Identification with the organization is posited to be a key factor in stewardship. Organizational identity includes those characteristics which are central, unique, and enduring (Pratt & Dutton, 2000). Identification occurs when a person or group employs elements of the organization's identity to define oneself (Pierce, Kostova, & Dirks, 2001). Managers who identify with their organizations take comments about the organization as also referring to themselves and are more likely to engage in spontaneous, cooperative, unrewarded behaviors (Mowday et al., 1982). In contrast, managers who externalize organizational problems to avoid blame would be expected to have lower levels of identification. Hence, individuals who identify with their organizations would be more likely to become stewards while those who externalize blame are more likely to behave as agents.

Internalization of organization values is also expected to accompany the development of stewardship. Mayer and Schoorman (1992) found that organizational commitment is multi-

dimensional consisting of continuance commitment (e.g., the desire to remain with the organization) and value commitment (e.g., belief in and acceptance of the organization's goals and values). Value commitment is associated with levels of effort on core work tasks, improving the context within which one works (Pierce et al., 2001), and intent to remain with an organization (Mayer & Schoorman, 1992). Value commitment is not an outcome with economic value and would not be expected to be associated with agency theory.

The source or use of power is another important factor in differentiating management stewardship from agency theory. One source of power found in organizations is institutional power vested in the holder by virtue of position within the organization (Gibson, Ivancevich, & Donnelly, 1991). In principal–agent relations, control is likely to be maintained through use of institutional power to establish the desired levels of coercion, hierarchical control, and influence over rewards. In principal–steward relationships personal power is more likely to be used (Davis et al., 1997b). Personal power utilizes influence derived from perceived expertise or affective relationships where individuals identify with each other.

Management philosophy is a key factor differentiating the nature of principal - steward and principal–agent relationships. The unit of analysis in principal–agent relationships is the contract. Agency theory assumes agents and principals are likely to have conflicting goals. The actions of agents are controlled through use of an economic or employment contracts. Performance is ensured or monitored through the use of information systems (Eisenhardt, 1989). The principal–steward relationship is based upon trust and interpersonal relationships where trust is defined as a "willingness to be vulnerable in the context of a relationship based upon the belief that another party is competent, honest, reliable and concerned about [ones] own interests" (Spreitzer & Mishra, 1999, p. 159).

The differences in management philosophies between agency and stewardship are reflected in the sources of commitment which are assumed to develop. Agency theory is consistent with the exchange approach that views commitment primarily as an outcome of the inducements offered for contributions given. Stewardship theory is consistent with psychological approaches that depict commitment as a positive, high-intensity orientation toward the organization that develops as individuals' goals and values become integrated or congruent with the goals and values of the organization (Mayer & Schoorman, 1992).

Individualism and collectivism are aspects of culture aligned respectively with agency and stewardship theory. In cultures stressing collectivism, the individual defines self through group or family membership; group membership is an important part of identity and achievement. While individualism and agency theory place personal goals over group goals, collectivism and stewardship define success in terms of the collective's success (Davis et al., 1997b).

### *2.2.4 Four Concepts Supporting the Development of Group Stewardship as a Group-level Construct*

Scholars do not appear to have studied stewardship as a group-level construct. However, several streams of emerging thought provide the insights needed to develop the extension of stewardship to the group level of analysis.

- the call for group-level social-psychological constructs to enhance input-process-output group effectiveness models
- recent application of shared mental models to group effectiveness models
- development of psychological ownership theory to explain conditions under which employees are intrinsically motivated to engage with organizational issues.
- development of the concept of two-way covenantal relationships in the academic literature.

This section will describe these supporting developments. Group stewardship will be defined and differentiated from related constructs in section 2.2.5

#### 2.2.4.1 Group-level Social-psychological Constructs

The input-process-output (IPO) model has been the most researched model of team effectiveness. IPO models posit that inputs such as task design, group characteristics, and organizational support influence group processes that in turn influence group outputs.

While IPO models have helped our understanding of factors associated with group design and generally expected levels of effectiveness, central issues about how groups function still need to be addressed. Little research or theory has been devoted to understanding in what way contextual inputs influence group processes and why groups in similar contexts perform so differently (Druskat & Pescosolido, 2000). Work group processes and strategies may emerge from or be moderated by the shared mental models held by group members (Druskat &

Pescosolido, 2000; Klimoski & Mohammed, 1994). Group models need to be expanded to address a central issue of how groups function, form expectations and determine expectations (Rouse, Cannon-Bowers, & Salas, 1992).

Recognizing the need to move beyond IPO models, Cohen and Bailey (1997) called for inclusion of psychological traits as factors that may influence group outcomes directly as well as through their influence on group processes. Their review of group effectiveness research found the degree or nature of cohesiveness, norms, affective states, and shared mental models relates to group effectiveness outcomes.

There is debate as to whether psychological traits or processes associated with individuals can actually occur at the group level of analysis (Klimoski & Mohammed, 1994). For example, can cognition, which presumably occurs only within individuals, be a group activity? Levine and Moreland's (1998) review of social-psychological small group research warns it is inappropriate to assume that cognitive group processes (for example, decision making) occur in the same way as individual cognitive processes. However, they conclude that cognitive group processes may occur whenever someone holds a group in tacit awareness regardless of whether group members are present or not. For example, group members may collaboratively encode, store and retrieve information (Wenger, 1995). The outcome of the collaborative work may be a transactive memory system that enables group members to collectively recall more information, have a better grasp of the entire system, and be more likely to do the "right thing" in novel situations than they would when working alone (Levine & Moreland, 1998; Weick & Roberts, 1993).

Another justification suggested for group-level psychological constructs is the growing acceptance of the idea that group-level cognition constructs are not only appropriate, but may be more appropriate than many individual-level cognition constructs.

> Cognition is almost always a social phenomenon. 'Reality' is jointly created by individuals acting in a social context. . . . the individual-level focus in the study of cognition is no longer perceived as adequate for capturing even individual level thinking in all its variety (Klimoski & Mohammed, 1994, p. 406).

#### 2.2.4.2 Shared Mental Models

Shared mental models, a group-level psychological trait, have received increasing attention as a factor believed to significantly influence group processes and effectiveness (Klimoski & Mohammed, 1994; Mathieu et al., 2000; Pearce & Ensley, 2000). Mental models

are mechanisms humans use to generate descriptions of system functioning, explain observed system states, and predict future states in their environments (Rouse & Morris, 1986). Mental models consist of organized knowledge or beliefs with simple causal connections. These causal connections permit people to screen information to support rapid and effective decisions with respect to their tasks, expectations, coordination of work group interactions, and adaptation of their behavior to meet demands of the task and team members (Cannon-Bowers, Salas, & Convers, 1993; Druskat & Pescosolido, 2000; Mohammed, Klimoski, & Rentsch, 2000; Rouse et al., 1992). Mental models often utilize rules about factors such as time to execute tasks, cause and effect relationships, or categorical membership to make decisions or organize data into meaningful patterns (Cannon-Bowers et al., 1993).

Work groups may share mental models in different ways. Klimoski and Mohammed (1994) found the term "shared" mental models used three ways in the literature. Identical mental models imply group members have a common set of knowledge. Distributed knowledge configurations can imply knowledge is divided up among members and does not imply any overlap. The third type of shared mental model, overlapping, implies that the knowledge held does not need to be identical, but does require that models be compatible and lead to shared expectations. Klimoski and Mohammed (1994) suggest groups may begin with distributed knowledge and move to overlapping mental models through communication and joint interpretation of situations.

Group members probably develop several types of shared mental models rather than a single shared mental model. Rouse et al. (1992) posited groups develop three types of mental models: models about the *equipment* used to perform their work, models about *tasks* that comprise their work, and *team* knowledge about the way group members work together. They propose that shared mental models contain elements of knowledge about why a system exists, what a system is doing, and how the system operates. Mathieu et al. (2000) found mental models about technology, task, team interaction, and knowledge of other team members factored into two mental models: teamwork (team interaction and knowledge of other team members) and taskwork (technology or equipment knowledge and knowledge about tasks required to do core work processes). Mediated regression analysis showed team processes fully mediated the effect of teamwork mental model convergence on team performance. Taskwork mental model convergence had some effect on team processes, but no significant effect on team performance.

Druskat and Pescosolido (2000) found mental models relating to teamwork could be categorized according to three themes. They began by subjecting the context and process variables in five group effectiveness models to content analysis. The concepts within each of the three categories consisted of group member beliefs about states that are demanded, expected or preferred. The first theme related to the need for the group to experience the affect and motivation associated with a psychological sense of ownership for the group's processes and outcomes. Related process variables include commitment, norms supporting proactivty and effort, and a sense of potency in the group's ability. The second theme related to perceptions about the need for continuous learning including sharing of knowledge, giving and receiving feedback, and seeking information external to group processes. The third theme, heedful interrelating, is the extent to which behaviors within and external to the group are carried out in a way that is attentive, purposeful, conscientious, and considerate.

#### 2.2.4.3 Psychological Ownership Theory

Psychological ownership has received increasing attention in the literature during the past decade. Researchers have proposed that financial ownership leads to positive consequences for both the organization and employees who are owners. Benefits have been shown to include productivity, quality, turnover, attitudes, and positive relations (Van de Walle, Van Dyne, & Kostova, 1995). However, a sense of psychological ownership may be developed even when there is no financial or legal status as an owner (Pierce, Van Dynne, & Cummings, 1992).

Psychological ownership is a state of mind in which an individual "feels as though the target of ownership or a piece of it is 'theirs' (it is MINE!). The core of psychological ownership is a feeling of possessiveness and being psychologically tied to an object" (Pierce et al., 2001). The target of psychological ownership may be material (e.g., my equipment) or immaterial in nature (e.g., my job). That which is psychologically owned becomes part of the owner's identity. Its presence is manifest in the meaning and emotion of phrases such as "my job" or "my organization" (Van de Walle et al., 1995).

Two complementary theories suggest the basis of psychological ownership. One approach draws from research on issue interpretation. This approach suggests that issues, once noticed, are interpreted in terms of social identity and emotional reactions. To the extent issues are believed to relate to or be a part of who one is (i.e., one's identity) and evoke a strong emotional reaction, strong feelings of ownership are likely to result. The degree of felt

ownership is in turn expected to influence the degree of action (Pratt & Dutton, 2000). A second theory suggests three motives associated with psychological ownership: self-identity (e.g., what is central or of value within the entity), the extent to which one wants to make the target of ownership part of their "home," and the extent to which one feels able to control the potential object of ownership (Pierce et al., 2001).

Several consequences are believed to flow from psychological ownership. Ownership is typically associated with a "bundle of rights" including rights to information, the right to have a voice in matters relating to the target of ownership, and a felt responsibility to invest time and energy to advance the cause of the organization (Pierce et al., 2001). Van de Wall et al. (1995) found that psychological ownership was correlated with organizational commitment (measured as feelings of identification and affective relationships), overall satisfaction, and extra-role behaviors, but not with in-role behaviors. It appears that organizational controls may have a dominant influence on in-role job performance; the degree of psychological ownership may have little effect upon in-role performance. However, a positive sense of satisfaction and ownership associated with one's work are likely to promote discretionary behaviors that influence the context within which the employee works (i.e., organizational citizenship behaviors or OCB's). Finally, psychological ownership may not only enable, but may be the single most important factor required for manager-led groups to successfully transition into self-managing groups (Druskat & Pescosolido, 2000).

(Psychological ownership is closely related to the construct of stewardship. The two constructs will be compared in section 2.2.5 after group stewardship is more fully defined.)

#### 2.2.4.4 Two-way Covenantal Relationships

In contrast to psychological ownership that relates to *what* people will become engaged with, mental models of teamwork also contain knowledge or beliefs about *how* people relate (or should relate) to those within or external to the work group. One way to characterize relationships is along a continuum from exchange contracts to reciprocal or relationship contracts (McNeil, 1985). Exchange contracts include Ouchi's (1980) market model, quasi-spot contracts (Tsui et al., 1997) and agency theory (Eisenhardt, 1989) in which employees are motivated to work in their own best interests. The interests of principles and agents are not presumed to be aligned. The basis for the exchange contract is the bargain to exchange specified, measurable work for something of economic value. At the other end of the continuum is the covenantal

relationship characterized by commitment to a relationship. Covenantal relationships are based upon trust, shared values, and employee identification with the organization (Van Dyne et al., 1994). The social exchange contract lies between the covenantal and pure exchange contracts. Like the covenantal relationship it typically has an open-ended duration and develops over time. However, the social exchange relationship is based more upon a commitment to values or fairness while the covenantal contract is based more upon the commitment to a relationship (Graham & Organ, 1993).

The appropriate type or balance of relationship contracts to be used depends upon the type of work being done, the organizational context, and the types of behaviors required. Economic exchange contracts appear to be most appropriate when work requirements can be clearly specified due to the nature of the task or because of a stable environment, work outcomes can be monitored, and affective relationships among employees, which typically require a period of time to develop, are not required. The presence of social exchange and covenantal relationships has been shown to be related to higher levels of organizational citizenship behaviors (OCB's), behaviors associated with improving the organizational context beyond ones core job requirements (Tsui et al., 1997; Van Dyne et al., 1994). Hence the open-ended responsibilities associated with social exchange or covenantal relationships may become more appropriate when environmental uncertainty makes specification of exact job duties difficult, work cannot be closely monitored, or when creativity and flexibility in work relationships are required. Where people are required to work together in a way that requires trusting affective relationships, covenantal relationships may be most appropriate.

The employee-employer relationship may be better characterized by the degree to which alternative relationship styles are present than as a choice between one relationship and the others. There is some evidence that a balance of exchange and relationship contracts may promote higher levels of both in-role and OCB's than when only one relationship is present (Tsui et al., 1997). Pay for performance may support the level of OCB's when high levels of internalized value and goal congruence are present (Deckop et al., 1999).

### *2.2.5 Group Stewardship Definition and Differentiation from Related Constructs*

Drawing upon the concepts of shared mental models, psychological ownership, and relationships, group stewardship can be defined as a collectively held sense of responsibility to oversee and improve performance in the group's area of responsibility in accordance with the

best interests of the organization. Stewards feel a clear charge to act in behalf of those in the organization who have entrusted them with their responsibilities. The definition of group stewardship can also be framed using the three components of teamwork mental models suggested by Rouse et al. (1992) as shown in Table 2.8.

**Table 2.8. Definition of Group Stewardship using a Mental Model framework**

| What the system is doing | Group members collectively accept the responsibility to . . . |
|---|---|
| How the system operates | oversee and improve performance in the group's area of responsibility in the best interest of the organization within the bounds of a two-way covenantal relationship. . . |
| Why the work group is needed | to respond in behalf of organization stakeholders and avoid suboptimization of system subcomponents. |

The construct of group stewardship is similar to several related constructs including psychological ownership, commitment, internalization, and identification. Therefore, the issue of whether or not group stewardship is distinct and needed should be addressed. The distinction between the core concept of stewardship and related constructs will first be addressed. Then the additional considerations associated with group-level stewardship will be described.

Stewardship may be differentiated from several related constructs:

- stewardship: the steward *is given* and *takes* the responsibility and authority to act as a co-owner or partner in the best interests of the organization.
- psychological ownership: the entity (individual or group) *develops* feelings of possession – "it is mine" through a set of organizational experiences (Pierce et al., 1992).
- organizational commitment: strong belief in an organization's goals, willingness to exert effort on behalf of the organization, and a strong desire to maintain membership in the organization (Mowday et al., 1982)
- organizational identification: a primarily cognitive connection or sense of oneness with the organization not necessarily associated with specific behaviors, the tendency to experience the organization's successes and failures as one's own, and defining ones self by the distinctive qualities of the organization (Ashforth & Mael, 1989; Mael & Tetrick, 1992).
- internalization: adoption of values and goals of the organization (Mael & Tetrick, 1992).

These constructs are likely to have a reciprocal relationship with one another. The presence of one may support the development of another. However, the conceptual core, motive served, and the type of state may be different as summarized in Table 2.9.

Among the constructs listed above, stewardship may be closest to psychological ownership. However, there are significant differences. First, psychological ownership develops through a set or organizational experiences (Pierce et al., 1992). No contract or exchange between partners is required for psychological ownership to exist although a social exchange or covenantal relationship might promote the development of psychological ownership. Stewardship can only occur within the bounds of a two-way covenantal relationship where responsibility and rights are both given and accepted. Second, psychological ownership is about possession – "what do I feel is mine?" Psychological ownership is anchored in the self (Pierce et al., 1992), a trait demonstrated by groups that become too inwardly-focused or collude in their own best interest (Quinn et al., 2000). Stewardship is anchored in action on behalf of organization stakeholders and supported by the belief that the steward's interests are best served when the organization succeeds (Davis et al., 1997b).

Moving from stewardship as a general concept to group-level stewardship, group stewardship occurs when the work group is held responsible by the organization and collectively accepts its rights and responsibilities with respect to the organization. It is a two-way covenant between the organization and the work group as an entity. For group stewardship to exist, it appears two related conditions must be met. First, the group must possess relatively identical or at least compatible mental models that lead to common expectations about the way teamwork will be done and what is to be accomplished (Cannon-Bowers et al., 1993). Secondly, it appears that in order for group stewardship to occur group members must collectively feel a high level of attachment (e.g., commitment, identification, and internalization of goals and values) toward the organization supported by a strong enhancing attachment toward the work group.

**Table 2.9. Comparison of Stewardship with Related Constructs**

| | *Stewardship* | *Psychological Ownership* | *Commitment* | *Identification* | *Internalization* |
|---|---|---|---|---|---|
| Conceptual Core | Accepted responsibility to act in best interests of the organization | Possessiveness (it is mine) | Wanting to remain affiliated | Employ element of organization's identity to define self | Shared goals or values |
| Question answered | What is best for the organization? | What is mine? | Should I maintain membership? | Who am I? | What do I believe? |
| Motivational basis | Trust, commitment to relationship | Efficacy/effectance<br>Self-identity<br>Need for place (home) | Security<br>Belongingness<br>Beliefs and values | Attraction, Holism<br>Affiliation<br>Self-enhancement | Need to be right<br>Beliefs and values |
| Development | Active effort in behalf of organization,<br>Accountability given and responsibility taken | Active imposition of self on organization | Decision to maintain membership | Categorization of self with organization<br>Affiliation<br>Emulation | Adoption of organization's goals or values |
| Type of state | Affective/cognitive | Affective/cognitive | Affective | Cognitive/perceptual | Cognitive/objective |
| Selected consequences | Rights & responsibilities<br>Promote/resist change<br>Sharing<br>OCB<br>Stress | Rights & responsibilities<br>Promote/resist change<br>Refusal to share<br>Stewardship & OCB<br>Stress | OCB<br>Intent to remain<br>Attendance | Support for and participation in organization activities<br>Intent to remain<br>Stress | OCB<br>Intent to remain<br>In-role behaviors |
| Rights | Information, voice<br>Use of resources | Information, voice | None | None | None |
| Responsibilities | Burden sharing<br>Active & responsible voice for organization stakeholders<br>Be informed<br>Protect<br>Grow/enhance<br>Provide feedback | Burden sharing<br>Active & responsible voice<br>Be informed<br>Protect<br>Grow/enhance | None | Maintain the status of the admired organizational attribute | Goal and value protection |
| (Source for psychological ownership, commitment, identification & internalization entries: Pierce et al., 2001, Table 1) | | | | | |

The need for high levels of attachment to both the group and the organization can be seen by examining the consequences of low and high levels of attachment to the organization matched with different levels or alignment of attachment within the group. Applying Martin and Siehl's (1983) typology of subcultures within organizations, work group subcultures may be:

- enhancing - clear, distinctive and coherent values in full alignment with the organization, high levels of member identification with the work group, adherence to core values of the overall organization are higher than in the balance of the organization,
- orthogonal - group members simultaneously accept core values of the organization and a "separate, unconflicting set of values particular to themselves" (Martin & Siehl, 1983, p.54),
- countercultural - the core values of the work group oppose or challenge those of the organization, and group members "create a symbolic frame which remains impervious to control by the institution which surrounds them" (Linstead & Grafton-Small, 1992, p. 331).

Utilizing this typology, Bligh et al. (2000) hypothesized the outcomes of various combinations of identification with the organization and the work group shown in Table 2.10. For example, when organizational and work group identification are low, group members will behave as individuals; no group-level effect would be expected with respect to group or organizational goals and values. When identification with the work group is significant and orthogonal or counter to organizational values and goals, groups will resist organizational goals or develop individualistic approaches to the way things are done within their domain. When identification with the organization is high and identification with the work group is enhancing, the group work enables individuals to collaboratively work together, synergistically accomplishing more within and across group boundaries than they could alone. While group identification supports development of group teamwork capabilities, strong group identification coupled with enhancing high identification with the organization supports development of collaboration and synergy across groups.

Becker and Billings' (1993) research supports the importance of attachment to both the work group and the organization. Employees were clustered into four groups: the locally committed (commitment to their supervisor or work group but not to the organization), the globally committed (commitment to the organization but not locally committed), the committed (commitment both locally and to the organization), and the uncommitted. The committed had the highest levels of overall satisfaction and the lowest intent to quit. The committed and locally

committed had significantly higher levels of prosocial behaviors and local satisfaction than the other two groups.

**Table 2.10. Linkages between Cultural Identification, Work Group Identification and Behavioral Outcomes**

| **Identification with Organizational Culture** | **Work Group Identification** (Martin & Siehl, 1983) | **Behavioral Outcome** | **Examples** |
|---|---|---|---|
| High | None | Behavioral consensus around core cultural values | Strong culture organizations |
| High | Enhancing | Behavioral synergy around core cultural values | High performance teams or "clans" |
| High | Orthogonal | Situational behavior based on dual influence of organizational and subcultural identification | Negotiating multiple identifications |
| Low | Orthogonal | Behavioral consensus around core subcultural values | Strong geographical, functional, subcultural differences |
| Low | Countercultural | Behavioral consensus around core subcultural values contradictory to overall organizational culture | Cultural resistance and sabotage |
| Low | None | Individualization | Ambiguous or weak culture organizations, virtual organizations |
| (Source: Bligh et al., 2000, Table 1) | | | |

.

The conditions for group stewardship, mental models leading to common expectations and high levels of enhancing attachment to both the group and the organization, differentiate group stewardship from group psychological ownership and group member commitment to remain a part of the organization. A shared mental model of psychological ownership could emerge when a group collectively begins to actively impose itself on the organization (Pierce et al., 2001). The subculture that develops with group psychological ownership could be enhancing, orthogonal, or countercultural with respect to its organization's goals and values. Similarly, commitment to remain in an organization may not imply any more than a decision to meet the minimum standards required of organizational members. In contrast, group-level stewardship can only exist within an enhancing subculture since stewardship requires engagement in work directed toward the best interests of the organization.

### *2.2.6 Antecedents of Group Stewardship*

The antecedents of group stewardship will be developed through a two-step process. First the factors associated with the development of shared mental models will be reviewed. Then the factors likely to lead groups to develop a shared mental model of stewardship will be reviewed. Drawing from the antecedents developed in the following sections, the antecedents to be tested in this research will be described in charter 3.

#### 2.2.6.1 Antecedents of Shared Mental Models

At a basic level, group training, communication, and interactions among team members and with the system being managed are the processes through which shared mental models may be formed. However, just experiencing these processes will not necessarily lead to shared mental models, let alone a shared mental model of stewardship. To develop compatible shared mental models that lead to common expectations, these processes must provide experiences promoting common understandings of the current state, the cause and effect relationships influencing how the system functions, and why the group exists (Cannon-Bowers et al., 1993).

The mental model literature proposes several factors that should promote the development of shared mental models. These factors can be grouped into those that relate to the task design, the group, and the organizational context.

1. Task Design
   - Task and outcome interdependence that promote interactions among group members as work is being done. Low levels of task interdependence do not require interactions (e.g., coordinate, cooperate, collaborate) and permit people to develop a sense of responsibility solely for their own portion of the work (Druskat & Pescosolido, 2000). The type of task interdependence (e.g., pooled, sequential, reciprocal, Montemayor, 1994; Van de Ven, Delbecq, & Koenig, 1976) is also likely to influence the degree to which shared mental models develop.
   - Nonroutiness of work. Tasks have been characterized according to the number of exceptions (predictability) and the difficulty of analyzing problems (Perrow, 1967). However, these scales have often been collapsed into a routine-nonroutine continuum by researchers (David, Pearce, & Randolph, 1989; Van de Ven et al., 1976). Nonroutine tasks are more difficult to analyze in terms of alternative courses of action, possible outcomes, and the resultant costs versus benefits (Daft & MacIntosh, 1981). Accordingly

nonroutine tasks provide the need for heedful interrelating and learning activities that promote the development of shared mental models (Druskat & Pescosolido, 2000).

- The group is a "bounded collection of people who operate as a social system" (Hackman, 1982, p. 7). This factor is often listed in the team effectiveness literature as a defining criterion for the presence of true work groups. Structuring work so that it is clear who is or is not a member of the group is associated with development of an intact social entity that sees itself and is seen by others as a as a group. Given task and outcome interdependence, an intact social entity would be expected see the group's successes and failures as their own thereby leading to development of a sense of "groupness" and identification with the group.

2. Group Conditions
   - Group development through the forming, storming and norming phases (Tuckman, 1965). During the forming stage members elicit information about each other, as well about processes and the tasks that must be done (Jones & Bearley, 1994). Groups at the forming stage have a less detailed and less refined "collective mind" than teams with more time together (McClure, 1990).
   - Changes in group membership during the life span of the group affect the rate at which the group progresses through the development cycle, or if it is even able to begin (Klimoski & Mohammed, 1994).
   - Prior experience of members working in groups. Members with different levels of experience working in groups are likely have different amounts of teamwork knowledge and to use different teamwork knowledge structures to organize new information and understand what is happening (Rentsch, Heffner, & Duffy, 1994). This implies different levels of knowledge or beliefs about what groups may or can do, but also different ways of reacting to a given situation.
   - Verbal communication in which group members engage in heedful interactions to interpret situations, develop new ideas (Crossan et al., 1999), and discuss strategies about how they will respond in given situations (Orasanu & Salas, 1993). Klimoski (1994) suggests the willingness to disclose personal information arises from cohesion. However, some research suggests cohesiveness can reduce willingness to disagree and challenge others' views. Cohesiveness may lead to groupthink. Hence, Edmondson (1999b)

proposes that group psychological safety, "a shared belief that the team is safe for interpersonal risk taking" (p.354), is the key antecedent to group members participating in open communications in which group members reflect upon and reframe their ideas. The key is not only that interactions take place, but that they take place in a heedful (e.g., careful purposeful, attentive, conscientious) manner (Weick & Roberts, 1993).

3. Organizational Context
   - The presence of energizing organizational causes and common ways of valuing people with which group members "resonate," especially when promoted through training at the time the group is formed (Cannon-Bowers et al., 1993; Klimoski & Mohammed, 1994). When issues evoke strong emotional reactions relate to or create a sense of "who we are," the entity is likely to take ownership for the issue (Pratt & Dutton, 2000).
   - Training that provides declarative or procedural knowledge and conceptual understanding of cause and effect relationships (Cannon-Bowers et al., 1993; Klimoski & Mohammed, 1994). The training could relate to taskwork, teamwork, or organizational processes external to the group. Shared mental models include cause and effect relationships about what is known or believed to be true. Training provides an opportunity for organizations to present the institution's models of cause and effect relationships and provide sessions in which group members interact to develop and recognize shared mental models. (This concept is listed under organizational context as the organization typically needs to authorize the use of resources to conduct training.)
   - Freedom to interact with the system and receive feedback about consequences in a way that supports understanding of cause and effect relationships (Cannon-Bowers et al., 1993). When the group collectively perceives the consequences of actions in a way that tests or validates the validity of individuals' current mental models, shared models are more likely to be developed.
   - Leaders sharing expectations as well as their task and teamwork mental models (Cannon-Bowers et al., 1993). When leaders share their expectations, the group is no longer left to wonder "what is our purpose?" or "why were we organized into a work group?" As developing a collective sense of the group's charter is one of the tasks that must be completed for a group to move beyond the forming stage of group development (Scheck

& Kinicki, 2000), shared leader expectations promote the group development toward the norming stage where shared mental models are recognized and utilized.

- Supportive organizational culture and norms. Consistency between culture and practices that encourage teamwork support development of teamwork mental models (Druskat & Pescosolido, 2000). For example, if the organization formally says it wants to develop work groups but rewards individual performance, fails to provide training, or discourages use of time for groups to meet, the mental models developed are not likely to support teamwork.
- Environmental uncertainty. When the environment the group is serving is uncertain, as with task nonroutineness, conditions supporting the need for heedful interrelating and learning will be present (Druskat & Pescosolido, 2000) to enable group members to meet customer requirements or organizational performance objectives.

#### 2.2.6.2 Antecedents of Stewardship

In order for group stewardship to exist, a group must not only have shared mental models, but the content of the models must be supportive of stewardship. The core components of stewardship include a two-way covenant to a relationship based on mutual trust, commitment to values, and a sense of responsibility to act in the best interests of the organization. The antecedents of these conditions will be reviewed within the framework of job design, group conditions and organizational context.

1. Job Design
   - Interaction with group members and leadership to facilitate the development of relationships. Interpersonal trust is the "extent to which a person is confident in, and willing to act on the basis of, the words, actions, and decisions of another" (McAllister, 1995, p. 25). While cognitive trust grows out of evidence of trustworthiness such as competence and responsibility, affective trust relates to the emotional bonds between parties (Lewis & Weigert, 1985). As covenantal relationships are based upon commitment to a relationship (Graham & Organ, 1993), McAllister's (1995) research showing that affective trust grows out of interaction frequency, positive affiliative behaviors, and cognitive trust supports the importance of job design in assuring interactions among group members provide opportunities to develop relationships. The three job design features which support shared mental models, task and outcome

interdependence, nonroutineness of work, and clearly defined group membership, all tend to increase the level of interaction among group members through which members may develop affective trust given an appropriate quality of interactions. Job complexity appears to be related to job ownership, affective commitment, and job involvement (Pierce et al., 1992).

- Autonomy, meaningful work, potency, impact and feedback. Together these factors lead to a collective sense of intrinsic motivation or group empowerment (Elby, Freeman, Rush, & Lance, 1999; Kirkman & Rosen, 1999; Thomas & Jansen, 1996; Thomas & Tymon, 1997). Davis et al. (1997b) posit that the presence of intrinsic versus extrinsic motivation is a key difference between stewardship and agency theory. Van Dyne et al. (1994) found the "motivating potential" of jobs was strongly correlated with the degree to which a two-way covenantal relationships were present in the workplace. This may be because when the organization is perceived as granting choice, the perceived ability to control strengthens emotional attachment with the organization (Lawler, 1992b).
- Management across boundaries. The ability of group members to work across group boundaries makes work more meaningful and provides feedback that enables control (Ancona & Caldwell, 1992; Kirkman & Rosen, 1999).

2. Group Conditions and Organizational Context
   - Tenure. Emotional relationships take time to form. Continuance with a group and an organization increases likeliness that emotional bonds will develop (Mowday et al., 1982; Rousseau, 1989) and that a covenantal relationship will form (Van Dyne et al., 1994).
   - Trust. People are more willing to form open-ended commitments when there is trust between the parties involved. Conversely, cynics are distrusting of others' motives and therefore less likely to become vulnerable in open-ended relationships. Van Dyne et al. (1994) found cynics were less likely to engage in covenantal relationships. Spreitzer and Mishra (1999) found levels of trust were associated with the extent to which employees were highly involved in their work and felt part of the work group.
   - Desirable workplace goals and values. Covenantal relationships appear to be formed in the presence of a compelling vision and set of values which become part of the organization (Graham & Organ, 1993). People tend to identify with values and goals which enhance their self-esteem (Mael & Ashforth, 1992). Hence they tend to choose

roles, occupations, and organizations that are congruent with their values. Person-organization fit predicts satisfaction and organizational commitment (O'Reillly, Chatman, & Caldwell, 1991). Perceptions of job satisfaction and socially desirable workplace values affect the degree to which covenantal relationships form (Van Dyne et al., 1994).

- Reciprocally high levels of investment in employees and expectations. Covenantal relationships are typified by open-ended relationships where individuals have a holistic or unit-level view of their work that includes doing whatever is necessary beyond the narrow definition of one's job requirements. In return the organization may be expected to reciprocate by investing the necessary resources to support the group. Reciprocally high levels of investment are associated with increased levels of psychological commitment to the organization and perceived fairness (Tsui et al., 1997). In related studies researchers have found that perceived organizational support (e.g., organizational rewards, procedural justice, and supervisor support) is related to employee's emotional bonds to their organization (Eisenberger & Fasolo, 1990; Rhoades & Eisenberger, 2000).

### *2.2.7 Consequences of Group Stewardship*

Team effectiveness models often include three kinds of outcomes: performance related to productive output, the well being of group members, and group viability. The presence of stewardship would be expected to increase the level of effort and therefore both core job performance and organizational citizenship behaviors. Individuals with high levels of identification and internalized goals and values would be expected to be relatively aligned, satisfied, and have high levels of continuance with their organizations. While the effect of group stewardship has not been studied to date, studies of concepts related to group stewardship show results in the expected directions. (See Table 2.11.)

Factors related to group stewardship such as psychological ownership, identification, and internalized goals and values are associated with improved work group effectiveness. However, the way in which group stewardship influences group outcomes needs to be understood. Drawing from the literature on shared mental models, it appears that a shared mental model of stewardship works through improved group processes to positively influence group outcomes (Klimoski & Mohammed, 1994; Mathieu et al., 2000).

**Table 2.11. Consequences of Constructs Related to Stewardship**

| Independent Variable(s) | Effect | Outcome/Consequence | Source |
|---|---|---|---|
| Overall commitment | –<br>ns | Turnover<br>Performance | (Mowday et al., 1982) |
| Organization commitment | + | Extrarole behavior | (Pierce et al., 1992; Van de Walle et al., 1995) |
| Organization commitment | Ns | In-role behavior | (Van de Walle et al., 1995) |
| Identify with and Internalize goals & values both locally and with Organization | +<br>+<br>– | Overall satisfaction<br>Prosocial behaviors<br>Intent to quit | (Becker & Billings, 1993) |
| Internalization of supervisor goals and values | + | Supervisor ratings of performance | (Becker et al., 1996) |
| Value commitment | + | Performance & OCB | (Mayer & Schoorman, 1992) |
| Psychological ownership mediated by organizational commitment | + | Extrarole behavior | (Van de Walle et al., 1995) |
| Psychological ownership | Ns | In-role behaviors | (Van de Walle et al., 1995) |
| Psychological ownership | + | Job involvement | (Pierce et al., 1992) |
| Manager openness<br>Felt responsibility<br>Self-efficacy | + | Take charge behaviors | (Morrison & Phelps, 1999) |
| Pay for performance with<br>▪ Low value alignment<br>▪ High value alignment | <br>–<br>+/ns | <br>OCB<br>OCB | (Deckop et al., 1999) |
| Employee involvement | +<br>+<br>+ | Labor productivity<br>Innovation<br>Employee morale | (Spreitzer & Mishra, 1999) |
| ns = not statistically significant | | | |

Shared mental models (SMM's) of stewardship are likely to improve team processes in several ways. One effect is an improved efficiency of group work including a reduction in resources consumed by work groups in their communication, planning, and coordination processes. Rouse et al. (1992) found communication problems in simulated aircraft crews were arguably attributable to a lack of shared expectations and explanations of what happened in various situations. The presence of SMM's implies the presence of a set of articulated schemas that can be used to explain cause and effect relationships. These schemas can be generalized to new group situations to improve the speed, flexibility, and implementation of decisions (Walsh & Fahey, 1986).

Second, a SMM about group stewardship would be expected to improve the degree of group learning as well as the time to move through cycles of learning and action. Daft and Weick (1984b) posit that organizational interpretation, including development of shared meanings, precedes learning and action. The presence of SMM's is associated with positive affect among group members, trust, willingness to take risks, and confidence (Klimoski & Mohammed, 1994; Levine, Resnick, & Higgins, 1993). These constructs are similar to psychological safety, a construct related to the level of group learning (Edmondson, 1999b).

Third, SMM's of stewardship would be expected to lead to high levels of proactiveness. Shared mental models not only create the confidence to act, but would be expected "to energize and motivate team relevant behavior" (Klimoski & Mohammed, 1994, p. 425). Psychological ownership engenders job involvement and proactive behaviors to protect the target of ownership (Pierce et al., 1992). In the presence of commitment to the organization, psychological ownership leads to organizational citizenship behaviors, actions that go beyond the core requirements of one's job (Van de Walle et al., 1995). Pearce and Ensley (2000) found the presence of a shared vision among group members was positively associated with altruism and courtesy behaviors and negatively associated with social loafing, an attempt to escape from responsibilities.

Fourth, SMM's of stewardship should associated with high levels of alignment with respect to organizational goals. One of the most important roles of SMM's is the creation of a shared set of expectations (Cannon-Bowers et al., 1993). Given that stewardship is associated with internalized organizational goals, a collective set of values that guide the formation of expectations, and a belief that actions in the best interest of the organization promote personal welfare, the expectations resulting from group stewardship would be expected to be aligned with the organization's interests (Bligh et al., 2000).

## 2.3 LEARNING

This section reviews the literature relevant to learning in work groups. First, organizational learning and its relevance to group learning will be reviewed. Then the construct of group learning process as well as its antecedents and consequences will be presented. The overall organization of this section is shown below.



### *2.3.1 Organizational Learning*

The concept of learning in organizations can be traced back at least to Frederick Taylor, the father of scientific management. He believed that with clear tasks and goals, feedback, training, experimentation and mutual support, learning could be transferred to improve the efficiency of workers (Weisbord, 1987). However, the current tremendous popularity of the learning organization concept grew from the work of Peter Senge and his colleagues at MIT. Senge (1990) defined the learning organization as one that continually expands its capacity to create its future. Others have defined the learning organization as one in which employees are challenged to shape the organization's future, the organization gains insight from its own experience, improves its actions through better knowledge and understanding, and creates and refines the capabilities needed for success (Ulrich, Jick, & Von Glinow, 1993). The following definition captures many of the concepts used to define learning organizations.

> The learning organization is one that learns continuously and transforms itself. Learning takes place in individuals, teams, the organization and even the communities in which the organization interacts. Learning results in changes in knowledge, beliefs, and behaviors. Learning also enhances organizational capacity for innovation and growth. The learning organization has embedded systems to capture and share learning (Watkins & Marsick, 1993, pp. 8-9).

While the learning organization describes an organization characterized by certain capabilities, the term organizational learning describes certain activities that occur at the

individual, team, or organization level of analysis in all organizations. A review of the organization learning literature finds four themes that can be drawn particularly from the writing of Dechant, Marsick and Watkins (Dechant & Marsick, 1991; Watkins & Marsick, 1993). First, learning is a process through which people invent ways to cope with obstacles, surprises and discontinuities in the course of doing their work. Second, organizational learning must go beyond the individual; it must involve collective actions such as making sense of ideas, experimenting, integrating perspectives, and taking action together. Third, organizational learning occurs when there is some set of mechanisms through which individual and work group knowledge, work procedures, and behaviors are captured and diffused across the organization so that they are retained in the organization's culture and knowledge base. Fourth, the organization must be connected to the external environment.

#### 2.3.1.1 Capabilities Leading to Organizational Learning: Generation and Generalization of Knowledge

A study of four hundred organizations in forty countries found organizational learning results from two key capabilities: generation of ideas, generalization of ideas that are generated (Yeung et al., 1999). Generation includes acquiring, discovering, inventing and sourcing ideas. The second key capability, generalization, includes idea sharing across boundaries so that they may be acted upon. The boundaries to be considered within an organization include time, physical space, and vertically as well as horizontally across the organization hierarchy.

The concept of generalizing learning across time is especially important. Without transfer of ideas over time, an individual, group or organization may continually need to reinvent ideas. Ways to generalize learning over time include incorporation of learning into an organization's culture or formally maintained knowledge bases. Although learning may be created by individuals and collectively in groups, organizational memory preserves behaviors, mental maps, norms, and values or time (Hedberg, 1981).

Organizations need to manage the balance between generation and generalization of ideas. March (1991) calls this need to balance the tension between exploration and exploitation. Crossan, Lane and White (1999, p. 522) state that "recognizing and managing

the tension between exploration and exploitation are two of the critical challenges of renewal and, hence, become a central requirement in a theory of organizational learning."

Jeung et al. (1999) utilized two dimensions to define four organizational learning types. The first dimension is the degree to which an organization relies upon exploration versus exploitation to learn. The second dimension is learning directly from one's own experience versus from the experience of others. The four learning types resulting from these dimensions are experimentation (explore/direct learning), continuous improvement (exploit/direct learning), benchmarking (exploit/ learn from others), and competency acquisition (explore/learn from others). Their study found several interesting correlations with the four learning types.

- Successful companies developed at least one learning type.
- The "clan" culture (loose, decentralized control, inward communication focus) was typical of organizations using teams (work groups).
- The clan culture was associated with organizations using experimentation, competency acquisition, and continuous improvement learning styles. This set of learning styles was associated with organizations effectively using a product differentiation strategy (value, flexibility), but was not significantly associated with organizations competing with a cost competitive (copying, imitation) strategy.
- Organizations successfully learning from direct experience (experimentation and continuous improvement learning styles) tended to have sufficient slack resources, satisfactory performance levels, and technology that is not easily transferred from one situation to another.

#### 2.3.1.2 The Role of Levels in Organizational Learning

To achieve a high level of organizational learning, the individual, work group and organizational levels of analysis must be addressed. Due to its role at the interface between the individual and organization, work group (e.g., team) learning is a key factor in development of the learning organization (Senge, 1990, p. 10). Crossan et al. (1999, p. 524) developed the 4I framework of organizational learning "containing four related (sub)processes – intuiting, interpreting, integrating, and institutionalizing – that occur over

three levels: individual, group and organization." The 4I's are the process through which groups act to enable learning in an organization.

- Intuiting – includes the subconscious process of developing insights, often through recognition of patterns. Expert intuition, recognition of how to apply information to do existing tasks, support exploitation. Entrepreneurial intuition, the ability to perceive new or emergent relationships that have not be utilized previously, support exploration.
- Interpreting – involves conscious development of cognitive maps and language to enable change in actions and understanding. Interpretation occurs with respect to a domain or environment. Cognitive maps influence what is inferred or seen in the domain. As Weick (1979) suggested, we are more likely to see what we believe than believe what we see. Common language and shared mental models are critical elements that enable people to engage in dialog.
- Integrating – focuses on coherent, collective action. As interpretive dialogs lead to a shared understanding, people are able to work from their shared understandings to engage in mutual adjustment and negotiate concerted collective action.
- Institutionalizing – preserves what individuals have learned. Even when people leave an organization, some of what they learned is embedded in the routines, strategies, structures, and information systems.

The 4I framework shown in Table 2.12 is a useful tool to integrate several organizational learning concepts into a model that explicitly considers three organization levels and their relationships to each other. The direction of information flow from intuition and interpretation is feed-forward to higher level as individuals and groups explore and develop knowledge. Institutionalization results in information flow toward groups and individuals so that knowledge can be exploited.

The 4I model of organizational learning is based upon four premises resulting in a central proposition (Crossan et al., 1999):

- *Premise 1: There is tension between assimilating new learning (exploration/generation) and using what has been learned (exploitation/generalization).*
- Premise 2: Organizational learning is multilevel.

- Premise 3: The three levels are linked by four social and psychological processes, the 4I's.
- Premise 4: Cognition affects action and action affects cognition.
- Proposition: The four "I" processes are related through feed-forward and feedback processes operating across levels.

**Table 2.12**. **Learning/Renewal in Organizations: Four Processes Through Three Levels**

| Process | Level | Inputs | Outcomes | Direction |
|---|---|---|---|---|
| **Intuiting** | Individual | Experiences<br>Images | Metaphors | Feed-forward to higher level |
| **Interpreting** | Individual & Group | Language<br>Cognitive map | Conversation dialogue | Feed-forward to higher level |
| **Integrating** | Group & Organization | Shared understanding<br>Mutual adjustment | Interactive systems | Feed-forward to higher level |
| **Institutionalizing** | Organization | Routines<br>Diagnostic systems | Rules and procedures | Feedback to lower levels |
| (Adapted from Crossan et al., 1999, pp. 525, 532) | | | | |

#### 2.3.1.3 Conditions Supporting Organizational Learning

The nature and extent of learning processes used may be expected to vary with the learning conditions in which an entity operates. Much has been written about the conditions necessary for learning. However, most of the learning conditions, learning facilitators (DiBella & Nevis, 1998), or learning disabilities (Yeung et al., 1999) discussed in the literature relate to organization-level or individual conditions and fail to explicitly consider the role of levels in the organization. Watkins and Marsick's (1993) framework in Figure 2.1 depicts the role of teams in the learning organization at the interface between the organization and the individual levels of analysis. The framework includes six action imperatives required to develop conditions that support work group learning. Each action imperative is associated with a specific level, the individual, group, or organizational level of analysis. Following additional research, two additional imperatives for organizational learning were added: leadership and measuring results (Watkins, Yang, & Marsick, 1997).

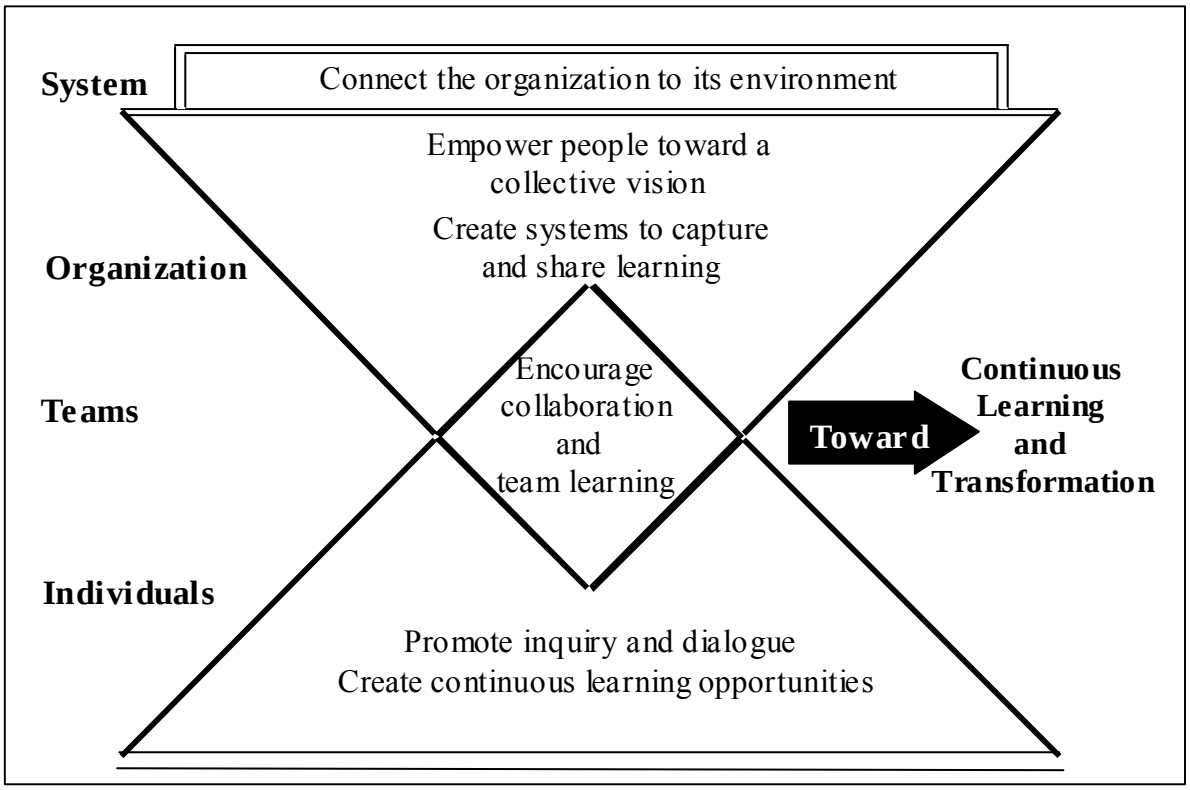



Figure 2.1. **Learning Organization Action Imperatives Support Learning at the team Level** (Source: Watkins and Marsick, 1993, p. 10)

The eight imperatives can be used to group the conditions other learning researchers and practitioners have prescribed to enable development of the learning organization.

- Connect the organization to its environment – includes environmental scanning, systems perspective, and interorganizational learning, and industry characteristics (DiBella & Nevis, 1998; Pedler, Burgoyne, & Boydell, 1991; Senge, 1990; Ulrich et al., 1993; Yeung et al., 1999). Environmental conditions drive an organization's creative tension for renewal (Crossan et al., 1999) which in turn determine the types of learning activities (such as exploration versus exploitation) which will enable an organization to be effective (Lynn, 1998; Yeung et al., 1999).
- Empower people toward a collective vision – includes empowerment, shared vision, rewards, resources (Watkins & Marsick, 1993), performance gap (DiBella & Nevis, 1998), rewarding flexibility and participative policy (Pedler et al., 1991).

- Create systems to capture and share learning – includes strategy and slack resources to enable resilience to the shock of change, structure and culture to support creation and sharing of ideas (Watkins & Marsick, 1993), curiosity and openness (DiBella & Nevis, 1998). Some researchers describe learning orientations such as benchmarking, continuous improvement, acquiring skills and experimenting as the processes through which organizations learn or develop learning capability (DiBella & Nevis, 1998; Yeung et al., 1999). However, with respect to their influence on teams, these orientations seem to be a what Pedler et al. (1991) refer to as a learning approach to strategy, part of the system created to capture and share learning as well as an influence on the extent to which teams engage in basic learning processes including experimenting, reframing, and crossing boundaries.
- Encourage collaboration and team learning – includes appreciation for teamwork, promotion of open inquiry and dialogue, and operating principles held by team members (Senge, 1990; Watkins & Marsick, 1993).
- Promote inquiry and dialogue – includes inquiry and dialogue skills (Watkins & Marsick, 1993) supported by personal mastery and awareness of mental models (Senge, 1990). Creating conditions where team members feel psychological safety (e.g., conditions where team members share the belief that it is safe to engage in interpersonal risk taking such as speaking up, asking questions, or trying new roles) may be especially important to enabling team learning behaviors (Edmondson, 1999b).
- Create continuous learning opportunities – includes capabilities, will, and job design (Watkins & Marsick, 1993), continuous education, operational variety and internal exchanges (DiBella & Nevis, 1998; Pedler et al., 1991).
- Strategic leadership for learning – supervisory capability and support for teams (Watkins & Marsick, 1993), involved leadership and multiple advocates for ideas (DiBella & Nevis, 1998).
- Measuring results – includes financial and knowledge measures (Watkins et al., 1997), and concern for measurement (DiBella & Nevis, 1998).

### *2.3.2 Work Group Learning*

As organizations move toward flatter, less hierarchical organizations, teams (e.g., work groups) are being called upon to solve highly complex problems (Katzenbach & Smith, 1993). Senge emphasizes that "teams, not individuals, are the fundamental learning unit in modern organizations. This [is] where the 'rubber meets the road'; unless teams can learn, the organization cannot learn" (Senge, 1990, p. 10).

Despite the importance of group learning to the development of organizational learning, until recently relatively little has been written to define group learning or to delineate individual, group and organizational roles in developing learning. As early as 1965, Cangelosi and Dill (1965) suggested learning is a series of interactions occurring at the individual, group and organizational level. However, the same learning processes were assumed to occur at each level. A literature review of the most cited organizational learning papers from 1965 through 1995 found little consensus about the roles of organizational levels, how organization levels relate in the learning process, or the role of cognition and behaviors in learning (Crossan et al., 1995). The organizational and individual levels of analysis dominate most research about learning in organizations.

While group level learning has generally been neglected, there are a few exceptions. For example, Stata (1989) suggested organizational learning occurs through collective insights, knowledge, and mental models developed in groups while the individual and organization provide memory.

The writings co-authored by Dechant, Kasl, Marsick and Watkins also explicitly consider the role of the group in learning organizations (Dechant & Marsick, 1991; Kasl et al., 1997; Watkins & Marsick, 1993; Watkins & Marsick, 1996). They define team learning as "a process through which a group creates knowledge for its members, itself as a system, and for others. . . . [It is] an interrelated set of processes in which collective thinking and action play a central role" (Kasl et al., 1997, p. 229). Similarly, Watkins and Marsick define group learning as "the mutual construction of new knowledge and the capacity for concerted, collaborative action" (Watkins & Marsick, 1996, p. 6). This second definition recognizes the need for group processes as well as the value added by group learning.

The following sections consider the ways in which groups learn. Section 2.3.2.1 considers group learning process, the cognitive and action-oriented processes that characterize group learning behaviors. Then section 2.3.2.2 considers group learning modes, the extent and frequency with which group learning processes are used. Section 2.3.2.3 proposes contributions of the learning literature to the work group effectiveness literature. In sections 2.3.2.4 and 2.3.2.5 antecedents and consequences of work group learning are presented.

#### 2.3.2.1 Work Group Learning Processes

The terms change, learning, adjustment, and adaptation have been widely but inconsistently used in the literature relating to learning. Differing views relative to the roles of cognition and behavior in learning contribute to the differences in the way these terms are used. Learning may consist of adjustment in the way events are interpreted due to shared understanding, cognition, or the new responses that are developed based on interpretations, behaviors (Daft & Weick, 1984a). A review of 15 influential learning papers found thirteen referred to both cognition and actions as part of the learning process (Crossan et al., 1995). While it appears that learning frequently is used to refer to both cognition and action processes, the review of influential papers found considerable variety of opinion as to which should be considered the dominant process. To deal with this problem, Fiol and Lyles (1985) propose the appropriate levels of effort applied to cognitive development versus behavioral change (e.g., actions) may appropriately vary with the demands of the environment within which an entity exists.

The organizational learning literature was reviewed to find work group learning constructs associated with distinct cognitive and action-oriented scales. Most organizational learning instruments have been developed through consultancy with a practioner rather than a research-based approach (Romme & Ron, 1997). A 1995 review of twenty-one learning organization assessment instruments listed two that emphasize the role of all three levels of analysis, the individual, group and organization levels (Van Buren & Lucandano, 1995). Neither instrument explicitly differentiates between the cognitive and behavioral components of work group learning. One instrument, the Strategic Learning Assessment Map (Bontis & Crossan, 1999), considers the knowledge level of groups and the feed-forward and feedback of information through work groups. This instrument considers the relative extent to which a group is contributing to organizational learning (e.g., generating) versus utilizing generalized

organizational learning rather than the extent to which the group is learning. The second instrument, Dimensions of the Learning Organization Questionnaire (DLOQ) (Watkins et al., 1997; Yang, Watkins, & Marsick, 2000), considers collaboration and team learning as one of seven key dimensions. The team learning dimension (e.g., scale) includes only cognition or attitudinal items such as freedom to adapt goals, revising thinking as a result of group discussions, and confidence the organization will act upon group recommendations.

Two survey instruments found in the group learning literature specifically consider group learning. Edmondson (1999b) utilized a single team learning behavior scale including items related primarily to information gathering, reflection and group processes. Dechant and Marsick (1993) developed a theoretical learning model explicitly considering both cognitive and action-oriented behaviors: framing, reframing, integrating perspectives, experimenting, and crossing boundaries (see Table 2.13 for definitions). Their analysis found the items associated with the five constructs were highly interrelated; factor analysis did not support distinct constructs. Three of the constructs are cognitive (framing, reframing, integrating perspectives) while two are actions (crossing boundaries, experimenting).

**Table 2.13. Definition of Group Learning Constructs**

| Learning Construct | Definition |
|---|---|
| Framing | The team's initial perception of an issue, situation, person, or object based on past understanding and present input. |
| Reframing | The process of transforming perceptions into a new understanding or frame. May involve challenging initial perspectives and working out consensus |
| Experimenting | Team action is taken to test hypotheses or to discover and assess impact of actions. May involve systematic, planned testing or trial and error to observe the results of actions. |
| Crossing boundaries | Individuals seek or give information, views, and ideas through interaction with other individuals or units. Boundaries can be physical, mental, or organizational. Boundary crossing involves brining into the team the ideas, insights, information or data from outside the team. |
| Integrating perspectives | Team members synthesize their divergent views such that apparent conflicts are resolved through dialectical thinking, not compromise or majority rule. |
| (Adapted from Dechant & Marsick, 1993 p. 7; Kasl et al., 1997 p. 230) | |

Research into the behaviors or strategies individuals use to learn has found the expected distinction between cognitive and action-oriented behaviors associated with learning at the individual level of analysis. While individual and group-level learning do not necessarily include the same processes, finding distinct cognitive and action-oriented behaviors seems consistent with the belief that groups engage in cognitive and action-oriented behaviors. Warr and Downing (2000) proposed three cognitive and three behavioral (i.e., action-oriented) learning strategies. The cognitive strategies included reproduction/rehearsal without reflection on meaning, organization to identify key issues and schemas, and elaboration to examine implications of new information in light of existing knowledge. The action-oriented learning strategies included interpersonal help-seeking, seeking help from written materials, and learning through trying things out in practice. Factor analysis of items developed for use in an educational setting supported the presence of the three proposed action-oriented behavioral strategies. Only two cognitive factors emerged. One was included items from the proposed rehearsal strategies scale. The other cognitive factor was called active reflection and included the proposed elaboration and organization learning strategy scales.

Research with individuals working in three call centers (Holman, Epitropaki, & Fernie, 2000) utilized the six learning strategies proposed by Warr and Downing (2000). This research also found distinct cognitive and action-oriented behavioral factors. Homan et al.'s (in press) factor analysis of call center employee learning strategies supported the presence of the same three action-oriented behavioral learning strategies Warr and Downing (2000) found. The cognitive items factored into three constructs, the original rehearsal construct and two new constructs related to active reflection. One active reflection factor contained *externally*-oriented items related to thinking about how one's work fits into the organization and the work others do. The second active reflection factor included *inwardly*-oriented items related to how new information influences the way one should prioritize work or current mental models.

#### 2.3.2.2 Modes of Work Group Learning

Relating the group dynamics literature to work group learning, Kasl et al. (1997) suggest the way in which a group works together as a learning system may be described by one of four modes ranging from fragmented to continuous (see Table 2.14). As work groups

progress toward the continuous mode, group members progress in the extent to which their efforts are aligned, knowledge is collectively created, and the frequency with which the group creates collective knowledge. The term learning mode was chosen to indicate that although groups develop in their ability to act as a learning system, change tends to be nonlinear, i.e., not always a one-way stepwise process.

**Table 2.14 Modes of Team Learning**

| Learning Mode | Definition |
|---|---|
| Fragmented | Individuals learn separately, but the team as a whole is not learning. Members retain their separate views and may not be committed to working as a team. |
| Pooled | Individuals share information and perspectives to promote team efficiency and effectiveness. Small clusters of individuals may learn together, but there is not yet an experience of having knowledge that is uniquely the team's own. |
| Synergistic | Members create knowledge mutually. The team actively experiments with new ideas and behaviors. Members are committed tot heir roles as team players to innovate, create, integrate and share knowledge outside the team |
| Continuous | The team operates in a synergistic mode habitually |
| | (Source: Dechant & Marsick, 1993; Kasl et al., 1997) |

#### 2.3.2.3 Contributions of Group Learning Literature to Work Group Effectiveness Theory

As described in section 2.1, work group effectiveness research has tended to relate group effectiveness to structural features such as the design of team tasks, team composition, and a context assuring information, resources, and rewards (for example, see Hackman, 1987). Organizational learning has tended to focus on cognitive and interpersonal factors that promote effectiveness. A review of the work group effectiveness and organizational learning literatures "reveals markedly different approaches and a lack of cross-fertilization between them" (Edmondson, 1999b, p. 350). My review of the literature suggests several concepts that could inform work group effectiveness research. Each of the following bullet points begins with a concept shared by the both literatures. Then the contribution from the learning literature is specified.

- It is well recognized that one must chose the right management style such as control versus involvement depending upon the complexity and coordination involved in work

(Lawler, 1992a). However, the organizational learning literature contributes the need to think about exploitation versus exploration (March, 1991) as one designs complementary business strategies, organizational learning styles, culture, and communication systems to support core work processes (Yeung et al., 1999).

- The team effectiveness literature recognizes the need to foster scanning and planning coupled with an appropriate organizational informational system to support creativity (Hackman, 1990). However, the learning literature contributes the need to think about when information sharing versus exploration (for example, dialog to develop ideas or coordinate) is appropriate for a given situation.

Gnywali, Stewart, and Grant (1998) build on the work of Daft and Lengel (1986) to propose the types of learning that are most effective in two different information contexts. A context is equivocal when there is ambiguity and confusion with different frames of reference contributing to multiple and conflicting perspectives. A context is uncertain when members lack critical information, especially when there is a gap between the information an organization possesses and the information possessed by those who need to perform a task. Gnywali et al. (1998) proposed two learning modes. One, the informational mode, uses formalized methods to acquire, distribute and store information. The second, the interactive mode, occurs when people interact, engage in dialogue, and develop a shared understanding about issues and a viable solution. A laboratory study supported their hypotheses that the effect of using a particular learning mode will be beneficial or harmful depending upon the context. In an equivocal context, dialogue supports commonality of understanding while information sharing may contribute to further ambiguity, overload and confusion. In an uncertain context, information sharing promotes accuracy of understanding while dialogue may actually reduce the commonality of participant's mental models.

The learning literature provides two concepts helpful in prescribing the appropriate purpose for learning interactions. First, as just described, the degree of uncertainty or equivocalness in the context can inform the extent to which information sharing versus interaction processes will promote effectiveness. Secondly, the 4I model (Crossan et al.,

1999) is helpful in prescribing the appropriate roles for each level in the organization to promote learning which in turn should lead to organizational effectiveness.

- Group development theory (e.g., forming, storming, and norming to performing) has changed little since Tuckman's work several years ago (Tuckman, 1965; Tuckman & Jensen, 1977). Groups need both task and process capabilities (Jones & Bearley, 1994). The learning literature contributes at least three concepts to our understanding of group development.

  1. A team might be perceived to be at the norming or performing stage without ever truly engaging in the cognitive learning processes. Creative teams must engage in both cognitive (framing or sensemaking, reframing, and integrating) and action (crossing boundaries, experimenting) processes when learning is needed (Kasl et al., 1997).
  2. The learning literature adds the concept of psychological safety, trust and mutual respect among group members, as a key factor to facilitate learning behaviors within the work group (Edmondson, 1999b).
  3. Learning research regarding tacit learning at the group and organizational level should (and is) beginning to inform team training. Team members may be unaware of knowledge and skills they possess even though they use them effectively. Knowledge and skills individuals use while part of their team may entirely disappear once they are removed from the group. Hence, members carry group learning but may not be able to transport it to different situations. This research is beginning to suggest "when learning efforts must be centered around enhancing group or unit-level response repertoires rather than focusing on individual training or formal systems" (Sitkin, Sutcliffe, & Weick, 1998, p. 12).

- Gladstein's (1984) study of group effectiveness found that boundary management and intragroup process items loaded onto separate factors. Boundary management had a positive but non-significant effect upon subjectively-rated group effectiveness. Edmondson (1999a) also found boundary spanning did not contribute *directly* to group effectiveness. She hypothesized that boundary spanning may contribute more to organizational effectiveness than group effectiveness. A complementary hypothesis would be that boundary spanning provides input to cognitive learning processes and acts

*indirectly* to increase group or organizational effectiveness through increased group stewardship, learning behaviors, and alignment with organizational objectives.

- Employee involvement in teams and TQM are mutually supportive in promoting effective teams (Lawler, Mohrman, & Ledford, 1992). The learning literature adds the need to consider the context when prescribing the quality improvement approach. The concepts of "zero defects" or "do it right the first time" may not be perceived to fit contexts where technological uncertainty is high and employees need to learn by failing (Sitkin, 1992). The learning literature contributes the idea that the three concepts underlying TQM, customer satisfaction, continuous improvement, and treating the organization as a system, should be applied based upon the context. Depending upon the context, it may be more appropriate to promote the application of total quality control or total quality learning (Sitkin, Sutcliffe, & Schroeder, 1994; Sutcliffe, Sitkin, & Browning, 1997).

#### 2.3.2.4 Antecedents of Work Group Learning

This section will outline the constructs believed to influence the extent of learning within work groups. There is a limited amount of literature upon which to draw for this section due to the emerging nature of work group learning research. Further, since group stewardship is a new construct, the extent to which antecedents of group learning discussed in the literature affect learning behaviors directly or through group stewardship has not been studied.

The antecedents of cognitive and action-oriented learning behaviors may differ somewhat (Axtell et al., 2000). The need or opportunity for the creation of ideas may be strongly influenced by task variables such as non-routineness of work, the breadth of the task and the opportunity for communication within and external to the group. However, implementation of ideas is likely to take group or organizational support. Group and organization norms such as the psychological safety to share new ideas and a high level of support for experimentation versus the perceived cost of experimental failures will influence the extent to which new ideas are explored.

As the literature related to group learning is just emerging, the literature related to creativity and innovation were reviewed for potential insights into the antecedents and consequences of group learning. Creativity has been defined as the production of novel and useful products, ideas, or procedures by employees "that provide an organization with important raw material for subsequent development and possible implementation" (Oldham & Cummings, 1996, p. 607). This construct appears to be closely related to the cognitive aspect of group

learning which includes the mutual construction of new knowledge (Watkins & Marsick, 1996) through an ongoing process of reflection, asking questions, and seeking feedback (Edmondson, 1999b). While some group learning behaviors such as adaptation of ideas developed elsewhere or integration of concepts into a mental models might not be construed as creation, it does seem that most or all creative behaviors (e.g., doing something for the first time or creating new knowledge,) are likely to be learning behaviors.

To be consistent with the proposed research model presented earlier, group learning antecedents will be considered within the framework of job design, group conditions and organizational context.

1. Job Design
   - Task and Outcome Interdependence. The need to work together to complete tasks promotes the exchange of information and increases the likelihood of common feedback that stimulates not only a shared mental model of the responsibilities but a common interpretation of cause and effect relationships that support group learning.
   - Nonroutine work requiring analysis. Non-routine work often involves dealing with difficult-to-analyze or equivocal situations which can benefit from dialog among group members (Gnywali et al., 1998). Challenging work is associated with increased individual creativity (Amabile, 1989). At the group level of analysis, Edmondson (1999b) presumed that unconstrained tasks with loosely defined criteria for success would benefit more from group learning than highly constrained tasks involving machine-paced assembly line work with little need to seek out and creatively apply information. This presumption could be a reasonable extension of research at the individual level of analysis. For example, George and Zhou (in press) found creativity was positively associated with complex tasks where there the means to the end was unclear or where there were multiple means to perform the task. The existence of rigid procedures has been found to diminish employee creativity (Shalley, Gilson, & Blum, 2000).
   - Autonomy, meaningful work, potency and impact. (Potency is a group-level variable while the other three are more related to job design. However the four constructs are grouped together here as they appear to act together to influence learning.) These constructs are associated with a sense of intrinsic motivation in individuals (Thomas &

Tymon, 1997) and have been shown to contribute to a collective sense of empowerment in work groups (Kirkman & Rosen, 1999). While Kirkman and Rosen (1999) found work group empowerment was positively correlated with group attitudinal outcomes (e.g., job satisfaction, organizational commitment, and team commitment) and performance outcomes (e.g., productivity, proactivity, and customer service), the mechanisms through which group empowerment worked to influence outcomes were not studied. Edmondson (1999b) studied the effect of team efficacy on group learning. (She defined team efficacy similarly to group potency as a collective belief in a group's capability to perform.) Edmondson found groups that felt capable of performing well demonstrated higher levels of learning. Similarly, Tierney and Farmer (2000) found creative self-efficacy and general task self-efficacy were positively correlated with supervisor creativity ratings.

2. Group Conditions
   - Psychological safety. Study of group characteristics suggests innovation generally increases when employees not only feel expected and encouraged to develop new ideas but also feel safe in participating in group processes (Axtell et al., 2000). Psychological safety is the shared belief that the work group is safe for interpersonal risk taking. It includes a belief that group members will not embarrass, reject or punish someone for speaking up (Edmondson, 1999b). Edmondson (1999b) found psychological safety mediated the influence of organizational contextual support and group leader coaching on learning behaviors. Other research has found that group member concern for the group's welfare motivates the interchange of information among group members which in turn contributes to the achievement of goals (Saavedra & Van Dyne, 1999).
   - Group stewardship. The effect of group stewardship on learning behaviors has not been studied. However, as its presence requires shared mental models leading to common expectations that support engagement in the best interest of the organization, the level of group stewardship could reasonably be expected to be positively correlated with both creative and action-oriented learning behaviors. Production ownership, the extent to which individuals felt ownership of their work and concern for production problems, is positively correlated with suggestions generated by shopfloor workers (Axtell et al., 2000). Parker and Sprigg (1999) found a sense of production ownership was positively

correlated with proactiveness, the tendency to enact environmental change, which could be associated with action-oriented learning behaviors such as experimenting or practical application of new ideas.

- Group composition. Although learning is a function of the individuals comprising the group, group learning is not likely to be the simple aggregate of individual learning. Group composition factors including diversity are likely to influence learning. Creativity is likely to be highest when groups are composed of individuals from diverse fields or having different backgrounds (Woodman, Sawyer, & Griffin, 1993). However, the process through which diversity influences group outcomes is not well understood. Group diversity may indirectly influence cognitive group processes through intragroup task conflict and intragroup emotional conflict (Pelled et al., 1999). Pelled et al.'s (1999) study found the following relationships in their study of forty-five work groups performing moderately to highly complex cognitive tasks:
  - Group longevity, functional diversity, and task conflict (e.g., the extent to which there were disagreements about processes, goals and tasks) were positively correlated with group effectiveness.
  - Emotional conflict, interpersonal clashes characterized by anger and negative feelings, was not significantly related with group effectiveness.
  - Group size and functional diversity was correlated with increased task conflict.
  - Task routineness and age diversity were correlated with reduced task conflict.
  - Group longevity interacted with functional diversity to reduce task conflict

  These findings may suggest that to the extent diversity stimulates task-oriented conflict or cognitive processes that expose alternatives and promote development of a comprehensive shared mental model of the work domain, diversity will enable learning.

3. Organizational Context

- Information and Resources. Knowledge of expectations, feedback about performance, the resources needed to perform work, and knowledge of institutional rules, standards, and policies embodying organizational knowledge are inputs to the intuiting and interpretation processes that should enable group learning. Edmondson (1999b) developed a scale to assess the supportiveness of the organizational context including the extent to which group members received appropriate information, assistance, training,

and recognition for excellent work. She found that group psychological safety fully mediated the influence of a supportive context on group learning behaviors. In other words, supportive conditions may work together to support development of a condition where individuals feel safe in working together which in turn enables group learning. An interaction approach to creativity suggests group creative performance is increased by the availability of slack resources and decreased by restrictions on information flows within the system (Woodman et al., 1993). Several studies have verified the importance of a supportive context to enable creativity. For example, Shalley and Gilson (2000) found the giving of recognition, value, and adequate time and resources for creativity was positively correlated with which creative and original outputs were developed.

- Supportive Supervision. Edmondson (1999b; 2000) found team leader coaching behaviors (e.g., availability for consultation and initiation of meetings to discuss progress) supported increased learning behaviors. Edmondson found supportive team leader coaching acted indirectly to increase learning behaviors through the creation of psychological safety. Somewhat similarly, Axtell et al. (2000) found that management and team leader support through collaboration, facilitation and feedback was significantly related to group member perceptions of participative safety but not with the level of shopfloor suggestions made by individuals. However, others have found that creativity is increased by supervision that supports group work and values contributions (Amabile, 1989).
- Researchers have also hypothesized that supportive supervision increases group learning and individual creativity indirectly through the creation of group or individual efficacy. However, these hypotheses have not been confirmed (Edmondson, 1999b; Tierney & Farmer, 2000).

#### 2.3.2.5 Consequences of Work Group Learning

Two significant changes occur in group members as a result of group learning. First, group learning results in collectively held new knowledge that is diffused among group members (Tompkins, 1995; Watkins & Marsick, 1996). As learning begins with the intuitions of individuals (Crossan et al., 1999), then clearly diffusion must take place for knowledge to be collectively held. Diffusion of knowledge takes place as the group interprets ideas and integrates new knowledge into its shared mental models. Therefore, as group learning occurs, group

members will increasingly hold a collectively shared vision, conform to group decisions, and be able to respond rapidly to questions about processes or their vision without referral to others (Tompkins, 1995).

The second change resulting from group learning is an expansion of capacity to take concerted, effective action (Kim, 1993; Tompkins, 1995; Watkins & Marsick, 1996). Group capacity to act should be increased by the extent group members have developed collectively held knowledge of group member abilities, commonly held principles or values, and technical knowledge about processes for which they are responsible. Groups demonstrating collective learning should be able to reach decisions more rapidly as group member's shared mental models reduce the time for the group to reach decisions. Groups should also be able to predict consequences of actions more accurately, utilize more of the group's members effectively, and increase the coordination among members (Tompkins, 1995).

Group learning may be self-reinforcing. Learning-oriented outcomes including perceived mastery (the opposite of learned helplessness), role breadth efficacy, production ownership, and skill utilization (Parker & Sprigg, 1999, personal correspondence with David Hollman) are also believed to create conditions which enable the formation of group stewardship and promote group learning.

Several outcomes of group learning at the work group-level are similar to those studied in team effectiveness models. Edmondson (1999b) found group learning led to increased levels of supervisor and self-assessed group performance. (The "team performance" scales included items assessing continuous improvement, quality, meeting customer expectations, and doing superb work.) Creativity is positively correlated with productivity (Amabile, 1989) and the quantity and quality of work performed (Oldham & Cummings, 1996). The extent of learning may be positively correlated with group attitudinal outcomes. Conditions associated with increased creativity have also been found to be associated with group member satisfaction, commitment, and reduced intentions to quit (Oldham & Cummings, 1996; Shalley & Gilson, 2000).

Group learning appears to be associated with increased levels of innovation although the empirical research on the topic has been limited (Axtell et al., 2000). Innovation has been defined as a process involving the generation, adoption, implementation and incorporation of new ideas or practices in an organization (van de Ven, Angle, & Poole, 1989). While creativity typically refers to the generation of ideas or suggestions, innovation is typically considered to be

a broader concept that includes both a suggestion phase and an implementation phase. Edmondson (2000) found increased levels of group learning were associated with more successful adoption of new technology. Higher levels of suggestions by shopfloor and call center employees were found to be positively significantly correlated ($p < 0.001$) with higher levels of innovation (Axtell et al., 2000; Holman et al., 2000).

---

The three sections in this literature review have described many concepts related to group effectiveness, group stewardship, and group learning. Antecedents and consequences relevant to the topic being reviewed were described in each section of chapter 2. More antecedents and consequences have been described than could be utilized in this research. In chapter 3 the selection of constructs to be utilized to test the research hypotheses will be described.

# CHAPTER 3 METHODOLOGY

This chapter describes the methods used to gather and prepare information for use in testing the research hypotheses described in chapter 1. Chapter 4 presents the results of testing each hypothesis.

The research methodology utilized is non-experimental survey research; the work groups examined were not randomly assigned to treatment groups and work groups were passively observed. Empirical data was gathered from work group members and their first level managers utilizing a survey questionnaire. Descriptive data relating to work group characteristics, the work being done and group management were also gathered for each work site.

This chapter begins with a section 3.1, the justification for the survey constructs and data gathering techniques that were included in the original research proposal. The balance of this chapter has been rewritten to describe how the proposed methodology was actually implemented. The overall organization of this chapter is shown below.

## 3.1 DATA COLLECTION INSTRUMENTS

This section describes the constructs used in this research and the rationale for their selection. Once the constructs to be utilized have been described, the operational measures for each will be described. This section concludes with the instrument used to gather descriptive information about each work group.

### *3.1.1 Selection of Constructs*

The central concepts being developed in this research are group stewardship and group learning. The literature review in chapter 2 described potential antecedents and consequences of these concepts. Following a preliminary literature review, candidate constructs for inclusion in the final model were tested with 112 employees in eleven work groups in two organizations. (The pilot test constructs, scale items and resulting scale reliabilities are provided in Appendix A.) Based upon the pilot test and further literature review, a final set of operational constructs was selected. The constructs used to assess antecedents, group stewardship, group behaviors, and effectiveness outcomes are described in sections 3.1.1.1 through 3.1.1.4.

#### 3.1.1.1. Antecedent Constructs

Table 3.1 summarizes the antecedents believed to promote the development of group stewardship and group learning as well as the operational construct(s) proposed for each concept. The existing stewardship literature proposes antecedents of *individual* stewardship. However, group stewardship requires the presence of a collectively-held mental model of how a *group* perceives its responsibilities. Accordingly, Table 3.1 lists the antecedents of both shared mental models and individual stewardship. The antecedents of shared mental models and individual stewardship taken together represent the set of antecedents expected to promote the development of group stewardship. Closely related constructs are grouped within the same cell in the table.

The antecedents listed in Table 3.1 are those expected to have the strongest influence on the development of group stewardship and group learning. Some potential constructs were not included to control the expected length of the survey instrument. For example, a construct specifically related to information and resources enabling work group members to perform their tasks was also dropped due to the presence of several related constructs: clear purpose, investment in employees (which includes training to enable task capabilities), group-level performance feedback, and supportive supervision.

**Table 3.1 Antecedents of group stewardship and learning and operational constructs**

| **Model Grouping/** Concept | Shared Mental Models | Individual Steward-Ship | Group Learning | Operational Construct |
|---|---|---|---|---|
| **Task Design** | | | | |
| Task interdependence | X | X | X | Task interdependence |
| Outcome interdependence | X | X | X | Clear Purpose |
| Bounded collection of people in a social system | X | | | Intact Social Entity |
| Nonroutine work, uncertainty | X | | X | Work requiring analysis |
| Freedom to interact with system<br>Autonomy | X | X | X | Autonomy |
| Meaningful work | | X | X | Meaningful work |
| Impactful work | | X | X | Impactful work |
| | | | | |
| **Group Conditions** | | | | |
| Self-efficacy<br>Group potency | | X | X | Group potency |
| Group development<br>Time together as work group | X | | X | Group tenure |
| Difference in knowledge levels or beliefs (diversity) | X | | X | Diversity of sex, tenure with organization, age, and education level |
| Heedful interactions<br>Trusting relationships<br>Psychological safety | X | X | X | Affect-based trust |
| Common values | X | X | | Internalized values |
| Identification | | X | | Identification |
| Feedback of consequences<br>Holistic expectations | X | X<br>X | X | Group-level feedback<br>Boundary management responsibility |
| | | | | |
| **Organizational Context** | | | | |
| Training for procedural and conceptual knowledge<br>Investment in employees | X | X | | Investment in employees |
| Information and resources | X | | X | Clear purpose,<br>Investment in employees |
| Supportive supervision | X | | X | Supportive supervision |

A construct specifically related to group-level performance focus (versus individual-level focus, Tsui et al., 1997) was not included due to the selection of related constructs. Constructs related to group feedback and recognition were included in the proposed construct set. These

constructs were expected to support a holistic perspective consistent with group stewardship and the enhancement of organization-level outcomes.

The concept of boundary management was refined following further review of the literature subsequent to the pilot test. The original boundary management scale included items related to the extent of the group's *responsibility* to perform boundary management as well as the extent of boundary crossing *behaviors* of group members. However, perceptions of task responsibilities or task structure should be separated from work-related behaviors. Further, items related to boundary-crossing behaviors were included in a learning behavior scale. Accordingly, boundary management responsibility (Bailey et al., 1998) is proposed as an antecedent construct while crossing boundaries is proposed as a learning behavior (Watkins & Marsick, 1993).

While psychological safety among group members was used in the pilot test, completion of the literature review suggested that affect-based trust should be used to assess group relationships in the proposed field study. Group psychological safety, a belief that the group is a safe place for risk taking, has been shown to be an antecedent of group learning (Edmondson, 1999b). However, the presence of a stewardship relationship is based more upon commitment to a relationship, affective trust, than commitment to values or fairness in interpersonal relationships (Graham & Organ, 1993) which support development of psychological safety. Psychological safety appears to be similar to cognitively-based trust which supports development of affect-based trust (McAllister, 1995). Accordingly, due to the need to limit the number of constructs in this study, affect-based trust was selected and the psychological safety construct was not used.

Although not prominent among concepts the literature suggests may lead to group stewardship, inclusion of the pay-performance linkage is proposed for two reasons. First, it is unclear whether pay-performance perceptions support development of stewardship. Some believe that a balanced and equitable distribution of rewards is part of the context within which stewardship develops (Block, 1996). However, others writing about stewardship suggest it is based upon commitment to relationships while pay in exchange for performance is an extrinsic motivator characterizing an agency-based (Davis et al., 1997b) or transactional relationships (Graham & Organ, 1993). Second, including the construct enables studying the conditions under which a perceived pay-performance linkage influences group processes (i.e., learning and proactive behaviors) and group outcomes (i.e., employee satisfaction and performance). For

example, inference from a study of organizational citizenship behaviors and value commitment (Deckop et al., 1999) suggests strong perceptions of pay-performance linkage might actually reduce the levels of proactive and group learning behaviors when group stewardship levels are low.

#### 3.1.1.2. Group Stewardship

A significant objective of this research was proposing and validating a scale to assess the presence of group stewardship. As no scale for individual or group-level stewardship was found in the literature review, six items related to the concept of stewardship were developed for evaluation in the pilot test. With either four or five items, the scale had an acceptable Cronbach's alpha of 0.76 (Nunnally, 1978). Five items from the pilot test were utilized with three wording changes to enhance consistency with the underlying concept of stewardship.

- Change wording to consistently tap into group member feelings. In the pilot test, three items asked about feelings while three asked about actions.
- Change the word "ownership" to "accountability" in one item. The word "ownership" may be more likely to tap into psychological ownership or possession than "accountability" which carries the sense of holding a responsibility in trust for another.
- Change the word "my" to "our" in three items. Three pilot test items used "my" while three used the word "our." "My" tends to indicate personal possession while "our" which has a more collective sense. Recent research with the construct psychological ownership found items such as "this organization is ours" factored separately from "this is my organization" in some cultures (personal conversation with Tatiana Kostova, co-author of Pierce et al., 2001).

To enable a test of construct divergence between group stewardship and a related concept, a psychological ownership scale was included in the survey. A five-item psychological ownership scale was used (Pierce et al., 1992). In non-American cultures the two items with the word "our" have sometimes loaded to a separate factor from those using the word "my" (personal conversation with Tatiana Kostova, Pierce et al., 2001). However, in American studies conducted since 1992, the scale items have quite consistently loaded to a single factor with strong internal consistency good reliability coefficients (personal correspondence from Jon L. Pierce).

#### 3.1.1.3. Group Learning and Proactive Behavior.

Group learning is generally recognized to be a multidimensional concept with cognitive and action-oriented learning behaviors (Crossan et al., 1999; Fiol & Lyles, 1985; Gephart, Marsick, & Van Buren, 1997; Watkins & Marsick, 1993). Little research utilizing the construct of group learning has been conducted; multi-dimensional group learning scales used in one study did not yield distinct cognitive and action-oriented factors (Dechant & Marsick, 1993). In the pilot test, Edmondson's (1999b) group learning and Kirkman and Rosen's (1999) proactiveness scales were used in an attempt to tap into cognitive and action-oriented behaviors. However, these two scales contained some similar items. A review of correlations among scale items following the pilot test suggested it was not likely the two scales would load on unique factors if subjected to factor analysis.

Two recently completed empirical studies of learning behaviors successfully demonstrated the multi-dimensional nature of learning by individuals in educational and call center settings (Axtell et al., 2000; Holman et al., in press). Four scales used by Holman et al. (in press) and one additional scale to assess boundary-crossing behaviors to exchange information with people external to the group were used. The learning constructs to be tested are: framing (developing perceptions, Holman et al.'s extrinsic work reflection), integrating group members' concepts (Holman at al.'s intrinsic work reflection), crossing boundaries to access or share information within the team (Holman et al.'s interpersonal help seeking), crossing boundaries external to the team, and experimentation to test ideas (Holman et al.'s practical application).

The level of effort or degree of engagement in performing group tasks would be expected to be positively correlated with levels of group stewardship. Previous studies have found several behaviors are related to conditions associated with group stewardship:

- in-role behaviors (i.e., the core requirements to perform one's job) and extrarole behaviors (i.e., doing more than narrowly defined core job requirements, such as work to improve the context within which the job in performed) (Van de Walle et al., 1995)
- take charge behaviors (Morrison & Phelps, 1999)
- the disposition to deal proactively with problems (Kirkman & Rosen, 1999).

The proactive behaviors construct was chosen from among the possible set of behaviors because it is consistent with the idea of high-involvement responsiveness sought by many who initiate the

use of work groups. Additionally, the concept should be distinct from learning. While learning involves thinking and action associated with the development of new capabilities or knowledge, proactiveness is related to a propensity to attack problems head on or engage in performing needed work.

#### 3.1.1.4 Outcomes

Three outcomes were chosen for study. Improved performance and customer service are outcomes sought by those who initiate the use of work groups. Employee job satisfaction could also be expected to increase due a supportive work environment, affective relationships, and the application of ideas generated through group learning.

### *3.1.2 Operational Measures*

To assess the constructs described in section 3.1, existing scales were selected for use where possible. In some cases, such as Holman et al.'s (in press) scales for individual learning, wording was adapted to the group level of analysis. With the exception of demographic questions, all items use a 6-point Likert-type scale. Generally speaking, the reliabilities of proposed scales including a newly developed scale for group stewardship were found to be acceptable either in the pilot test or in prior published research (Nunnally, 1978). However, as shown in the comparison of the pilot test items and the items used in the final survey displayed in Appendix B.1, some items were modified after the pilot test in an effort to improve internal reliabilities, consistency with the conceptual definition of the construct, or readability. The survey constructs, operational definitions and reliabilities in this research are listed in Table 3.2. The proposed items for each construct in the proposed survey are shown in Appendix B.1.

Separate surveys were developed for group members and their supervisors (or coaches). A few constructs listed in Table 3.2 were only in the group member or supervisor surveys. Supervisors were not asked to assess group member identification, internalization of values, and psychological ownership. Group members were not given items that assessed boundary management responsibility, customer service levels, and performance levels. These differences help to control the length of the survey.

## Table 3.2 Constructs and Reliabilities for Proposed Field Survey

| Construct | Operational Definition | Source | Reliability | | # Items |
|---|---|---|---|---|---|
| | | | Pub-lished[1] | Pilot Test | |
| **Group Definitional** (Also part of task and group constructs) | | | | | |
| Clear Purpose | The degree to which the work group has a well-defined mission/purpose that is understood by group members | (Wilson, Van Aken, & Frazier, 1998) | | 0.72 | 4 |
| Intact Social Entity | Members of the work group see themselves and are seen by others as members of a clearly defined group. | (adapted from Wilson et al., 1998) | -- | -- | 3 |
| Interdependence | Group members must share information, resources, and work co-operatively to complete their tasks | (Bailey et al., 1998) | | 0.51 pilot items not used | 3 |
| **Task and Group Constructs** | | | | | |
| Boundary Management Responsibility | The group is responsible to manage relationships with individuals or groups outside the work group | (Bailey, Van Aken, & Cohen, working paper) | 0.77 7-item binary scale | 0.66 revised | 4– item 6-pt scale |
| Identification with group & organization | A person employs elements of the (1) group and (2) organization to define him/herself. | (Mael & Ashforth, 1992) | .83 | 0.64 with 4 items | 5 items x 2 |
| Internalization of Goals & Values | Individuals share common goals and values with the (1) group and (2) organization | (Becker et al., 1996) | 0.84 4-items | 0.69 0.74 | **4 x 2** 3 x 2 |
| Need for Analysis | The work requires creativity, originality and analysis. | (developed from Jehn, 1995; Van de Ven et al., 1976) | | 0.61 0.65 revised | **4** 3 |
| Autonomy | The work group has been given decision-making authority for its work. | (four items from Kirkman & Rosen, 1999) | | 0.68 revised | 4 |
| Impact | The group perceives that its work has a significant influence on the success of the organization. | (adapted from Kirkman & Rosen, 1999) | 0.93 7 items | 0.54 revised | 4 |
| Meaningfulness | The group perceives its work as important, valuable, and worthwhile | (adapted from Kirkman & Rosen, 1999) | 0.92 5 items | 0.71 | 4 |
| Potency | A collectively held belief by the group that it can be effective | (adapted from Kirkman & Rosen, 1999; Spreitzer, 1995) | | 0.78 | 4 |
| Affect-based trust | A willingness to take interpersonal risk due to emotionally-based relationships. | (adapted for group from McAllister, 1995) | 0.89 | -- | 5 |
| Group Demographics/ Diversity items | Age of group members, tenure in group & organization, gender, group size, education level of group members | (Jehn, 1995) | n/a | n/a | 6 |
| **Organizational Context** | | | | | |
| Supportive Supervision | Supervisor behaviors encourage group effectiveness and show trust for group members. | (adated from Kirkman & Rosen, 1999) | | 0.81 | 4 |
| Feedback | The group receives feedback that helps them evaluate group performance. | (adapted for group from London, Larsen, & Thisted, 1999) | | 0.82 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Invest in Employees | The organization takes a long-term view in developing employee skills and providing opportunities. | (adapted from Tsui et al., 1997) | | 0.70 | 3 |
| Pay-performance link | Group members perceive a strong link between their performance and pay. | (adapted for group from Deckop et al., 1999) | 0.71 | 0.33<br>0.58<br>revised | 3<br>2 |
| **Central Psycho-social Constructs** | | | | | |
| Stewardship | A collectively held sense of responsibility to act as co-owners or partners in the best interest of the organization. | Developed for this research | -- | 0.74<br>0.75 | **5**<br>4 |
| Psychological ownership | A state where an individual feels as though the target of ownership or a piece of it is "theirs" (i.e., "it is mine"). | (Pierce et al., 1992) | 0.92 | -- | 5 |
| Group learning | A ongoing process of reflection and action leading to the creation of new knowledge | (Edmondson, 1999b) | | | |
| Group Learning sub-scales | Experimentation - practical application | (adapted for group from Holman et al., in press) | 0.70 | -- | 3 |
| | Crossing Boundaries - external to work group | Developed for this research | -- | 0.77 | 4 |
| | Crossing Boundaries - within work group | (adapted for group from Holman et al., in press) | 0.82 | | 3 |
| | Frame/reframe - developing perceptions | (adapted for group from Holman et al., in press) | 0.72 | -- | 3 |
| | Integration – of group member concepts | (adapted for group from Holman et al., in press) | 0.72 | -- | 5 |
| Proactive Behaviors | Taking initiative to seek continuous improvement and work through obstacles. | (adapted from Kirkman & Rosen, 1999) | 0.90<br>7 items | 0.76 | 5 |
| **Outcomes** | | | | | |
| Customer Service | The extent to which customers are provided high quality, reliable and timely service or products meeting their needs. | (adapted from Kirkman & Rosen, 1999) | 0.91<br>5 items | 0.81 | 4 |
| Performance | The extent to which a group meets or exceeds its goals in a timely fashion. | (adapted from Kirkman & Rosen, 1999) | | 0.89 | 5 |
| Employee Satisfaction | The extent to which employees are satisfied with their jobs. | (Hackman, 1982) | | 0.76 | 3 |
| | [1] number items is listed when different than the pilot test | | | | |

Finding reliable scales for the intact social entity and interdependence constructs has been problematic. Hackman (1982) provided a guide for observing work groups to help identify intact social entities. Using these concepts, earlier work by a Virginia Tech graduate student to develop a scale resulted in internal reliability scores between 0.47-0.48 (work associated with Wilson et al., 1998). For the pilot test, items relating to identification were used. However, this construct relates more to whether or not group members define themselves in terms of group

characteristics rather than the extent to which the group's work has been designed or bounded such that group membership is clear to those within or external to the work group. For the final survey, three items were developed to tap into the extent to which group membership is clearly defined. The wording in the interdependence items used in the pilot survey were also modified in an attempt to improve scale reliability.

Consistent with other research studying the effect of group diversity on group effectiveness (Pelled et al., 1999), five measures of group diversity were obtained: age, education, group tenure, organizational tenure, and gender. To assess diversity of age, education, and organizational tenure, all measured in years, the coefficient of variation (standard deviation divided by the mean) will be used (Allison, 1978). To assess diversity of gender within groups, a categorical variable, an index recommended by Teachman (1980) will be used:

$$H = - \sum_{i=1}^{k} P_i \, (\ln P_i),$$

where k is the number of categories and P is the proportion of group members in each category. In this case, k = 2 (male, female). Using Teachman's formula, if a group of ten people had one female, H = 0.32, while if the same group had three females, H would be 0.61. If a gender is not represented in a group, then the calculation $P_i$ x ($\ln P_i$) is not used for that category. In the example just given, a group with 10 males and no females would have a diversity index of H equal to zero.

### *3.1.3 Gathering Descriptive Information about Work Groups*

Appendix B.4 contains the observer's questionnaire used in conjunction with the field survey instrument. Most of the questions were drawn from Hackman's (1982) Guide for Observations of Work Teams. An observer's questionnaire was completed for each site with the assistance of a human resource or production manager who was the primary contact for the site. The questionnaire was completed during a site visit for 10 organizations and via a phone interview with the organization manager for the out-of-state site.

The purpose of the observer's questionnaire was to provide a complementary view of the work and context within to supplement data obtained from the survey questionnaires. Information gained through observation of the work place was expected support interpretation of the field survey and provide rich descriptive information that might be missed if using only closed-response questions. Additionally, some quantitative performance information about

group productivity, quality, or customer service levels may be available to check the perceptual performance ratings obtained from the survey.

## 3.2 DATA COLLECTION PROCEDURES

Prior to survey administration, a Virginia Tech application for approval of research involving human subjects was approved by the Institutional Review Board (IRB). The IRB also approved the pilot test survey.

Companies were invited to participate in the survey in exchange for feedback that would help them assess the status of their work groups to support the development of group stewardship. An additional benefit offered was the opportunity to compare their feedback with that of other companies participating in the survey. Potential participants were also advised that my interest was the opportunity to conduct research. There was no charge to participate in the research.

With the exception of one out-of-state organization that participated in the research, the researcher visited each organization at least three times. When an organization expressed interest in participating in the research, a site visit was made to assure there was a fit between the research requirements and the work groups potentially to be surveyed. The researcher returned to the site to oversee administration of the survey. Feedback on how each team scored on the proposed constructs was provided during the final visit to each site.

The surveys were generally administered to all group members at the same time. In a few cases, employees who could not leave their work area to take the survey with other group members took the survey with another group from their organization. In all cases except for the out-of-state organization, the researcher was present at all sessions where the survey was given or present the first several times the survey was given to demonstrate and then observe the person who would administer the survey in my absence.

All group members taking the survey received the same materials: a set of printed instructions for taking the survey that were read to the group, the survey questionnaire, and a Scantron form to record answers (Appendix B.2). For supervisors taking the survey, the survey package included an instruction sheet and the survey questionnaire with columns for circling a response for each work group supervised (Appendix B.3). Participants completed the survey in twenty to thirty-five minutes. Participants were given as long as they needed to complete the

survey. As surveys were completed, the researcher or site coordinator quickly looked over the response sheet to assure the group number was recorded and to see if all questions had been answered. If some questions were missed, survey respondents were asked if they would be willing to respond to those questions. The surveys were then placed in a plain envelope indicating the survey site.

The work group observation form to record descriptive information was completed within one week of the time the surveys were completed. No significant changes in personnel or layoffs occurred within the weeks immediately preceding or following the survey. However, during the time of survey administration, mid-April through May, 2001 there was some concern that the economy was softening and production orders were slightly down at many of the sites.

## 3.3 THE SAMPLING FRAME

A sampling frame is the working population from which the sample may be drawn. As this research studies group stewardship, group learning, and associated antecedents and consequences in work groups, the sampling frame needed to meet at least two requirements. First, the collections of individuals studied needed to be real work groups. Second, the groups studied need to provide a range of responses on anticipated moderator and process variables. These requirements are described further in sections 3.3.1 and 3.3.2. Section 3.3.3 provides a profile of the organizations participating in the research.

### *3.3.1 Assuring Real Work Groups*

Two requirements were used to admit prospective work groups into this study. First, they needed to meet three definitional criteria to be considered real work groups: be an intact social entity, demonstrate task interdependence, and have a clear purpose. Second, the groups must have been established for at least three months. While the definitional criteria were intended assure the context would permit real work groups to develop, the time requirement assured people would have at least a few months to develop group norms.

Prior to accepting groups into the study, each organization contact was interviewed and some questions from the work group observation form were discussed. The organization contact was either the plant manager or a direct report such as the HR or production manager. The type and extent of interdependence was discussed to assure that there at least some pooled, sequential or reciprocal interdependence among group members. With the exception of the out-of-state

organization, a site visit allowed verification that there was spatial or task separation between groups to enable groups to develop as intact social entities and have a clearly defined product or service to produce. For the site not visited, a series of e-mail and a phone interview were used to determine that each group worked in a separate portion of the city and was clearly distinct from other groups. Further, group members within each location had shared, rotated administrative duties that required them to interact with each other as well as work within a relatively close distance of other group members. All organization contacts provided the shortest time any of the groups had been together to assure all groups had been together for at least three months.

The intent described in the research proposal was to utilize survey results from the three group definitional constructs to perform a final screening for admission of groups into the study. However, the intact social entity and interdependence scales were not usable due to poor scale reliabilities, range restriction for the intact social entity responses, and the non-normal underlying distributions for some item responses. Table 3.3 displays the scale reliabilities for the group definitional constructs.

**Table 3.3 Scale Reliabilities for Group Definitional Constructs**

| Construct | No. Items | Group Member | Supervisor |
|---|---|---|---|
| Interdependence | 3 | 0.547 | 0.492 |
| Intact Social Entity | 3 | 0.480 | 0.403 |
| | 2 | 0.664 | 0.801 |
| Clear Purpose | 4 | 0.806 | 0.833 |

Several attempts were made to develop a usable task interdependence scale. For example, unsuccessful attempts were made to combine items from the observation form with the group member or supervisor responses. However, exploratory factor analysis did not support any ways to combine items; the observation form responses loaded onto three separate factors while the three survey items loaded onto a fourth factor. The underlying problem resulting in poor reliabilities with the interdependence items used may be that the items tap into different forms of interdependence. The survey questions ask about initiated, received, and general interdependence while the observation form assessed sequential, pooled and reciprocal interdependence.

A review of the intact social entity scale responses found that the mode (most common response) was six on a six-point scale for one of the group member and two of the supervisor items. In other words, the responses were so badly skewed to the high end of the scale as to be non-normal and unusable in analyses requiring generally parametric distributions.

Range restriction probably also reduced the intact social entity and interdependence reliabilities. The prescreening process removed groups that would have been likely to have low levels of interdependence or a low sense of intact social entity. Even when the values of scale items are highly correlated, as the range of values is restricted the observed correlation between items will be reduced resulting in a lower scale reliability statistic.

Due to the above problems, the decision was made to include all groups that met the group definitional requirements based upon information obtained during the prescreening process and confirmed with the work group observation form as well as three additional screening criteria:

- Item responses should not have a bimodal distribution. This check was assessed by reviewing the histograms of group member and supervisor responses for each item.
- Only responses from full-time manufacturing or service teams were used. Data received from a project management and leadership teams within the organizations surveyed was not used.
- Each work group needed to have at least three members and at least fifty percent of a group's members had to complete usable survey responses.

### *3.3.2 Anticipated Response Range for Moderator and Process Constructs*

The analysis described in section 3.3.1 was to assure real work groups were selected. However, it was also necessary to assure that there was sufficient between-group variability to test hypotheses (Kozlowski & Klein, 2000). For example, the degree to which the work being done requires analysis is hypothesized to moderate the extent to which group learning occurs. To test this hypothesis, one of the requirements was to have work with relatively high and relatively low needs for analysis. Failure to have an adequate differentiation between the highest and lowest levels, range restriction, would greatly reduce the power of statistical tests to find a significant effect even when a practically significant effect was present.

Steps were taken during the screening process to minimize difficulties due to range restriction. An effort was made to find work groups providing a range of values for three of the constructs: analyzability of work, the degree of stewardship present, and the extent to which the groups worked together to learn collectively. Questions in the Work Group Observation Form, Appendix B.4, were used to help obtain a range of responses. The following bullet points list

items in the Work Group Observation Form that helped select work groups with a range of responses across the three constructs.

- Analyzability of work. Challenging work, requirement for initiative/autonomy in task.
- Group stewardship. Time the group has been together, levels of responsibility for group management, degree of shared leadership within group, requirement for initiative/autonomy in task, opportunity for group to influence quality or quantity of work performed.
- Group learning. Ability of group members to see each other and communicate easily, interdependence, performance feedback, requirement for initiative/autonomy in task.

To aid in finding the required range of responses, participants from a range of industries with varying management styles were sought. Some participants had scored highly in their state's quality award while others were rather traditionally managed with more poorly defined processes. The set of organizations included a variety of work from discrete manufacturing to batch processing and service work. The sample of organizations included some with profit sharing plans or incentive pay while others had no formal pay-for-performance plan.

### *3.3.3 Organizations Participating in the Research*

Ten organizations were selected to participate in the research. Within each organization there was one plant or district-level manager who had responsibility for the work groups involved in the research. One organization was in the southeastern part of the United States while the others were in the mid-Atlantic states region. In the following paragraphs, the work done by each organization is briefly described.

Auto parts company (Auto). This plant produces assembles for the automotive industry. The primary work performed includes heat treating and assembly of components. Much of the work is performed in small manufacturing cells. The facility has won national and state quality awards.

Site services office (SSvc). The work groups included in the survey provide purchasing support, administrative, security and operations support for a large facility. The management group in this office is responsible for contract management. However, the groups utilized in the survey were not management teams.

Engineer and assemble-to-order operation (Engr Assemble). This plant produces components for electrical signal transmission. The components vary from relatively simple commercial components to applications requiring close-tolerance applications for the military.

The manufacturing groups surveyed produce the machined parts and assemble the components. The operations support groups consisted of administrative personnel providing services such as accounting, payroll, and inside sales system support. The plant has been heavily involved in the quality movement and development of teams for over ten years. The plant has won recognition at the second-highest award level in its state quality award program.

Tax service offices (Tax). This service operation provides financial services to individuals. As some of the work involves tax preparation, a number of employees work primarily during the tax season. The district manager is responsible for establishing systems, hiring and training personnel. The supervisors of each group meet together for training. Group members in each office use very similar work systems and software to perform their work. The district manager has been initiating pay and teamwork systems that will reduce annual turnover in the offices she oversees.

Environmental engineering company (Enviro). This small company has offices in three states. The teams surveyed in this organization provide engineering services. The engineers within each group work together to provide a complete service for their clients.

Plastics extrusion company (Plastics). This manufacturing operation uses extruded plastics technology to insulate wire and make plastic guards for telephone pole guy wires. The service groups included maintenance and a small administrative staff. This organization is a relatively small, privately held single-plant organization that has been traditionally managed.

Precision machining plant.(Machine). The employees in this plant are primarily involved in machining operations. The plant has a mature pull-system process (lean manufacturing), a well-developed 5S program with visual cues to guide operations, and a gain-sharing program. The plant manager and HR manager chose a cross section of groups that they believed would represent high, medium, and low levels of teamwork.

Chemical batch processing plant (Chem Batch). These groups worked in the portion of a chemical plant producing product for commercial sales. The groups were comprised of small teams of people that ran successive portions of a chemical batch process that runs twenty-four hours per day. The people within each group work closely together doing relatively routine tasks in an environment that requires high levels of cooperation and safety awareness. Group members belong to a union.

Electric Motor Plant 1 (EM1). The group surveyed at this plant produces electrical motors used for motion control. This production group had been in existence for nine months since the production line was established as a lean manufacturing operation to meet customer requirements. The group members were originally carefully chosen and developed to be a closely knit team. However, the group had experienced supervision changes and a series of personnel issues during the last few months prior to taking the survey.

Electric Motor Plant 2 (EM2). The groups in this operation were responsible for the cores, hand winding and automated winding of electrical motors. At the time the survey was administered the group members were organized into functional process groups.

Information was gathered to describe the work environment and demographics as shown in Table 3.4. The top section indicates the number of production and service groups in each organization. The "6-month turnover %" row provides the proportion of people that had been in their current group for less than six months. The supervisor and group member demographic sections are self-report information from the surveys. Using one-way ANOVA, the organizations differed significantly at $p < 0.001$ on all demographic items except for supervisor age.

The Pay-Performance Link section of Table 3.4 provides information on merit raises and incentive pay. Each organization was asked to provide the largest percentage merit or incentive pay increase employees had received during the past three years. The magnitude of incentive increases was determined by either a gain-sharing system or productivity/piecework performance. Where these types of pay increases were available, the basis for determining the increase, individual, group or plant, is indicated.

Leadership within work groups was found to take several different forms:

- Mgr Apt – management appointed group members to leadership or other roles within the group.
- Coord – there was a formal system in place where the group selected group members to fill roles coordinator roles such as safety, administration, quality, production planning or reporting.
- Shared – some combination of management-appointed and formal coordinator roles.

## Table 3.4 Organizations Participating in the Research

| Production / Service | Auto Prod | SSvc Svc | Engr Assemble Prod | Engr Assemble Svc | Tsx Svc | Enviro Svc | Plastics Prod | Plastics Svc | Machine Prod | Machine Svc | Chem Batch Prod | Chem Batch Svc | EM1 Prod | EM2 Prod | Subtotal Avgs Prod | Subtotal Avgs Svc | Total / Avg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Groups | 15 | 3 | 27 | 7 | 8 | 2 | 3 | 3 | 11 | 1 | 16 | 3 | 1 | 8 | 81 | 27 | 108 |
| Levels from Site Manager to Group | 3.9 | 2.0 | 4.7 | 3.0 | 2.0 | 1.5 | 3.0 | 2.7 | 3.0 | 2.0 | 5.0 | 3.7 | 2.0 | 2.0 | 4.0 | 2.5 | 3.6 |
| Avg. Group Size | 12.4 | 6.3 | 11.8 | 8.0 | 10.1 | 8.0 | 6.7 | 7.7 | 5.1 | 6.0 | 4.2 | 7.0 | 14.0 | 5.4 | 8.7 | 8.2 | 8.6 |
| Years since groups were formed (avg) | 5.7 | 6.0 | 4.4 | 2.9 | 5.3 | 6.0 | 6.0 | 6.0 | 3.0 | 2.5 | 3.0 | 1.3 | 1.0 | 1.8 | 3.9 | 4.3 | 4.0 |
| 6-month turnover % | 0.0 | 0.0 | 1.6 | 6.5 | 30.8 | 16.7 | 10.8 | 0.0 | 0.0 | 0.0 | 5.6 | 0.0 | 28.6 | 15.4 | 3.9 | 12.0 | 6.0 |
| **Supervision Demographics** | | | | | | | | | | | | | | | | | |
| Yrs with Group | 2.6 | 4.2 | 3.7 | 4.0 | 0.6 | 3.9 | 5.3 | 4.5 | 3.0 | 5.5 | 4.4 | 3.5 | 0.3 | 0.3 | 3.2 | 2.9 | 3.1 |
| % Female | 0 | 0 | 13 | 50 | 88 | 0 | 33 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 43 | 14 |
| Supervisor Age | 42 | 45 | 46 | 41 | 48 | 45 | 45 | 49 | 47 | 61 | 43 | 45 | 37 | 45 | 44 | 46 | 45 |
| Yrs with Org | 11 | 15 | 14 | 11 | 4 | 8 | 20 | 11 | 7 | 8 | 21 | 18 | 18 | 23 | 15 | 10 | 14 |
| **Group Members Demographics** | | | | | | | | | | | | | | | | | |
| Yrs with Group | 5.3 | 7.1 | 3.9 | 4.4 | 4.2 | 4.3 | 4.8 | 6.3 | 6.0 | 5.7 | 2.6 | 4.5 | 1.1 | 3.6 | 4.2 | 4.8 | 4.4 |
| % Female | 18 | 41 | 72 | 72 | 79 | 42 | 71 | 69 | 2 | 0 | 38 | 11 | 31 | 47 | 46 | 60 | 50 |
| Yrs Education | 13 | 15 | 13 | 13 | 14 | 16 | 12 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 14 | 13 |
| Age | 37 | 54 | 42 | 38 | 48 | 33 | 46 | 48 | 43 | 43 | 40 | 41 | 40 | 37 | 40 | 44 | 41 |
| Yrs with Org | 7 | 13 | 13 | 12 | 7 | 5 | 12 | 12 | 15 | 20 | 7 | 13 | 5 | 8 | 10 | 10 | 10 |
| **Pay-Performance Link: Maximum increases during last three years** | | | | | | | | | | | | | | | | | |
| % Merit | n/a | 2.0 | 3.0 | 3.0 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 1.7 | n/a | n/a | 1.0 | 1.2 | 1.0 |
| Basis | | Ind | Ind | Ind | | | | | | | | Ind | | | Ind | Ind | Ind |
| % Incentive | n/a | 1.0 | n/a | n/a | 90.0 | 20.0 | n/a | n/a | 3.9 | 2.7 | 3.0 | 2.7 | n/a | n/a | 1.1 | 28.7 | 1.4 |
| Basis | | Ind | | | Ind | Ind | | | Group | Ind | Plant | Plant | | | Grp/Plt | Ind/Plt | |
| **Group Management Characteristics** | | | | | | | | | | | | | | | | | |
| Ldrship w/in Group | Mgt Apt | Mgt Apt | Coord | Coord | Mgt Apt | Mgt Apt | Mgt Apt | Mgt Apt | Mgt Apt | Mgt Apt | Mgt Apt | Mgt Apt | None | Informal | | | |
| Group Management | Supv | Supv | Shared | Shared | Supv | SMT | Supv | Supv | Shared | Shared | Supv | Supv | Supv | Supv | | | |
| **Work Characteristics** | | | | | | | | | | | | | | | | | |
| Challenge | 2.7 | 3.7 | 3.0 | 3.6 | 4.0 | 5.0 | 2.0 | 2.7 | 2.9 | 4.0 | 3.3 | 3.7 | 2.0 | 3.0 | 3.0 | 3.7 | 3.1 |
| Discretion | 2.9 | 3.0 | 3.0 | 3.9 | 1.0 | 5.0 | 3.0 | 3.0 | 3.0 | 4.0 | 3.1 | 3.0 | 2.0 | 3.0 | 3.0 | 2.8 | 2.9 |
| Machine Control | 3.5 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.0 | 3.7 | 4.1 | 5.0 | 3.5 | 3.7 | 3.0 | 5.0 | 4.2 | 4.7 | 4.4 |
| Customer Feedbk | 3.1 | 3.0 | 4.0 | 4.0 | 5.0 | 5.0 | 3.3 | 3.0 | 3.5 | 5.0 | 3.0 | 3.0 | 1.0 | 3.4 | 3.5 | 4.1 | 3.6 |
| Influence | 3.0 | 4.0 | 4.0 | 3.9 | 5.0 | 3.0 | 3.0 | 3.0 | 4.1 | 5.0 | 1.9 | 3.0 | 3.5 | 3.0 | 3.3 | 4.0 | 3.4 |

- None – group members did not have any group roles beyond their production tasks.
- Informal – no formal system in place to utilize group members in roles beyond their production tasks.

The form of external manager associated with group varied between organizations. Most had traditional supervisor roles. One organization had self-managed teams (SMT's) of engineers located remotely from headquarters with no formal group leader role. Two organizations had a form of shared leadership where group members and their supervisor formally shared leadership roles. While these two organizations had relatively mature teamwork systems, the groups were not self-managed teams.

The work characteristics section characterizes the work performed along several dimensions. The rating scales for these dimensions are described in the key for the work group observation form, Appendix B.4, section 5: group task. As an example, machine control assesses the degree of technological versus group control. The observation uses a scale from one to five where one represents work under full machine control and the group member primarily supplies parts to the machine. On this scale a five would include manual work such as hand wiring a motor where there is no machine intervention or pacing of work.

## 3.4 SAMPLE SIZE

Adequate sample size is necessary to permit stability of results and provide for adequate statistical power to find existing relationships. Individual-level data was used for factor analysis to validate constructs. To test the research hypotheses, the appropriate level of analysis (i.e., individual group or plant) was first determined. It was expected that most relationships would be appropriate to analyze as group-level constructs. Hence, both the number of survey respondents and the number of work groups surveyed was considered to assure an adequate sample size.

### *3.4.1 Number of Survey Respondents*

There are many different guidelines about the number of survey respondents required to obtain factor analysis results that will be stable and can be replicated. Perhaps the most commonly cited guideline is five to ten subjects per item up to about three hundred subjects (Tinseley & Tinseley, 1987). DeVillis (1991) suggests 100 subjects would be too few for a twenty-item factor analysis, but for a ninety-item factor analysis, 400 might be adequate. The number of subjects required tends to increase with the number of factors expected, lower correlation among variables, and fewer items per scale (Pedhazur & Schmelkin, 1991). Many of

the scales being utilized had been previously tested and were believed to have relatively high within-scale correlations. The largest number of items tested together during scale validation was eighteen. Given these requirements, rules of thumb suggest three to four hundred responses should be adequate for either exploratory or confirmatory factor analysis.

The survey responses were split into two halves. One half was first used for exploratory factor analysis. The second half was used to test the resulting constructs with confirmatory factor analysis. This required a total sample size of six to eight hundred responses. Eight hundred four group member survey responses were received.

### *3.4.2 Number of Work Groups*

The number of work groups required for the survey was primarily driven by the need to assess mediating and moderating variable relationships utilizing multiple regression. A sample size large enough to support future research employing data envelopment analysis (DEA) was also a requirement.

The number of groups required for multiple regression analysis depends upon the number of independent variables in the equation, the expected effect size (the degree of correlation among variables), the type I error specified, the statistical power desired, and the degree of generalizability required (Hair, Anderson, Tatham, & Black, 1998). For example, with a sample size of 100 groups, type I error = 0.05, and power = 0.80, the minimum $R^2$ that can be found to be significant is 0.10 with two independent variables and 0.15 with ten independent variables. To maintain acceptable generalizability of results, the number of observations per independent variable should never fall below a five-to-one ratio; a ratio of 15:1 or more would be desirable (Hair et al., 1998).

An adequate number of work groups was obtained: 108 work groups with three or more responses and data from at least one-half of the group members. Of these 108 groups, usable supervisor responses were obtained for 100 groups. Given that no more than five independent variables were included in any multiple regression equations, the ratio of observations (groups) to independent variables was 20:1.

Data envelopment analysis (DEA) will be used to analyze the data in future post hoc analysis. For DEA, the number of inputs and outputs to be used drives the required number of work groups, called decision making units (DMU's) in DEA terminology. The number of DMU's which could appear to be on the efficient frontier is at least equal to the product of the

number of inputs and outputs. Hence, the number of DMU's needs to be much greater than the product of the number of inputs and outputs (Boussofiane, Dyson, & Thanassoulis, 1991). Prior to conducting DEA, the number of inputs (independent variables) to be considered will be reduced using exploratory factor analysis to develop a reduced set of relatively orthogonal constructs. If, for example, seven input variables and the three output variables are used, the number of DMU's (work groups) sampled will need to be much greater than twenty-one. The sample of one hundred work groups is expected to enable DEA analysis with a moderate number of input and output variables.

## 3.5 ANALYSIS TO PREPARE FOR TESTING OF HYPOTHESES

After the surveys were administered, several steps were taken to prepare the data for hypothesis testing. Each Scantron form was submitted to University Testing Services for scoring and assigned a number. Data from supervisor surveys was entered manually into a spreadsheet. Data preparation and exploratory data analysis were performed to assure the data was entered correctly as described in section 3.5.1. Then analysis was conducted to assure the reliability and validity of the operationalized constructs as described in section 3.5.2. Once these tests were complete, the testing of the research hypotheses described in chapter 4 was performed.

### *3.5.1 Data Preparation and Exploratory Data Analysis*

All data was initially gathered into a master Excel spreadsheet. Excel was chosen because it could open the plain text files University Testing Services provided with the Scantron data. A research assistant entered the group member and supervisor data into a spreadsheet and kept a careful log of issues found. Checks for out-of-range responses were conducted utilizing Excel's MAX and MIN functions to check the minimum and maximum scores for each question. The researcher reviewed the accuracy of procedures and checked at least five percent of the data in each file. Then utilizing the "codebook," the survey questions were grouped according to constructs. The scores for any reverse coded items were reversed (i.e., 6=1, 5=2, and etc.).

A few surveys were discarded because of missing responses. If a survey was missing any responses in the constructs related to group stewardship (i.e., attitudes toward the organization) or the learning behaviors, the survey was dropped. For these two sets of constructs, a missing data point could have been estimated by using the mean of other scale responses. However, this would tend to reduce within-scale variance and thereby influence factor analysis or aggregation decisions. Therefore, the conservative approach of dropping the surveys with missing responses

was taken for these constructs central to the research where new scales were being developed. For other constructs, if only one response was missing, the construct mean was used to replace the missing data point. A few responses were also discarded because the respondent only used the extreme response levels of one and six.

During the confirmatory factor analysis (CFA) stage of analysis, AMOS's outlier diagnostics capabilities were used to determine the Mahalanobis' distance for each observation while assessing the constructs related to group stewardship and learning. Observations with distances much higher than normal with p-values less than 0.001 were examined. If a reason for the outlier behavior was found the survey was dropped from the data set. The primary justification for dropping outliers was that the respondent was primarily using extreme responses (one or six) and gave inconsistent responses on the reverse coded questions within the survey. AMOS was also used to assure the multivariate normality of responses for items subjected to CFA.

After the incomplete and outlier responses were dropped, the data set was reviewed to select the groups with responses for at least fifty percent of total group members and a group size of at least three. The original set of 804 survey responses was reduced due to incomplete responses on survey constructs (23), outliers (12), and usable responses for less than 50% of group (22) leaving a total of 747 responses from 108 work groups. (Surveys were not dropped from the database for partial missing demographic information.) Total group membership in the 108 groups was 926 people. For the 108 groups, 782 responses were received for a response rate of 84.4%. Of the responses received, 95.5% were usable. Therefore, usable surveys were received for 80.7% of group members.

Once the data was initially prepared, exploratory data analysis was conducted. Then the data was imported into SPSS for further assessment. Calculation of the mean, standard deviation, normality tests, and histograms helped determine which survey questions could be considered for use in factor analysis. The data distributions were generally reasonably symmetrical. The histograms revealed no signs of bimodality. However, there were several cases where the mode was equal to the maximum scale value making the data unusable for parametric analysis in general and exploratory factor analysis in particular. The survey items in Table 3.5 had modes equal to the high scale value and were dropped from further using in forming any scales used in hypothesis testing.

**Table 3.5 Unusable Survey Questions where Mode Equals the High Scale Value**

| | Response Frequencies | | | |
|---|---|---|---|---|
| Construct Item: Question | Supervisor Responses | | Group Member Responses | |
| Scale Response Level | 5 | 6 | 5 | 6 |
| Impact 1: My work group has a positive impact on this organization's customers. | 35 | 60 | 260 | 275 |
| Impact 4: My group makes a difference in this organization. | 45 | 60 | | |
| Intact Social Entity 1: Our group members know who is and is not a member of this group | 25 | 75 | 250 | 350 |
| Intact Social Entity 3: It is clear to us which people are members of our work group. | 53 | 53 | | |
| Meaningful Work 1: We feel that the work we do is meaningful. | | | 250 | 390 |
| Meaningful Work 2: Our group feels that its purpose is important. | 30 | 85 | | |
| Meaningful Work 3: We believe that our work is significant. | 45 | 60 | | |

### *3.5.2 Assessing Psychometric Properties of Survey Scales*

The survey scales were assessed to assure they were reliable, measured a single construct, and demonstrated divergent validity so they could be used to test the research hypotheses. The scale assessment followed the four-step process described in the research proposal. First, exploratory factor analysis was used to assure scale items loaded to a common factor. Second, internal reliabilities of scales were assessed using the coefficient alpha, generally referred to as Cronbach's alpha (Cronbach, 1951). Third, to assure constructs were distinct, exploratory factor analysis with orthogonal rotation was conducted using scale items from related constructs. The correlations among constructs emerging from factor analysis were reviewed. For constructs related to group stewardship and group learning, the data set was split. Exploratory factor analysis was run on the first split half. The emerging constructs were subjected to confirmatory factor analysis and tests were conducted to assure discriminant validity. Fourth, the convergence of related scales assessed by different methods was assessed.

The first three steps of the scale development process were performed for groups of related constructs. Group member responses were used for all scale analysis except for the

customer service and performance outcomes measures assessed by supervisors. The analysis of each of the following groups of constructs is presented in subsections 3.5.2.1 through 3.5.2.7 after which convergence among scales measured by different approaches is discussed.

- task design – clear purpose, intact social entity, interdependence, need for analysis
- empowerment – autonomy, impact, meaningfulness, potency
- group relationships – identification with group, internalized group values, affect-based trust
- organizational context – supportive supervision, feedback, investment in employees, (perceived) pay-performance link
- attitude toward organization – psychological ownership, group stewardship, identification with organization, internalized organization values
- group behaviors – group learning, proactive behaviors
- outcomes – customer service, performance, employee job satisfaction

Due to difficulties with intact social entity and interdependence scales, clear purpose was also factor analyzed with the constructs related to beliefs about the group. While there were not enough service employees to conduct separate exploratory and confirmatory factor analyses, it did appear that the factor structures for production and service groups appeared to be nearly identical in preliminary exploratory factor analysis that was conducted. Therefore, service and production work group member data was utilized together throughout the analyses.

#### 3.5.2.1 Task Design

These scales include the problematic intact social entity and interdependence scales. As is shown in Table 3.6, all items factor cleanly into the anticipated factors with the exception of ISE2. While ISE1 loads to the same component as ISE3, as noted earlier, its usefulness is questionable due to the skewed distribution of responses. Those items clearly and meaningfully loading to one factor are shown in bold.

Reliability of the need for analysis scale improved from 0.591 to 0.623 if item ANAL3 was dropped. Exploratory factor analysis with only the four need for analysis items found ANAL3 loaded by itself on one factor while the other three items loaded to the same factor. Therefore, the final need for analysis scale was composed of ANAL1, ANAL2, and ANAL4.

The scale statistics for the task design constructs are shown in Table 3.7. Clear purpose has good scale reliability. However, the need for analysis scale reliability is only sufficient for

use in exploratory analysis. The intact social entity and interdependence scales were not used in the set of group stewardship antecedents.

**Table 3.6 Task Design Factor Analysis**

| Item No. | Item | Factor | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| CLRP2 | Goals and objectives we must achieve to fulfill our work group's purpose are clear. | **.829** | .111 | | |
| CLRP3 | Our purpose and goals clearly define what is expected of our work group. | **.797** | | .110 | .175 |
| CLRP1 | My work group has a clearly defined purpose. | **.707** | | .206 | .181 |
| CLRP4 | My entire work group understands our group's purpose. | **.694** | | .305 | .115 |
| ANAL3 | New ideas are rarely required to complete our work. | -.178 | **.681** | | -.150 |
| ANAL1 | The jobs our group does frequently require problem solving. | .170 | **.681** | .215 | .106 |
| ANAL4 | New solutions are often needed to solve problems we find while doing our work. | .169 | **.618** | .198 | .303 |
| ANAL2 | Tasks in our work group usually require thinking time before they can be completed. | .214 | **.603** | | .240 |
| ISE3 | It is clear to us which people are members of our work group. | .241 | | **.779** | |
| ISE1 | Our group members know who is and is not a member of this group. | .225 | | **.775**[a] | |
| ISE2 | Our work group is distinct from other work groups in the organization. | | .221 | .490 | .167 |
| INTR1 | I cannot accomplish my task without information or materials from other members of my team. | | | | **.758** |
| INTR2 | Other members of my work group depend on me for information or materials needed to perform tasks. | | .151 | .106 | **.672** |
| INTR3 | Within my work group, jobs performed by group members are dependent on one another. | .231 | | .173 | **.623** |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
[a] The responses for ISE 1 had a mode of 6.

### 3.5.2.2 Empowerment.

As is shown in Table 3.8, three distinct factors emerged: meaningful work, group potency, and autonomy. Earlier research found four constructs related to empowerment at the group level of analysis (Kirkman & Rosen, 1999). Part of the reason only three factors emerged may have been that fewer items for these constructs were used in this research than in Kirkman & Rosen's (1999) research in an effort to control the length of the survey. The pool of usable items was

further reduced as two of the items, MEAN1 (meaningful work) and IMPT1 (Impact), were unusable due to the mode of the responses being 6, the highest response value. The three resulting scale reliabilities shown in Table 3.9 are highly acceptable.

**Table 3.7 Mean, Standard Deviation and Correlations among Task Design Constructs**

| Variable | Mean | Std. Dev. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| 1 Clear Purpose | 4.46 | 0.97 | (.806) | | | |
| 2 Need for Analysis | 4.42 | 0.94 | .344** | (.623) | | |
| 3 Intact Social Entity | 4.98 | 0.94 | .453** | .290** | (.664) | |
| 4 Interdependence | 4.33 | 0.97 | .344** | .374** | .243** | (.547) |

Scale reliabilities are shown along the diagonals. Individual N=747. ** Indicates correlation is significant at p = .01.

**Table 3.8 Empowerment Factor Analysis**

| Item No. | Item | Factor | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| MEAN3 | We believe that our work is significant. | **.780** | .322 | .176 |
| IMPT4 | My group makes a difference in this organization. | **.775** | .292 | .224 |
| MEAN2 | Our group feels that its purpose is important. | **.767** | .269 | .234 |
| MEAN4 | Our group feels that its tasks are worthwhile. | **.736** | .305 | .288 |
| IMPT3 | My group has a positive impact in helping the organization accomplish its objectives | **.654** | .432 | .187 |
| IMPT2 | Our group Is confident in its ability perform our job. | .499 | .490 | .259 |
| POTN3 | Our group feels self-assured about its capabilities to work together as a team. | .168 | **.843** | |
| POTN1 | We can get a lot done when we work hard. | .383 | **.697** | .216 |
| POTN2 | Our group Is confident in its ability perform our job. | .336 | **.636** | .301 |
| POTN4 | Group members have mastered the skills necessary to do their jobs. | .385 | **.601** | .114 |
| AUTO3 | Our group has a lot of choice in determining what we do to solve problems. | .104 | .170 | **.873** |
| AUTO4 | Our group determines *how* things are done | .181 | .178 | **.832** |
| AUTO2 | Our group can make significant choices without waiting to be told by management. | .358 | .146 | **.730** |
| AUTO1 | Our group feels a sense of freedom in what it does. | .503 | .154 | .548 |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 6 iterations.

**Table 3.9 Mean, Standard Deviation and Correlations among Empowerment Constructs**

| Variable | Mean | Std. Dev. | 1 | 2 | 3 |
|---|---|---|---|---|---|
| 1 Meaningful Work | 4.62 | 0.97 | (.893) | | |
| 2 Group Potency | 4.61 | 0.94 | .701** | (.795) | |
| 3 Autonomy | 3.74 | 1.15 | .526** | .498** | (.822) |

Individual N = 747. ** Indicates correlation is significant at p = .01

#### 3.5.2.3 Group Relationships.

These items generally factored cleanly to the expected factors. As is shown in Table 3.10 there were two exceptions. One affective trust item, TRST3, did not load strongly with the other items from the proposed scale. Additionally, two group identification items did not load with the other three group identification items. The scale reliabilities shown in Table 3.11 are highly acceptable. The affective trust and internalization of group values scales are moderately highly correlated with the identification with the group scale, but not so high as to preclude their usefulness as distinct scales. Further, the correlations shown are total or individual-level correlations. In chapter 4 the appropriate level of analysis for studying correlations among variables will be determined.

#### 3.5.2.4 Organizational Context.

The four proposed constructs in this set emerged as three distinct constructs. As is shown in Table 3.12, the feedback and investment in employees constructs loaded to the same factor. The common concept associated with items loading to factor one appears to be a perception about the extent to which the organization provides group members with the information and resources needed to do their work. The loading for the positively worded pay-performance link item (PPL1) split between the two reverse coded pay-performance link items and the information and resources items. As indicated in Table 3.13 all scales reliabilities are acceptable for the organizational context factors.

**Table 3.10 Group Relationships Factor Analysis**

| Item No. | Item | Factor | | | | |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| TRST1 | We have a sharing relationship. Group members can freely share ideas, feelings, and hopes. | **.799** | .279 | .127 | .129 | |
| TRST2 | We can talk freely to group members about difficulties we are having at work and know that they will want to listen. | **.785** | .211 | .199 | .132 | |
| TRST4 | If we share problems with group members, we know they will be helpful and caring. | **.749** | .170 | .315 | .246 | |
| TRST5 | Our group has worked together to form close working relationships. | **.682** | .260 | .227 | .304 | .144 |
| TRST3 | We would feed a sense of loss if a group member was transferred and we could no longer work together. | .498 | | .358 | .276 | .348 |
| CLRP2 | Goals and objectives we must achieve to fulfill our work group's purpose are clear. | .158 | **.785** | .140 | | |
| CLRP1 | My work group has a clearly defined purpose. | .113 | **.772** | | .191 | |
| CLRP3 | Our purpose and goals clearly define what is expected of our work group. | .205 | **.739** | .180 | .214 | |
| CLRP4 | My entire work group understands our group's purpose. | .418 | **.639** | .181 | | |
| IV_G2 | My attachment to this group] is primarily based on the similarity of my values and those represented by this group. | .344 | .106 | **.731** | .221 | |
| IV_G1 | If the values of this group were different, I would not be as attached to this group. | .167 | .190 | **.653** | | .399 |
| IV_G4 | Since starting this job, my personal values and those of this group have become more similar. | .119 | .297 | **.620** | .316 | |
| IV_G3 | My attachment to this group is primarily based on the similarity of my values and those represented by this group. | .339 | .109 | **.608** | .393 | |
| ID_G3 | This group's successes are my successes. | .308 | .157 | .265 | **.690** | |
| ID_G5 | I'm very interested in what others think about this group. | | .207 | .295 | **.684** | |
| ID_G4 | When someone praises this group it feels like a personal compliment. | .329 | .147 | | **.631** | .376 |
| ID_G2 | When I talk about this group (organization), I usually say "we" rather than they. | .458 | .220 | | .521 | .171 |
| ID_G1 | When someone criticizes this work group, it feels like a personal insult. | | | .131 | .158 | **.885** |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

**Table 3.11 Mean, Standard Deviation and Correlations among Group Relationship Constructs**

| Variable | Mean | Std. Dev. | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| 1 Affective Trust | 4.17 | 1.18 | (.870) | | | |
| 2 Clear Purpose | 4.46 | 0.97 | .567** | (.806) | | |
| 3 Internalized Group Values | 3.75 | 1.05 | .629** | .503** | (.771) | |
| 4 Identification with Group | 4.31 | 1.06 | .596** | .483** | .634** | (.722) |

Individual N=747. ** Indicates correlation is significant at p = .01.

**Table 3.12 Organizational Context Factor Analysis**

| Item No. | Item | Factor | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| IVST2 | In this organization, employees are trained on skills that prepare them for future jobs. | **.759** | .168 | .120 |
| EFBK3 | Our group receives feedback that helps determine the areas in which we need education and development. | **.735** | .326 | .147 |
| IVST3 | This organization provides employees with employment security. | **.725** | .133 | |
| IVST1 | This organization provides employees the opportunity to learn new skills. | **.696** | .164 | .114 |
| EFBK4 | The feedback our group receives helps us understand how others view our performance. | **.663** | .388 | |
| EFBK1 | The feedback our group receives compares our performance to our goals. | **.602** | .285 | |
| PPL1 | Increased productivity means higher pay for employees. | .583 | .137 | .437 |
| EFBK2 | Our group receives feedback that shows how our performance has changed over time. | **.564** | .324 | |
| SSUP2 | In general, our supervisor uses the group's suggestions and ideas when making decisions. | .244 | **.810** | .166 |
| SSUP3 | In general, our supervisor encourages our group to figure out the causes/solutions to its problems. | .228 | **.797** | |
| SSUP4 | In general, our supervisor trusts our group. | .248 | **.749** | |
| SSUP1 | In general, our supervisor asks the group for advice when making decisions. | .291 | **.702** | .136 |
| PPL2 | Our performance has little impact on our pay. | | | **.864** |
| PPL3 | Performance on our work actually has little impact on any incentive pay award. | .148 | | **.852** |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

**Table 3.13 Mean, Standard Deviation and Correlations among Organizational Context Constructs**

| Variable | Mean | Std. Dev. | 1 | 2 | 3 |
|---|---|---|---|---|---|
| 1 Information and Resources | 3.81 | 0.98 | (.854) | | |
| 2 Supportive Supervision | 4.10 | 1.07 | .610** | (.823) | |
| 3 Pay Performance Link | 2.95 | 1.50 | .257** | .159** | (.720) |

Individual N=747. ** Indicates correlation is significant at p = .01.

#### 3.5.2.5 Attitude toward Organization.

This set of constructs included group stewardship, a new construct developed for this research, and three related constructs. For this analysis, exploratory factor analysis was conducted first on one half of the data. As is shown in Table 3.14, items loaded to the expected factors except that two of the proposed stewardship items, STEW4 and STEW 5 loaded to more than one of the factors. It was also difficult to determine if the internalization of organizational values and identification with the organization should be combined into one factor or kept as two separate factors. All factors except for STEW4 and 5 were entered into a series of nested confirmatory factor analyses to determine which model gave the best fit. The right side of Table 3.14 shows which items were used in the one, three and four-factor CFA analyses. A review of the model fit and comparison of fit statistics in Table 3.15 suggests the 4-factor model is the best-fitting CFA model for several reasons:

- An overall indication of good fit is ratio of $\chi 2$ / degrees of freedom should be less than two or three. This is only the case for the four-factor model.
- The fit indices, GFI, NFI, and CFI, ideally should be above 0.95 or at least above 0.90. Again, the four-factor model displays good fit.
- The PCFI which adjusts for the complexity of a model should be above 0.50, higher values are better. All three models have similar PCFI's.
- Lower values of RMSEA indicate are preferable, indicating a lower root mean square error of approximation. Values less than 0.05 indicate good fit while values as high as 0.08 represent reasonable error of approximation. Values from 0.80 to 0.10 indicate mediocre fit while those greater than 0.01 indicate poor fit. The three or four factor models provide reasonable fit while model four again has a better fit.
- Values of the expected cross validation index, ECVI, and the consistent Akaike information criterion allow a comparison of models. When comparing models, the model with lowest value would be favored. The bounds shown below ECVI are the traditional 10 and $90^{th}$ percentile confidence intervals for the estimate. The four-factor model again is favored.

Note: for an interpretation of model fit statistics provided by AMOS, see Byrne (2001).

## Table 3.14 Attitude toward Organization Factor Analysis

| | | Exploratory Factors | | | CFA Model | | |
|---|---|---|---|---|---|---|---|
| Item No. | Item | Rotated Components | | | Best fit: 4 factors | | |
| | | 1 | 2 | 3 | 1 factor | 3 factor | 4 factor |
| IV_O3 | Since starting this job, my personal values and those of this organization have become more similar. | **0.775** | 0.258 | 0.231 | 1 | 1 | 1 |
| IV_O2 | My attachment to organization is primarily based on the similarity of my values and those represented by this organization. | **0.744** | 0.273 | 0.140 | 1 | 1 | 1 |
| IV_O4 | The reason I prefer this organization to others is because of what it stands for. | **0.713** | 0.376 | 0.127 | 1 | 1 | 1 |
| IV_O1 | If the values of this organization were different, I would not be as attached to this organization. | **0.626** | 0.427 | | 1 | 1 | 1 |
| ID_O4 | When someone praises this organization it feels like a personal compliment. | **0.736** | 0.271 | 0.340 | 1 | 1 | 2 |
| ID_O5 | I'm very interested in what others think about this group organization. | **0.682** | 0.247 | 0.312 | 1 | 1 | 2 |
| ID_O3 | This organization's successes are my successes. | **0.667** | 0.276 | 0.243 | 1 | 1 | 2 |
| ID_O1 | When someone criticizes this organization, it feels like a personal insult. | **0.662** | 0.334 | 0.217 | 1 | 1 | 2 |
| ID_O2 | When I talk about this organization, I usually say "we" rather than they. | **0.552** | 0.153 | 0.327 | 1 | 1 | 2 |
| POWN4 | I sense that this is my organization. | 0.311 | **0.847** | 0.245 | 1 | 2 | 3 |
| POWN2 | This is my organization. | 0.293 | **0.817** | 0.225 | 1 | 2 | 3 |
| POWN3 | I sense that this organization is ours. | 0.415 | **0.725** | 0.291 | 1 | 2 | 3 |
| POWN5 | This is our organization. | 0.345 | **0.708** | 0.291 | 1 | 2 | 3 |
| POWN1 | I feel a very high degree of personal ownership for this organization. | 0.433 | **0.632** | 0.315 | 1 | 2 | 3 |
| STEW2 | Our work group feels a sense of accountability for the work we do. | | 0.162 | **0.827** | 1 | 3 | 4 |
| STEW1 | Our group members feel a shared sense of responsibility for our work. | 0.251 | 0.240 | **0.735** | 1 | 3 | 4 |
| STEW3 | Our group members want to do what is best for the organization. | 0.268 | 0.246 | **0.716** | 1 | 3 | 4 |
| STEW5 | In our work group we feel as if we're partners in making this organization successful. | 0.459 | 0.429 | 0.482 | | | |
| STEW4 | We feel as if the work we do were for our own business. | 0.367 | 0.431 | 0.454 | | | |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 7 iterations. Only cases for which SPLIT = 1 are used in the analysis phase.

**Table 3.15 Organizational Attitude Construct CFA Tests**

| Test | 1 factor | 3 factors | 4 factors |
|---|---|---|---|
| $\chi^2$ | 834.7 | 405.6 | 302.7 |
| d.f. | 119 | 116 | 113 |
| *p* | 0.000 | 0.000 | 0.000 |
| $\chi^2$/d.f. | 7.015 | 3.497 | 2.679 |
| GFI | 0.742 | 0.875 | 0.915 |
| AGFI | 0.668 | 0.835 | 0.885 |
| NFI | 0.831 | 0.918 | 0.939 |
| CFI | 0.851 | 0.940 | 0.960 |
| PCFI | 0.744 | 0.801 | 0.798 |
| RMSEA | 0.127 | 0.082 | 0.067 |
| ECVI | 2.433 | 1.293 | 1.031 |
| lower bound | 2.196 | 1.138 | 0.903 |
| upper bound | 2.69 | 1.468 | 1.181 |
| CAIC | 1070 | 662 | 579 |

Figure 3.1 shows the four-factor model of organizational attitude factors prepared using AMOS 4.0. The model displays the standardized coefficients. The coefficients along the curved lines between latent variables are the correlations between variables. Three sets of tests can be conducted to determine the discriminant validity between the latent variables: change in $\chi^2$, a test to determine if the correlation between variables is different from one, and a comparison of the variance extracted from the scale items with the variance between pairs of latent variables. (The calculations and associated tables for these tests are in Appendix C.1.)

- Change in $\chi^2$: The change in $\chi^2$ from a one-factor to a three-factor model is 429.1 with a change in three degrees of freedom, significant at $p < 0.001$. The change in $\chi^2$ from a three-factor to a four-factor model is 102.9 with a change in three degrees of freedom, again significant at $p < 0.001$. This test supports the four-factor model.
- Correlations differ from one. The recommended test is to determine if the correlations between pairs of latent variables are at least two standard deviations less than one. All correlations meet this test. For example, the largest correlation between pairs of variables is the correlation between internalized organizational values and identifying with the organization. The estimated correlation is 0.869 with a standard error of 0.028. The upper bound of the two-sigma confidence interval is 0.925, which is less than one.

- Variance extracted. This test gives mixed support for the four-factor model. While five of the six pairs of variables meet or marginally meet this requirement, the internalization of values and identification with the organization constructs extract 62.7 and 60.4% of the variance in their respective items, the square of the correlation between the two variables squared is 0.755. The internalization and identification constructs do not meet this test of discriminant validity.

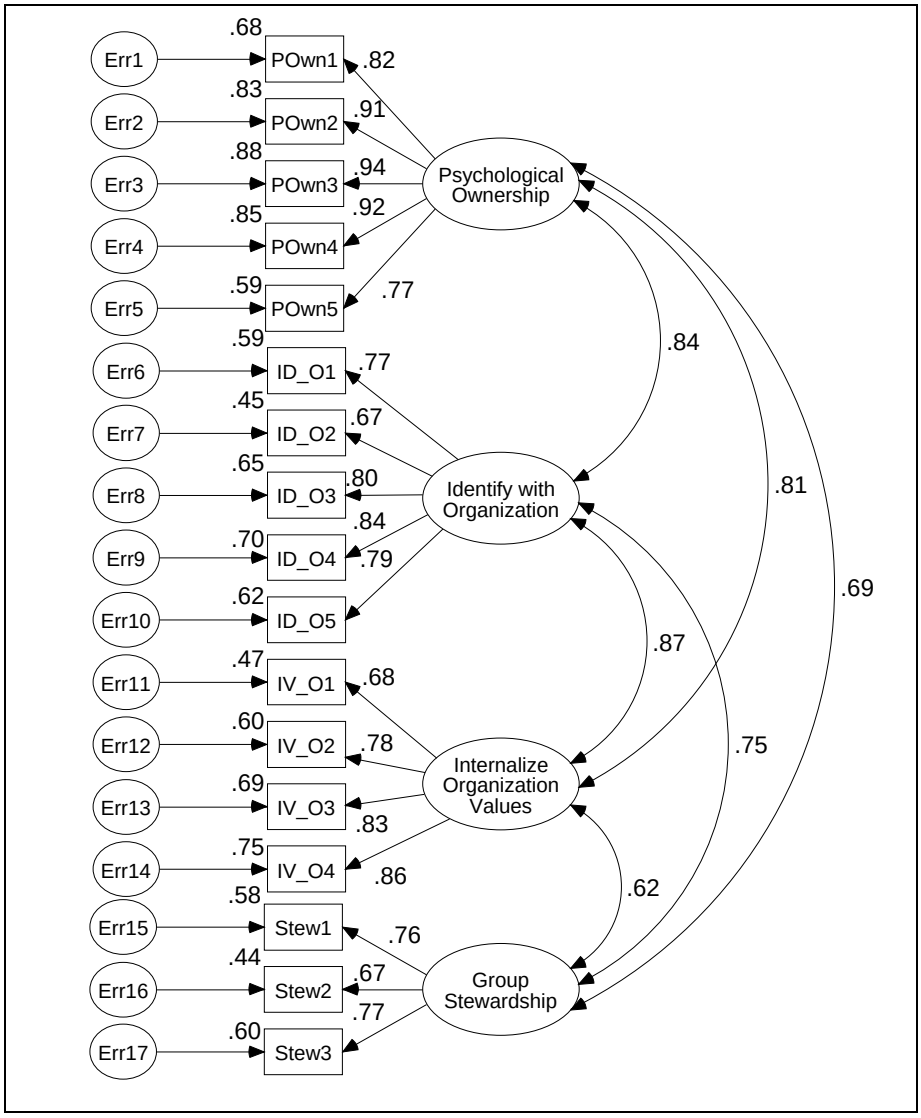



**Figure 3.1. Confirmatory factor analysis model of organizational attitudes with four latent variables (factors).**

The four-factor model appears to be the best fit to the data although the discriminant validity between identification with the organization and internalized organization values is weak. However, the discriminant validity of group stewardship versus other constructs is the central question in this research. Group stewardship emerged as a distinct construct in the exploratory factor analysis. Its validity as a distinct construct appears to be supported by confirmatory factor analysis. Table 3.16 presents statistics for the four constructs. The reliability and variance extracted estimates meet the test criteria for acceptable scales.

**Table 3.16. Scale Statistics for Organizational Attitude Constructs**

| Construct | Indicator | Stdized Loading Li | Indicator Reliability | Composite Reliability | Variance Extracted Estimate |
|---|---|---|---|---|---|
| Psychological Ownership | POwn1 | 0.823 | 0.677 | 0.942 | 0.765 |
| | POwn2 | 0.912 | 0.832 | | |
| | POwn3 | 0.936 | 0.876 | | |
| | POwn4 | 0.922 | 0.850 | | |
| | POwn5 | 0.767 | 0.588 | | |
| Group Stewardship | Stew1 | 0.762 | 0.581 | 0.778 | 0.540 |
| | Stew2 | 0.666 | 0.444 | | |
| | Stew3 | 0.771 | 0.594 | | |
| Internalized Organization Values | IV_O1 | 0.682 | 0.465 | 0.870 | 0.627 |
| | IV_O2 | 0.778 | 0.605 | | |
| | IV_O3 | 0.83 | 0.689 | | |
| | IV_O4 | 0.865 | 0.748 | | |
| Identify with Organization | ID_O1 | 0.771 | 0.594 | 0.883 | 0.604 |
| | ID_O2 | 0.673 | 0.453 | | |
| | ID_O3 | 0.805 | 0.648 | | |
| | ID_O4 | 0.837 | 0.701 | | |
| | ID_O5 | 0.789 | 0.623 | | |
| | Desired level of test statistics: | | | good: >.7<br>min: >.6 | good: >.5 |

### 3.5.2.6 Group Learning and Proactive Behaviors.

Three of the five proposed group learning behaviors emerged from the exploratory factor analysis. (See Table 3.17.) The items relating to group members integrating information into their work and crossing boundaries to share information with other group did not load to a single factor. The three emerging constructs relate to utilization of an external perspective, openness to experiment with new ideas, and internal collaboration. The four items loading to factor 1 include three cognitive items and one item from the crossing external boundaries scale, CBEX4, an action-oriented item. CFA models were tested with and without CBEX4 included in the first

factor. The results from this analysis are shown in the right hand columns of Table 3.17. Model 1 without CBEX4 has good model fit characteristics. The ECVI and CAIC tests suggest that Model 1 without CBEX4 is the better choice although the difference between the two models is not quite significant when looking at the 90% confidence interval for ECVI. Figure 3.2 shows the CFA model. Table 3.18 shows the scale reliabilities are quite good and the variance extracted estimates are acceptable.

Group proactive behaviors were also subjected to exploratory factor analysis. As is shown in Table 3.19, item PROA2 does not load with the other items. The proactive behavior reliability was also slightly improved without PROA2. If the proactive behavior items are placed in exploratory and confirmatory factor analysis with the learning items, proactive behaviors emerges as a separate construct with the same four items. However, for the purpose developing and reporting on a set of group learning scales, the proactive behavior scale items were assessed separately (per recommendation in personal correspondence with David Holman August, 2001).

The proactive behavior scale has good scale properties. The scale mean is 4.26 with a standard deviation of 0.98 and a reliability of 0.843.

#### 3.5.2.7 Outcome Measures

Employees' satisfaction with their jobs was assessed using a three-item scale. The three factors loaded strongly to a single factor; loadings ranged from 0.83 to 0.88. The scale reliability was 0.806.

Supervisors were asked questions relating to the performance, customer service, and their perception of group member satisfaction with their jobs. The scale reliabilities using supervisor responses were very acceptable. As is shown in Table 3.20, the scales are fairly highly correlated. Due to the size of the correlation, there may be some doubt as to the distinctness of the scales. However, further use of these scales found there was a difference in the way group behaviors correlated with the performance and customer service outcomes, lending at least some support to the value of using separate outcome scales rather than a composite of performance and customer service.

## Table 3.17. Learning Behavior Factor Analysis

| Item No. | Item | Factor | | | Model 1: 3 Factor Base | Model 2: Base + CBEX4 |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | | |
| FRAM1 | We often think about how our work fits into the "bigger picture" at our organization. | **.818** | .223 | .157 | 1 | 1 |
| FRAM2 | We try to think how the different parts of our organization fit together. | **.786** | .279 | .178 | 1 | 1 |
| FRAM3 | We try to think how our work relates to that of others. | **.641** | .250 | .322 | 1 | 1 |
| CBEX4 | Our work group coordinates with those who receive our work. | .640 | .173 | .372 | | 1 |
| INTG4 | In order to understand something about our work better, we think about how new ideas make sense in terms of what we already know. | .554 | .413 | .274 | | |
| INTG2 | Our group generally tries to understand how new information fits into how we should do our work. | .508 | .447 | .338 | | |
| INTG1 | Our group works out which are the key points of our jobs and which are less important. | .464 | .349 | .352 | | |
| CBEX1 | We offer to share its ideas with other groups. | .381 | .365 | .373 | | |
| EXP2 | We try out new things by applying them in practice. | .200 | **.786** | .117 | 2 | 2 |
| CBEX2 | We invite people from outside our work group to present information or have discussions with us. | .267 | **.728** | | 2 | 2 |
| EXP3 | We test new ideas to help ourselves learn. | .393 | **.680** | .289 | 2 | 2 |
| INTG3 | Our group thinks about new information and its implications for our work rather than merely concentrating on the facts given. | .197 | **.598** | .376 | 2 | 2 |
| CBEX3 | We maintain contact with people outside our team who have information we need to do our work. | .230 | .566 | .417 | | |
| CBIN1 | We ask other group members questions when we are uncertain about something | .270 | .195 | **.808** | 3 | 3 |
| CBIN3 | We ask other group members for more information they have when we need it. | .256 | .324 | **.801** | 3 | 3 |
| CBIN2 | We get other group members to help us when we need assistance. | .295 | .162 | **.785** | 3 | 3 |
| **Model fit parameters** | | | | | | |
| $X^2$ | | | | | 93.6 | 149.4 |
| Df | | | | | 32 | 41 |
| $X^2$/df | | | | | 2.926 | 3.643 |
| NFI | | | | | .952 | .931 |
| CFI | | | | | .967 | .949 |
| PCFI | | | | | .688 | .707 |
| RMSEA | | | | | .072 | .084 |
| ECVI | | | | | .376 | .537 |
| ECVI Lower bound 90% Confidence Interval | | | | | .308 | .447 |
| ECVI Upper bound 90% Confidence Interval | | | | | .465 | .648 |
| CAIC | | | | | 252.8 | 322.3 |

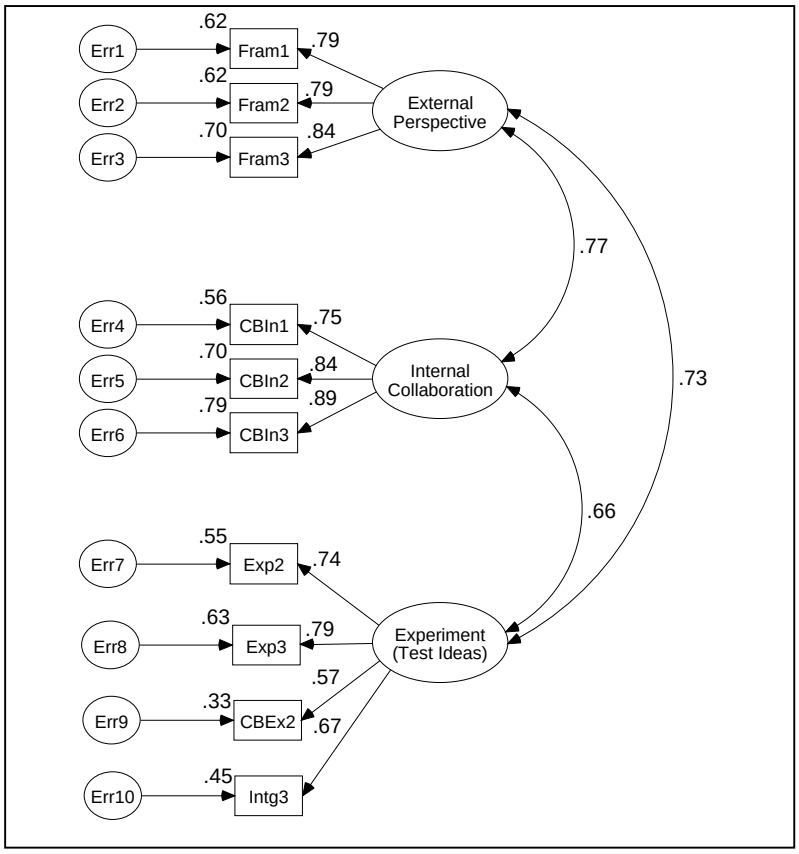



**Figure 3.2. Confirmatory factor analysis model of learning behaviors with three latent variables (factors).**

**Table 3.18**. **Scale Statistics for Learning Behavior Constructs**

| Scale/ Indicator | Standardized Loading $L_i$ | Reliability: Scale/ Indicator | Variance Extracted Estimate |
|---|---|---|---|
| External Perspective | | 0.846 | 0.646 |
| Fram1 | 0.785 | 0.615 | |
| Fram2 | 0.788 | 0.624 | |
| Fram3 | 0.838 | 0.701 | |
| Internal Collaboration | | 0.867 | 0.685 |
| CBIn1 | 0.749 | 0.561 | |
| CBIn2 | 0.838 | 0.702 | |
| CBIn3 | 0.890 | 0.792 | |
| Experiment | | 0.792 | 0.491 |
| CBEx2 | 0.571 | 0.326 | |
| Exp2 | 0.744 | 0.554 | |
| Exp3 | 0.795 | 0.632 | |
| Intg3 | 0.674 | 0.454 | |
| | | good: >.7<br>Min: >.6 | good: >.5 |

**Table 3.19. Exploratory Factor Analysis for Proactive Behavior Items**

| | | Component | |
|---|---|---|---|
| Item No. | Item | 1 | 2 |
| PROA4 | Our work group tackles problems head-on. | **.842** | .243 |
| PROA1 | Our work group makes things happen even when the odds are against it. | **.819** | |
| PROA3 | Our work group always looks for better ways to perform its work. | **.764** | .348 |
| PROA5 | Our work group addresses issues before they become major problems. | **.739** | .380 |
| PROA2 | Our work group fixes things it does not like. | .225 | **.954** |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
Only cases for which SPLIT = 1 are used in the analysis phase.

**Table 3.20. Mean, Standard Deviation and Correlations among Supervisor Assessments of Outcome Measures**

| VARIABLE | Mean | Std. Dev. | 1 | 2 | 3 |
|---|---|---|---|---|---|
| 1 Performance | 4.92 | 0.61 | (.789) | | |
| 2 Customer Service | 4.83 | 0.66 | .702** | (.770) | |
| 3. Employee Job Satisfaction | 4.75 | 0.60 | .706** | .697** | (.756) |

N = 112. Significance of correlations: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

### 3.5.2.8 Convergence of Multiple Methods Used to Assess the Same Constructs

Average group and supervisor survey responses were compared with the descriptive information gathered utilizing the Work Group Observation Form in Appendix B.4. Several constructs in the survey and observation form overlap: interdependence, feedback, need for analysis, autonomy, and measures of group outputs. In general, there were at best only modest correlations between related group member survey, supervisor survey, and group observation form data that would be expected to be more highly related.

Supervisor perceptions of group member attitudes and behaviors were generally not significantly correlated and tended to have a favorable bias (higher) relative to group member perceptions of the same constructs. Table 3.21 presents the comparison of supervisor and group member ratings. The middle columns present the unweighted group means for constructs with responses by both supervisors and group members. (Each group has the same weight regardless of the number of responses in the group. Therefore, these means will not necessarily match the individual means reported earlier for the construct means.) The Pearson correlation column is the correlation between group member means and supervisor means for each group. If supervisor and group member perspectives were identical, their ratings would be perfectly and significantly correlated with no significant difference in level of perception. There were only two constructs significantly correlated with no significant bias: pay-performance linkage and the

tendency to engage in experimentation. Even in these two cases, the correlation has only marginal practical significance. For example, the correlation between perceptions of experimentation is 0.351 which means the supervisor perceptions explain only 12% of the variance in group member perceptions.

**Table 3.21. Comparison of Supervisor and Group Member Perceptions**

| | Unweighted Group Means | | | |
|---|---|---|---|---|
| Characteristic | Group Members | Super-visor | Avg Paired Difference[a] | Pearson Correlation |
| Supportive Supervision | 4.13 | 4.88 | 0.76 *** | -0.051 |
| Meaningful Work | 4.66 | 5.34 | 0.68 *** | 0.048 |
| Info & Resources | 3.81 | 4.21 | 0.40 *** | 0.089 |
| Affective Trust | 4.19 | 4.59 | 0.40 *** | 0.201 * |
| Autonomy | 3.79 | 4.15 | 0.37 *** | 0.126 |
| Clear Purpose | 4.51 | 4.86 | 0.36 *** | 0.056 |
| Group Stewardship | 4.42 | 4.72 | 0.29 *** | 0.164 |
| Pay-Performance Link | 2.97 | 3.17 | 0.20 | 0.291 ** |
| Proactive Behaviors | 4.26 | 4.44 | 0.18 * | 0.173 |
| Group Potency | 4.65 | 4.82 | 0.18 | 0.121 |
| Internal Collaboration | 4.67 | 4.82 | 0.14 | 0.114 |
| Employee Satisfaction | 4.65 | 4.71 | 0.06 | 0.155 |
| External Perspective | 4.11 | 4.06 | -0.06 | 0.049 |
| Experiment | 3.94 | 3.81 | -0.13 | 0.351 *** |
| Need for Analysis | 4.43 | 4.18 | -0.26 ** | 0.357 *** |

Note: [a] Difference = supervisor – group member perception. Significance of difference based on a paired 2-tailed t-test. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Significance tests based on 100 groups.

Information gathered using the work group observation form was very helpful for screening groups for admission into the research and characterizing the environment in which the groups worked. From a practitioner standpoint, the observation form would be very helpful in creating an understanding of the work system during intervention planning.

However, the observation form data was of limited use in assessing the validity of information gathered from the surveys. The data obtained from the observation forms was generally skewed and often distributed over only one to three response levels making it inappropriate to use the data in statistical tests requiring normal distributions. Many of the response scales were categorical. When a scale could be created, it generally was at best only ordinal (with unequal intervals).

Given the above constraints a few validity checks can be drawn from the work group observation form. For example, Table 3.22 compares the need for analysis scale responses with items in the work group observation form. In every case the supervisor perceptions are more highly correlated with the perceptions of the manager and myself who completed the observation form than with group member perceptions. The group member response correlations may be more discerning than that for the supervisors. Group members rated work as highest in the need for analysis when the work was observed to be complex and/or unpredictable and the group's effort could have a significant impact on quality and quantity. In contrast, the highest correlation for supervisor ratings occurred for work that was relatively more manual versus machine paced.

**Table 3.22. Nonparametric Correlations between Survey and Observation Form Ratings for Items Relating to Need for Analysis**

| **Work Group Observation Form Rating** | **Survey Scale: Need for Analysis** (Need for problem solving or new ideas) | |
|---|---|---|
| | Group Perception | Supervisor Perception |
| Task Challenge: repetitive to complex and/or unpredictable | 0.232 * | 0.247 * |
| Collective Initiative and Judgment: no task autonomy to high discretion required | 0.125 | 0.263 ** |
| Process Control: Machine/technology-paced to group controls process | 0.219 * | 0.410 *** |
| Customer Feedback: None to direct contact with customers | 0.225 * | 0.364 *** |
| Group effort influence on quality and quantity: None to substantial | 0.274 ** | 0.325 *** |
| Number responses | 108 | 99 |

Significance of Spearman's rho: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The differences in correlations between work group and supervisor perceptions of autonomy with several related items from the observation form are interesting. The group

member and supervisor perceptions correlate with different items on the observation form. Supervisors were more likely to consider autonomy higher in situations where group members can control the pace of work; note the correlations between supervisor perceptions and items related to pace of work, machine-controlled versus manually-controlled work, and the extent to which effort impacts quality and quantity of work. These items are not correlated with group member perspectives of autonomy. The group member responses may suggest perceptions of autonomy are more related to decisions about *what* is to be done and *how* to solve problems rather than situations in which they have simply been given control over how fast they work.

**Table 3.23. Nonparametric Correlations between Survey and Observation Form Ratings for Items Relating to Autonomy**

| **Work Group Observation Form Rating** | **Survey Scale: Autonomy** (to determine what to do and how work is done) | |
|---|---|---|
| | Group Perception | Supervisor Perception |
| Evidence of performance feedback systems that provide group members feedback on their performance | -0.063 | 0.222 * |
| Work group authority to control the pace at which work is done | -0.107 | 0.347 *** |
| Task Challenge: repetitive to complex and/or unpredictable | 0.302 ** | 0.189 |
| Collective Initiative and Judgment: no task autonomy to high discretion required | 0.232 * | 0.101 |
| Process Control: Machine/technology-paced to group controls process | 0.137 | 0.263 ** |
| Customer Feedback: None to direct contact with customers | 0.187 | 0.283 ** |
| Group effort influence on quality and quantity: None to substantial | 0.052 | 0.276 ** |
| Number responses | 108 | 99 |

Significance of Spearman's rho: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Supervisor ratings of boundary management responsibility correlated appropriately with the observation form question about the extent to which group members were in contact with those who receive its product or service. As is shown in Table 3.24, the supervisor responses correlated with questions about customer and supplier relationships but not with the questions about contact with other work groups and upper management.

**Table 3.24. Nonparametric Correlations between Observation Form Question about Contact with Customers and Supervisor Boundary Management Items in Survey.**

| Item No. | Item | Correlation with Observation form |
|---|---|---|
| BMGT1 | The group has responsibility to maintain contact with other work groups | -0.026 |
| BMGT2 | The group has responsibility to maintain contact with those who receive its work (internal or external customers) | 0.263 ** |
| BMGT3 | The group has responsibility to maintain contact with people who supply it with parts or information to do its work | 0.303 ** |
| BMGT4 | The group has responsibility to maintain contact with upper level managers | 0.022 |

Significance of Spearman's rho: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

This section completes the methodology chapter which has reviewed the process through which survey data was collected and analyzed in preparation for testing of hypotheses. Given the differences between supervisor and group member perceptions of group member attitudes, group member data will be used to test hypotheses relating to group design factors, group attitudes, and group behaviors. The process of testing each research hypotheses is presented in chapter 4. Conclusions and interpretations to tie together what has been learned will be presented in chapter 5.

# CHAPTER 4 RESULTS

Once the survey response data was obtained and work was completed to assess the psychometric properties of the survey scales, the research hypotheses were tested. The research hypotheses may be grouped into four categories: tests of correlation between two constructs, tests to assure distinct factors, tests to determine to what extent one construct mediates the effect of an antecedent construct on a dependent construct, and a test of the extent to which the need for analysis moderates the effect of an antecedent construct on a dependent construct. In sections 4.1 through 4.4 the research questions associated with each type of test will be listed. Then the methodologies to test the research hypotheses will be described. This chapter is organized into four sections:



## 4.1 TESTING HYPOTHESES OF CORRELATION

Research hypotheses one, two and four propose that a significant correlation exists between constructs at the group level of analysis. The hypotheses are:

- ***Research Hypothesis 1: Supportive task, group, and organizational context are positively associated with the presence of group stewardship.***
- ***Research Hypothesis 2: Group stewardship is positively associated with the presence of group learning and proactive behaviors.***
- ***Research Hypothesis 4: Group learning and group proactive behaviors are positively associated with group effectiveness outcomes.***

Tests of a significant correlation are often conducted by use of a correlation matrix. If there is a significant total correlation between two variables, the proposed hypotheses cannot be disproved and is generally accepted. However, in this research individuals are nested within groups that are in turn nested within plants. If correlations between constructs are tested using individual-level data, there will be at least two problems. First, when a correlation is calculated using data from individuals working within groups, the resulting correlation is a total correlation

between pairs of variables, $r_{Txy}$, which is equal to the sum of a between-group component plus a within-group component. The total correlation between two variables may be written as

$r_{Txy} = \eta_{Bx}\eta_{By}r_{Bxy} + \eta_{Wx}\eta_{Wy}r_{Wxy}$ where

$\eta_B = \sqrt{SS_B / SS_T}$ , the between-eta which is calculated for variables x and y where $SS_B$ is the sum of squares between and $SS_T$ is the total sum of squares,

$\eta_w = \sqrt{SS_W / SS_T}$ , the within-eta calculated for variables x and y where $SS_W$ is the sum of squares within,

$r_{Bxy}$ is the correlation between the weighted group means of variables x and y, and

$r_{Wxy}$ is the within-group correlation between variables x and y. $r_{Wxy}$ is the correlation between the signed deviations for each pair of observations with respect to the group means of the two variables, i.e., the correlation between $(\bar{x}_j - x_i)$ and $(\bar{y}_j - y_i)$ for each observation where $\bar{x}_j$ and $\bar{y}_j$ are the means for each of $j$ groups and $x_i$ and $y_i$ are individual observations.

This equation for $r_{Txy}$ is known as the WABA equation (Dansereau et al., 1984). If only the total correlation is examined, there is no way of knowing whether the correlation is primarily due to between-group, within-group, or some combination of both between and within-group variation. In fact, even when there is no significant total correlation, $r_{Txy}$, a significant between-group correlation, $r_{Bxy}$, could be present along with a significant within-group correlation, $r_{wxy}$, of the opposite sign. A second problem with using total correlations is that when a group effect is present, within-group responses are not independent. Hence, using degrees of freedom based upon the number of individuals surveyed to test for significance is inappropriate.

Since it would be inappropriate to only examine total individual correlations when a significant group effect may be present, researchers use one of several approaches to determine if aggregation of individual data to the group level of analysis is appropriate. When a significant between-groups effect is present, then group means may be the appropriate choice for use to study the relationships between constructs. The debate as to which approach should be used to

justify aggregation has not yet been resolved. However, there is some movement to recognize the insights provided by competing approaches and when each technique should be used (Klein et al., 2000). The concerns that guided selection of the WABA approach used in this research will be briefly described before the tests of research hypotheses are presented. For a description of WABA, see Dansereau, Alutto, and Yammarino (1984).

To determine if variables should be aggregated to the group level for analysis, a common approach in the team literature is to examine one variable at a time to determine if group membership has a significant effect on it. For example, Kenny and LaVoie (1985) recommend calculating the intraclass correlation (ICC) for each variable. The ICC statistic is considered to be significant if the F-test for one-way ANOVA with group as the independent variable is significant. If the ICC is significant, the group mean of individual scores is used to test relationships between variables. One significant difficulty with this approach is that by only looking at one variable at a time to determine if a group effect is present, the researcher is only assessing the between-group correlation and failing to determine whether the correlation is primarily between groups, within groups, or equivocal, meaning significant between and within-group effects are present. For example, a small but significant between-groups effect could be present as well as a much larger within-group correlation. In this case, the within-group correlation may better characterize the relationship between constructs and should be used even though a significant between-groups effect is present.

A second common approach to justify aggregation to the group-level of analysis is to calculate interrater agreement, $r_{wg}$, a measure of the extent to which group member ratings agree with each other (James et al., 1993). If the average $r_{wg}$ greater than or equal to 0.70 for all groups being considered, data is aggregated to the group level of analysis. This approach does allow testing to see which groups have a relatively high or low agreement in ratings. However, this approach fails to determine if there is a group effect present.

The approach that was used in this research is based on the WABA paradigm (Dansereau et al., 1984). The WABA approach used assessed the presence of a between or within-group effect for each variable, WABA I, and also compared the magnitude of within and between-group correlations for pairs of variables, WABA II. Unlike the most conservative approach to WABA that uses both practical and statistical tests of significance, generally only tests of statistical significance were used. To determine the appropriate level of analysis for correlations

between pairs of variables, tables with the six elements of the WABA equation were prepared to organize output from DETECT for Windows, a software package that performs WABA analysis.

Since data was obtained from individuals nested within groups nested within ten plants (organizations), a two-step multiple level analysis (MLA) approach was used. The first step assessed which correlations were significant using individual and group-level statistics. The second step assessed which correlations were significant using group and plant-level statistics. By combining the inductions from these two steps, an inference was made as to the appropriate level of analysis for each correlation: individual, group, or organization. This approach will be described in detail for the first hypothesis to demonstrate the technique.

### *4.1.1 Hypothesis 1: Supportive task, group, and organizational context are positively associated with the presence of group stewardship*

WABA Methodology. The six components of the WABA equation were computed to assess within and between-group correlations. The components of the WABA equation calculated with individual responses are shown in Table 4.1. Column (1) gives the eta-between, $n_{BX,}$ for the constructs hypothesized to support the development of group stewardship. Column (2) gives eta-between, $n_{BY}$, for group stewardship. An F-test from a one-way ANOVA with group as the independent variable was used to assess the significance of eta-between values. The correlation between weighted group means for group stewardship and each construct is given in column (3). Significance of the correlation was assessed with a t-test. Columns (4) through (6) assess within-group variance, the variance associated with the difference between the group mean and individual responses. The total correlation of each construct with group stewardship is shown in column (7). Column (8) a Z-test of the statistical significance of the difference between $r_{Bxy}$ and $r_{Wxy}$, is used to determine if the between and within-group correlations are significantly different and, if so, which is predominant. Column (9) gives an inference based upon the information in the first eight columns.

Using the six components of the WABA equation shown in Table 4.1, one of four inferences can be chosen as best representing the relationship between constructs. The correlation may be primarily between groups (wholes), between individuals within groups (parts), between individuals with no group effect (equivocal), or no significant correlation may be present (inexplicable).

As an example, consider an ideal wholes case where all variance is between groups and is significant. Group members would give nearly identical responses for their assessment of each construct and there would be significant between-group differences. Therefore, the eta-between values in columns (1) and (2) would be significant while the eta-within values in columns (4) and (5) would be non-significant. Thus, each of the two constructs being studied would exhibit a significant between-groups effect supporting aggregation of the two variables to the group level of analysis. The next step would be to examine the relationships between the two constructs using columns (3), (6) and (8). For a significant group-level relationship, the whole group inference, the correlation between group means weighted by the number of responses in each group, column (3), would be significant. As there would be no meaningful variance within groups, the within-groups correlation, column (6), would be non-significant. Therefore, the Z-test of the difference between $r_{BXY}$ and $r_{WXY}$ shown in column (8) would be positive and significant. In summary, in the ideal wholes (between-groups) case, columns (1) through (3) and (8) would be significant, and columns (4) through (6) would be near zero. The other end of the continuum, the parts inference, would occur when all variance and covariance could be explained by differences within groups; columns (4) through (6) and (8) would be significant while between-group statistics, columns (1) through (3) would be non-significant. The ideal equivocal case occurs when there is relatively equal and significant correlation both within and between groups. In the equivocal case, group membership is not relevant, but there are still interpretable relationships between variables. Therefore, the total correlation between variables shown in column (7) will be significant. The ideal null case occurs when there are no group effects and variables are not significantly related.

The inferences found when using the WABA equation tend to occur along a continuum rather than as the ideal cases just described. Therefore, information from the WABA equation was used to determine which inference best described the relationships between variables. Figure 4.1 displays this continuum with visual glyphs to describe each inference when looking at a single level of analysis.

**Table 4.1. Results of Work Group Analysis for Hypothesis 1: Group Stewardship (y) and Hypothesized Antecedents (x)**

| Construct | (1) ($n_{BX}$ | x | (2) $n_{BY}$ | x | (3) $r_{BXY}$) | + | (4) ($n_{WX}$ | x | (5) $n_{WY}$ | x | (6) $r_{WXY}$) | = | (7) $r_{TXY}$ | (8) Z-test | (9) Inference | (10) Between | (11) Within |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clear Purpose | 0.523 *** | x | 0.544 *** | x | 0.650 *** | + | 0.853 ns | x | 0.839 ns | x | 0.489 *** | = | 0.534 *** | 2.283 * | Wholes | 0.185 | 0.350 |
| Need for Analysis | 0.526 *** | x | 0.544 *** | x | 0.514 *** | + | 0.850 ns | x | 0.839 ns | x | 0.357 *** | = | 0.402 *** | 1.852 * | Wholes | 0.147 | 0.255 |
| Affective Trust | 0.584 *** | x | 0.544 *** | x | 0.807 *** | + | 0.812 ns | x | 0.839 ns | x | 0.620 *** | = | 0.679 *** | 3.730 *** | Wholes | 0.256 | 0.423 |
| Identify with Group | 0.531 *** | x | 0.544 *** | x | 0.742 *** | + | 0.848 ns | x | 0.839 ns | x | 0.572 *** | = | 0.621 *** | 2.893 ** | Wholes | 0.214 | 0.407 |
| Internalized Group Values | 0.507 *** | x | 0.544 *** | x | 0.702 *** | + | 0.862 ns | x | 0.839 ns | x | 0.508 *** | = | 0.561 *** | 2.962 ** | Wholes | 0.194 | 0.367 |
| Meaningful Work | 0.611 *** | x | 0.544 *** | x | 0.772 *** | + | 0.792 ns | x | 0.839 ns | x | 0.619 *** | = | 0.667 *** | 2.867 ** | Wholes | 0.256 | 0.411 |
| Group Potency | 0.564 *** | x | 0.544 *** | x | 0.786 *** | + | 0.826 ns | x | 0.839 ns | x | 0.605 *** | = | 0.661 *** | 3.424 *** | Wholes | 0.241 | 0.419 |
| Autonomy | 0.500 *** | x | 0.544 *** | x | 0.694 *** | + | 0.866 ns | x | 0.839 ns | x | 0.464 *** | = | 0.526 *** | 3.341 *** | Wholes | 0.189 | 0.337 |
| Internalized Org. Values | 0.512 *** | x | 0.544 *** | x | 0.580 *** | + | 0.859 ns | x | 0.839 ns | x | 0.458 *** | = | 0.492 *** | 1.596 ns | Equivocal | 0.162 | 0.330 |
| Identify w/Org | 0.546 *** | x | 0.544 *** | x | 0.681 *** | + | 0.838 ns | x | 0.839 ns | x | 0.573 *** | = | 0.605 *** | 1.710 * | Wholes | 0.202 | 0.403 |
| Psychological Ownership | 0.533 *** | x | 0.544 *** | x | 0.699 *** | + | 0.846 ns | x | 0.839 ns | x | 0.567 *** | = | 0.605 *** | 2.110 * | Wholes | 0.203 | 0.402 |
| Supportive Supervision | 0.548 *** | x | 0.544 *** | x | 0.566 *** | + | 0.836 ns | x | 0.839 ns | x | 0.478 *** | = | 0.504 *** | 1.154 ns | Equivocal | 0.169 | 0.335 |
| Info & Resources | 0.572 *** | x | 0.544 *** | x | 0.611 *** | + | 0.820 ns | x | 0.839 ns | x | 0.557 *** | = | 0.574 *** | 0.769 ns | Equivocal | 0.190 | 0.383 |
| Pay-Performance Link | 0.524 *** | x | 0.544 *** | x | 0.441 *** | + | 0.852 ns | x | 0.839 ns | x | 0.085 * | = | 0.186 *** | 3.688 *** | Wholes | 0.126 | 0.061 |

Notes: ns $P > 0.05$ ** $p \leq 0.01$ Column (10) = (1) x (2) x (3)

* $P \leq 0.05$ *** $p \leq 0.001$ Column (11) = (4) x (5) x (6)

Significance tests for columns (1) through (7) based on $i = 747$ individuals and $j = 108$ work groups

**Table 4.2. Results of Plant Analysis for Hypothesis 1: Group Stewardship (y) and Hypothesized Antecedents (x)**

| Construct | (1) ($n_{BX}$ | (2) x $n_{BY}$ | (3) x $r_{BXY}$) | + | (4) ($n_{WX}$ | (5) x $n_{WY}$ | (6) x $r_{WXY}$) | = | (7) $r_{TXY}$ | (8) Z-test | (9) Inference | (10) Between | (11) Within |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clear Purpose | 0.406 * | 0.528 *** | 0.524 ns | + | 0.914 ns | 0.849 ns | 0.693 *** | = | 0.650 *** | -0.694 ns | Equivocal | 0.112 | 0.538 |
| Need for Analysis | 0.404 * | 0.528 *** | 0.795 ** | + | 0.915 ns | 0.849 ns | 0.443 *** | = | 0.514 *** | 1.555 ns | Equivocal | 0.170 | 0.344 |
| Affective Trust | 0.463 ** | 0.528 *** | 0.810 ** | + | 0.886 ns | 0.849 ns | 0.809 *** | = | 0.807 *** | 0.007 ns | Equivocal | 0.198 | 0.609 |
| Identify with Group | 0.485 ** | 0.528 *** | 0.871 *** | + | 0.874 ns | 0.849 ns | 0.699 *** | = | 0.742 *** | 1.208 ns | Equivocal | 0.223 | 0.519 |
| Internalized Group Values | 0.560 *** | 0.528 *** | 0.769 ** | + | 0.829 ns | 0.849 ns | 0.675 *** | = | 0.702 *** | 0.505 ns | Equivocal | 0.227 | 0.475 |
| Meaningful Work | 0.480 ** | 0.528 *** | 0.876 *** | + | 0.878 ns | 0.849 ns | 0.738 *** | = | 0.772 *** | 1.047 ns | Equivocal | 0.222 | 0.550 |
| Group Potency | 0.409 * | 0.528 *** | 0.840 ** | + | 0.913 ns | 0.849 ns | 0.781 *** | = | 0.786 *** | 0.442 ns | Equivocal | 0.181 | 0.605 |
| Autonomy | 0.374 ns | 0.528 *** | 0.791 ** | + | 0.928 ns | 0.849 ns | 0.682 *** | = | 0.694 *** | 0.612 ns | Equivocal | 0.156 | 0.538 |
| Internalized Org. Values | 0.672 *** | 0.528 *** | 0.689 * | + | 0.740 ns | 0.849 ns | 0.534 *** | = | 0.580 *** | 0.640 ns | Equivocal | 0.245 | 0.336 |
| Identify w/Org | 0.622 *** | 0.528 *** | 0.867 *** | + | 0.783 ns | 0.849 ns | 0.597 *** | = | 0.681 *** | 1.615 ns | Equivocal | 0.285 | 0.397 |
| Psychological Ownership | 0.688 *** | 0.528 *** | 0.827 ** | + | 0.744 ns | 0.849 ns | 0.644 *** | = | 0.699 *** | 1.057 ns | Equivocal | 0.292 | 0.407 |
| Supportive Supervision | 0.494 *** | 0.528 *** | 0.743 *** | + | 0.869 ns | 0.849 ns | 0.504 *** | = | 0.566 *** | 1.024 ns | Equivocal | 0.194 | 0.372 |
| Info and Resources | 0.655 *** | 0.528 *** | 0.710 * | + | 0.755 ns | 0.849 ns | 0.569 *** | = | 0.611 *** | 0.615 ns | Equivocal | 0.246 | 0.365 |
| Pay Perform-ance Link | 0.699 *** | 0.528 *** | 0.902 *** | + | 0.716 ns | 0.849 ns | 0.178 * | = | 0.441 *** | 3.327 *** | Wholes | 0.333 | 0.108 |

Notes: ns $p > 0.05$ ** $p \leq 0.01$ Column (10) = (1) x (2) x (3)

* $p \leq 0.05$ *** $p \leq 0.001$ Column (11) = (4) x (5) x (6)

Significance tests for columns (1) through (7) based on $j = 108$ work groups and $k = 10$ plants

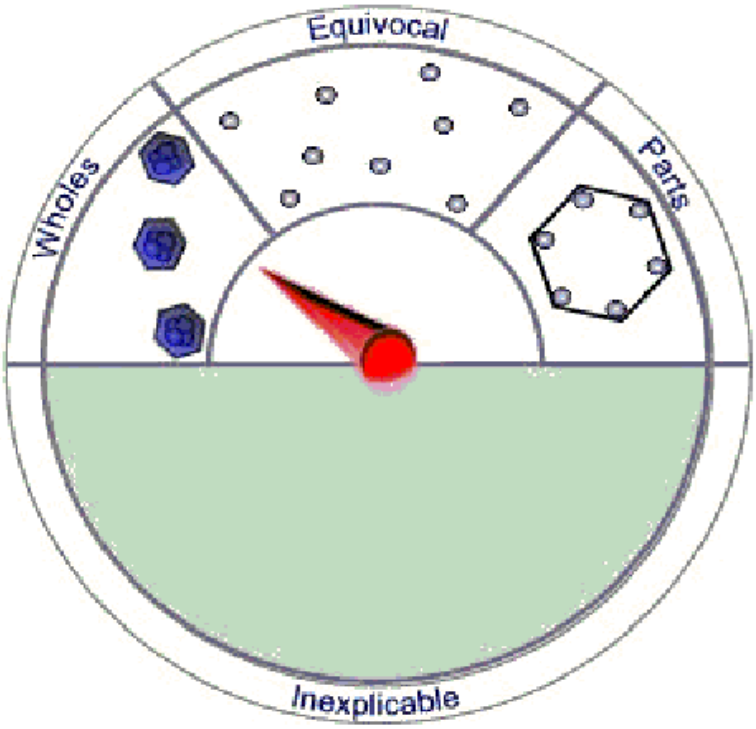



**Figure 4.1. The continuum of possible inferences derived from the WABA equation (Markham, 2000, figure 5).**

Results. Inferences about the correlations of constructs with group stewardship were drawn from Table 4.1. For most correlations a wholes inference was appropriate. In these cases the between-group etas, columns (1) and (2) justified aggregating each variable to the group level of analysis. Further, the between-group correlations in column (3) were significant and the between-group correlation was significantly larger than the within-group correlation, column (8). In three cases, the correlation of internalized organization values, supportive supervision, and information and resources with group stewardship, the between and within-group correlations were not significantly different. However, the total correlation in column (7) was significant. Therefore the equivocal inference was chosen as the best description of the relationship between the two variables.

The tests to determine if construct correlations should be studied at the plant level of analysis are shown in Table 4.2. (Only one plant was surveyed within each organization. Hence the higher level of aggregation will be referred to as plant.) At this level of analysis, the only wholes induction was found for the correlation of group stewardship with the perceived pay-performance linkage. The equivocal condition best described all other correlations.

The inferences drawn from Tables 4.1 and 4.2 were combined in Table 4.3 to enable determination of the most appropriate level of aggregation when testing Hypothesis 1 (multiple level analysis, Dansereau et al., 1984). Three types of interpretations were found. For example, in the case of clear purpose, data could be aggregated up to the group level but not to the plant level. Therefore the wholes condition was inferred at the group level of analysis and weighted group means were utilized to assess relationships. In the case of supportive supervisor relations, an equivocal condition was found at both the group and plant levels of analysis. The equivocal

**Table 4.3. Appropriate Levels of Analysis for Group Stewardship and Hypothesized Antecedents**

| Group Steward-ship with | Inference | | Interpretation | Data source for hypothesis testing |
|---|---|---|---|---|
| | Group level | Plant level | | |
| Clear Purpose | Wholes | equivocal | level-specific whole groups | weighted group means |
| Need for Analysis | Wholes | equivocal | level-specific whole groups | weighted group means |
| Affective Trust | Wholes | equivocal | level-specific whole groups | weighted group means |
| Identify with Group | Wholes | equivocal | level-specific whole groups | weighted group means |
| Internalized Group Values | Wholes | equivocal | level-specific whole groups | weighted group means |
| Meaningful Work | Wholes | equivocal | level-specific whole groups | weighted group means |
| Group Potency | Wholes | equivocal | level-specific whole groups | weighted group means |
| Autonomy | Wholes | equivocal | level-specific whole groups | weighted group means |
| Internalized Org. Values | equivocal | equivocal | equivocal | individual raw scores |
| Identify with Organization | Wholes | equivocal | level-specific whole groups | weighted group means |
| Psychological Ownership | Wholes | equivocal | level-specific whole groups | weighted group means |
| Supportive Supervision | equivocal | equivocal | equivocal | individual raw scores |
| Information & Resources | equivocal | equivocal | equivocal | individual raw scores |
| Pay Performance Link | Wholes | wholes | cross-level wholes | weighted plant means |

condition indicates a significant relationship was found between the constructs, but only at the lowest level entities, in this case the individual. Therefore, individual scores were used to assess relationships. The third interpretation found was cross-level wholes for the group stewardship relationship with pay-performance linkage. In this case weighted plant means were used to assess the hypothesis.

Once the appropriate level of analysis for each antecedent of group stewardship was determined, the appropriate statistics were drawn from Table 4.1 and 4.2 to assess the hypotheses. The results are shown in Table 4.4. All antecedents showed a significant correlation with the presence of group stewardship. Therefore, Hypothesis 1 is supported.

**Table 4.4. Summary of Correlation Tests to Assess Antecedents of Group Stewardship**

| Antecedent rated by: | Group Members | | | |
|---|---|---|---|---|
| Group Stewardship rated by: | Group Members | | | |
| | Correlation for inferred level of analysis | | | |
| | Individual | Group | Plant | Hypothesis |
| Antecedent Constructs | $r_{Txy}$ | $r_{Bxy}$ | $r_{Bxy}$ | Supported? |
| Clear Purpose | | 0.650 *** | | Yes |
| Need for Analysis | | 0.514 *** | | Yes |
| Affective Trust | | 0.807 *** | | Yes |
| Identify with Group | | 0.742 *** | | Yes |
| Internalize Group Values | | 0.702 *** | | Yes |
| Meaningful Work | | 0.772 *** | | Yes |
| Group Potency | | 0.786 *** | | Yes |
| Autonomy | | 0.694 *** | | Yes |
| Internalize Org. Values | 0.492 *** | | | Yes |
| Identify with Organization | | 0.681 *** | | Yes |
| Psychological Ownership | | 0.699 *** | | Yes |
| Supportive Supervision | 0.504 *** | | | Yes |
| Info. And Resources | 0.574 *** | | | Yes |
| Pay-Performance Link | | | 0.902 *** | Yes |
| Sample size | 747 | 108 | 10 | |
| | | | | |
| Antecedent rated by: | Supervisor | | | |
| Group Stewardship rated by: | Group Members | | | |
| Boundary Management | | 0.221 * | | Yes |
| Sample size | n/a | 100 | 10 | |

Statistical Significance: * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$

In addition to the constructs assessed by group members, supervisors assessed the level of boundary management responsibilities for their groups. The total correlation was significant but there was no justification found for aggregation to the plant level of analysis. The group-level inference for boundary management is shown near the bottom of Table 4.4.

### 4.1.2 ***Hypothesis 2: Group stewardship is positively associated with the presence of group learning and proactive behaviors***

The WABA multiple level analysis methodology used to test Hypothesis 1 was used to assess Hypothesis 2. The tables used to infer the appropriate level of analysis are in Appendix C.2. Group member ratings were used for all constructs. The results of the WABA analysis are shown in Table 4.5. All correlations are appropriately assessed at the group level of analysis and are significant at $p \leq 0.001$. Therefore the hypothesis that the extent of group stewardship is positively correlated with group learning and proactive behaviors is supported.

**Table 4.5. Summary of Correlation Tests Used to Assess Group Stewardship Outcomes**

| Hypothesized outcomes of Group Stewardship: | Correlation for inferred level of analysis | | | Hypothesis Supported? |
|---|---|---|---|---|
| | Individual | Group | Plant | |
| | $r_{TXY}$ | $r_{BXY}$ | $r_{BXY}$ | |
| External Perspective | | $0.813^{***}$ | | Yes |
| Experimentation | | $0.629^{***}$ | | Yes |
| Internal Collaboration | | $0.792^{***}$ | | Yes |
| Proactive Behaviors | | $0.848^{***}$ | | Yes |
| Sample size | 747 | 108 | 10 | |

Statistical Significance: $^{***}p \leq .001$

### 4.1.3 ***Hypothesis 4: Group learning and group proactive behaviors are positively associated with group effectiveness outcomes***

The analysis to test this hypothesis was done in two parts. The multiple level analysis used to test Hypotheses 1 and 2 was used with group member ratings to assess correlations with employee job satisfaction. Supervisor ratings were used to assess correlations with group performance and customer service. The tables used to infer the appropriate level of analysis are in Appendix C.3. The hypothesis tests are shown in Table 4.6. Hypothesis 4 was supported for all relationships except one; no significant relationship was found between supervisor ratings of experimenting behaviors and performance ratings. However, all other relationships were appropriately analyzed at the group level of analysis and were significant.

**Table 4.6. Summary of Correlations Tests Used to Assess Outcomes of Group Learning and Proactive Behaviors**

| **Constructs:** | **Correlation for inferred level of analysis** | | | | | |
|---|---|---|---|---|---|---|
| Behavior/ Outcomes | Null: $r_{TXY}$ | Individual: $r_{TXY}$ | Group: $r_{BXY}$ | Plant: $r_{BXY}$ | Rating by | Hypothesis Supported? |
| External Perspective | | | | | | |
| Performance | | | 0.610 *** | | Supervisor | Yes |
| Employee Job Satisfaction | | | 0.705 *** | | Group | Yes |
| Customer Service | | | 0.639 *** | | Supervisor | Yes |
| Experimentation | | | | | | |
| Performance | 0.115 | | | | Supervisor | No |
| Employee Job Satisfaction | | | 0.564 *** | | Group | Yes |
| Customer Service | | | 0.368 *** | | Supervisor | Yes |
| Internal Collaboration | | | | | | |
| Performance | | | 0.611 *** | | Supervisor | Yes |
| Employee Job Satisfaction | | | 0.697 *** | | Group | Yes |
| Customer Service | | | 0.676 *** | | Supervisor | Yes |
| Proactive Behavior | | | | | | |
| Performance | | | 0.721 *** | | Supervisor | Yes |
| Employee Job Satisfaction | | | 0.673 *** | | Group | Yes |
| Customer Service | | | 0.625 *** | | Supervisor | Yes |
| Sample size - group ratings | 747 | 747 | 108 | 10 | | |
| Sample size - supervisor ratings | 100 | n/a | 100 | 10 | | |

Statistical Significance: *** $p \leq .001$

## 4.2 TESTING THE HYPOTHESIS OF DISTINCT CONSTRUCTS

Research Hypothesis 3 proposes that group learning consists of two distinct but related dimensions, cognitive and action-oriented behaviors. This question was addressed in chapter 3, section 3.5.2.6. Distinct learning dimensions were found. Integration of an external perspective is a cognitive behavior. Internal collaboration and experimenting are action-oriented behaviors.

## 4.3 TESTING HYPOTHESES OF MEDIATION

Research hypotheses five and six propose that certain constructs mediate the effect of an antecedent construct on a dependent (endogenous) construct. The hypotheses are:

- ***Research Hypothesis 5: Group stewardship mediates the relationship between antecedent constructs and both learning and proactive behaviors.***
- ***Research Hypothesis 6: Group learning and proactive group behaviors mediate the relationship between group stewardship and effectiveness.***

As used in this research, the concept of mediation refers to relationships where an antecedent condition has its effect on an outcome by facilitating an intermediate condition or process. For example, mediation would be said to occur when an environmental condition facilitates a group process, which in turn leads to the outcome of interest (Kenny, Kashy, & Bolger, 1998).

One of three outcomes results from mediation analysis. Full confirmation of a mediation hypothesis is found if the antecedent acts on the dependent variable only through the mediating variable. In other words, referring to Figure 4.2 (b), full mediation occurs when the initial variable X acts on the outcome Y only through mediator M. The size of effect c' is not significantly different from zero after controlling for M. Partial confirmation of a mediation hypothesis is found if the antecedent construct acts directly on the dependent variable as well as indirectly through the mediating variable (i.e., partial mediation). In this case, c' is less than c, but is still significantly different from zero. The mediation hypothesis is not confirmed if neither partial nor full mediation is shown. In this case, as is shown in figure 4.2 (a), X acts on Y directly.

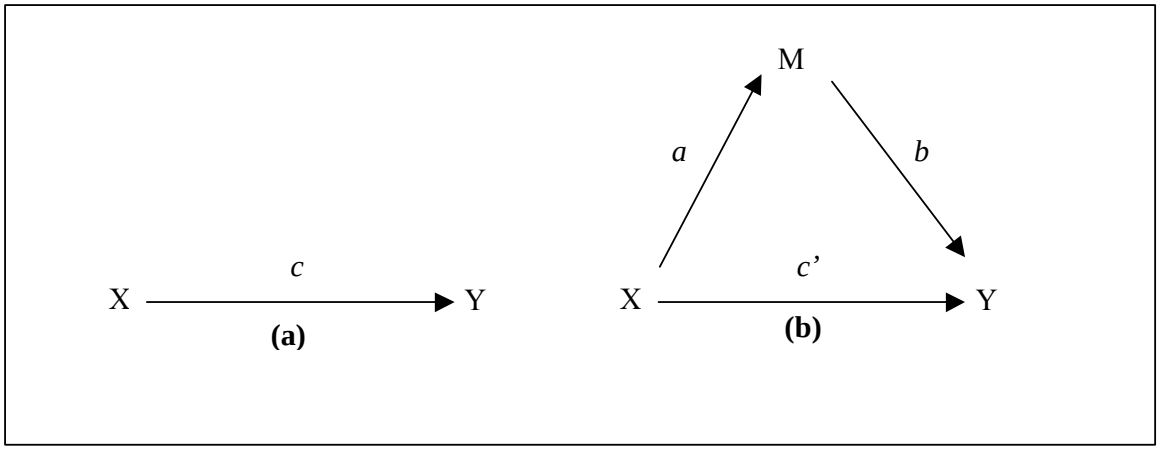



**Figure 4.2. Basic Mediation Structure Used to Test Hypotheses Five and Six.**

Two constraints were set to select the variables used in the mediation analysis. First, only variables related to group stewardship and learning at the group level of analysis were used. Second, for Hypothesis 5, multiple regression was used to select the subset of variables which best explained the extent of group stewardship.

A four-step mediation analysis process was used (Kenny et al., 1998) for hypotheses 5 and 6.

1. Show X is correlated with Y. Estimate and test the significance of path *c* in Figure 4.2 (a).
2. Show the initial variable X is correlated with the mediator M. Estimate and test the significance of path *a* in Figure 4.2 (b).
3. Show that the mediator variable M affects the outcome variable Y. Estimate and test the significance of path *b* in Figure 4.2 (b) while controlling for X. This will be done by using Y as the criterion variable in the regression equation and utilizing X and M as predictors. If *a* (step 2) and *b* (step 3) are significant, then at least partial mediation has been established. Step 4 is tested only if at least partial mediation is found.
4. Determine if the mediator variable M fully mediates the X-Y relationship. Test the effect of X on Y while controlling for M by estimating and testing the significance of *c'* in Figure 3.1 (b). If *c*' is zero, then M completely mediates the X-Y relationship. This test is conducted utilizing the same regression equation developed for step three.

### *4.3.1 Hypothesis 5: Group stewardship mediates the relationship between antecedent constructs and both learning and proactive behaviors.*

Four constructs were chosen through multiple regression analysis to test the mediating effect of group stewardship. The all possible best subsets routine in NCSS 6.0 and the stepwise regression routine in SPSS 10.0 converged on the same model with affective trust, group potency, need for analysis, and identification with the organization explaining 82% of the variance in group stewardship (see Table 4.7). The selected model included variables related to groups' attitudes toward their task, their group, and their organization.

**Table 4.7. Regression Equation for Selection of Variables to Use as Independent Variables in Mediation Analysis with Group Stewardship**

| Model | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|
| | B | Std. Error | Beta | t | Sig. | Tolerance | VIF |
| Constant | -.157 | .255 | | -.614 | .541 | | |
| Affective Trust | .153 | .058 | .202 | 2.619 | .010 | .290 | 3.445 |
| Group Potency | .436 | .067 | .442 | 6.458 | .000 | .367 | 2.727 |
| Need for Analysis | .161 | .049 | .151 | 3.257 | .002 | .801 | 1.249 |
| ID with Organization | .302 | .045 | .345 | 6.721 | .000 | .654 | 1.529 |
| R2 = 0.823, adj-R2 = 0.816, No. groups = 108 weighted by number responses/group. | | | | | | | |

Using this reduced set of antecedents as the independent variables, a series of mediation analyses were run with group stewardship as the mediating variable and the learning and proactive behaviors as the dependent variables. The full set of regression equations is in Appendix C.4. Table 4.8 shows the extent of mediation for each independent variable. For example, the effect of group potency on internal collaboration is fully mediated by group stewardship, meaning that after controlling for the presence of group stewardship the effect of group potency on internal collaboration was not significant. Further, 77% of the effect of group potency on internal collaboration acted through group stewardship. Using a test of the significance of mediation suggested by Baron and Kenny (1986), the mediation effect of group stewardship was significant at $p \leq 0.001$ for all cases. Therefore Hypothesis 5 was fully or partially supported in every case.

**Table 4.8. Extent to which Group Stewardship Mediates the Effect of Independent Variables on Group Learning and Proactive Behaviors**

| | **Dependent Variables** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Independent Variable** | External Perspective | | Internal Collaboration | | Experiment | | Proactive Behaviors | |
| | Mediation | Proportion | Mediation | Proportion | Mediation | Proportion | Mediation | Proportion |
| Affective Trust | Full | 0.77*** | Partial | 0.63*** | Partial | 0.56*** | Partial | 0.52*** |
| Group Potency | Full | 1.00*** | Full | 0.77*** | Full | 1.00*** | Partial | 0.59*** |
| Need for Analysis | Full | 0.77*** | Full | 0.83*** | Partial | 0.55*** | Full | 0.92*** |
| Identify w/ Org. | Partial | 0.54*** | Partial | 0.68*** | Full | 0.67*** | Full | 0.96*** |

Significance: *** $p \leq 0.001$

### *4.3.2 Hypothesis 6: Group learning and proactive group behaviors mediate the relationship between group stewardship and effectiveness.*

The full set of regression equations used to test Hypothesis 6 is in Appendix C.5. A summary of the analysis is presented in Table 4.9. The table layout is the same as was used to summarize Hypothesis 5 except the left hand column is the variable hypothesized to mediate the effect of group stewardship on the outcome variables. The extent of mediation is much less than was found for Hypothesis 5. No cases of full mediation were found; ten of the twelve mediation

analyses found significant partial mediation, and two cases had no significant mediation. Thus, Hypothesis 6 was only partially supported.

### 4.4 TESTING THE HYPOTHESIS OF MODERATION

Research Hypothesis 7 proposes that the extent to which a group's task requires analysis will moderate the effect of group stewardship on group learning and proactive behaviors. A moderator variable has been defined as "one which systematically modifies either the form and/or the strength of the relationship between a predictor and a criterion variable" (Sharma, Durand, & Gur-Arie, 1981). In this case, task requirements may affect both the presence of a group-level relationship between constructs as well as the size (i.e., sign and magnitude) of group stewardship's effect on group learning and proactive behaviors.

**Table 4.9. Extent to which Group Learning and Proactive Behaviors Mediate the Effect of Group Stewardship on Outcomes**

| | **Outcome Variables** | | | | | |
|---|---|---|---|---|---|---|
| **Mediating Variable** | Employee Job Satisfaction | | Performance | | Customer Service | |
| | Mediation | Proportion | Mediation | Proportion | Mediation | Proportion |
| External Perspective | Partial | 0.37 ** | Partial | 0.31 *** | Partial | 0.39 *** |
| Internal Collaboration | Partial | 0.35 ** | Partial | 0.29 *** | Partial | 0.42 *** |
| Experiment | Partial | 0.15 * | No | 0.01 $^{ns}$ | Partial | 0.10 * |
| Proactive Behavior | No | 0.23 $^{ns}$ | Partial | 0.57 *** | Partial | 0.30 * |

Significance: $^{ns}$ $p > 0.05$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

The process to test this hypothesis began with WABA to determine the appropriate levels of analysis. Hierarchical regression analysis was used to test the significance of moderation if a group-level relationship was inferred by WABA under both low and high need for analysis conditions. The following four-step process was used to test the hypothesized moderating effect.

1. Work groups were categorized as low or high need for analysis halves using a median split of the mean response from work group members. This resulted in 54 work groups in each half.

2. Multiple Variable Analysis (MVA), a WABA technique, was used to assess the relationships among the constructs. The MVA analysis found that group stewardship and group behaviors were significantly more strongly related each other than to the need for analysis construct. This step was necessary to avoid excessive range restriction in the responses of variables to be tested. For example, if the values of group stewardship, need for analysis and experimentation were approximately equally contingent upon each other, "then dividing the data set based upon any one of the variables would truncate the distribution of the other variables" (Dansereau et al., 1986, p. 89). Range restriction tends to reduce the ability of statistical tests to find a significant relationship even when one is known to be present.
3. Multiple Relationship Analysis (MRA), a WABA technique, was used to determine if the relationships between pairs of variables held constant across high and low levels analysis conditions (a multiplexed inference), or if relationships were contingent upon the need for analysis conditions.

Multiple relationship analysis found some relationships with group stewardship were contingent upon need for analysis conditions. The multiple-level WABA analysis for each condition is in Appendix C.6. A summary of the MRA analysis is shown in Table 4.10. When the presence of a group-level relationship between group stewardship and learning or proactive behaviors was contingent upon the analysis condition, Hypothesis 7 was supported. Thus, Hypothesis 7 was supported for group stewardship's relationship with external perspective and proactive behaviors. As the internal collaboration – group stewardship relationship held in both analysis conditions, hierarchical regression was used to assess for an interaction effect. No

**Table 4.10. Summary of Relationships between Constructs by Analysis Condition**

| **Constructs** | | **Inferred Relationships between Constructs by Need for Analysis Condition** | | **Induction** |
|---|---|---|---|---|
| | | Low | High | |
| Group Stewardship | External Perspective | Group | Plant | Contingent |
| Group Stewardship | Experiment | Individual | Individual | Multiplexed |
| Group Stewardship | Internal Collaboration | Group | Group | Multiplexed |
| Group Stewardship | Proactive Behaviors | Individual | Group | Contingent |

further testing was done with the experiment – group stewardship relationship, as it was not clear that the relationship was operating at the group level of analysis.

Initially it was surprising that the group stewardship – experiment relationship failed to show a group-level relationship for either condition. The relationship between these two constructs was equivocal at the group and plant level for both analysis conditions indicating the lowest level of entity, individuals, should be used to assess relationships. The group stewardship – experiment relationship had been found to operate at the group level of analysis when the entire data set was used to assess the relationship.

The change in the level of group stewardship – experiment relationship may have been due to range restriction occurring when the data set was split. The correlations between group stewardship and the experiment constructs were significantly *different* than their correlations with the need for analysis. However, as is shown in Table 4.11, the correlations with need for analysis were significant and meaningful. The need for analysis influenced just over 20% of the variance in experimenting and 25% of the variance in group stewardship resulting some truncation in the distributions of each split half relative to the whole data set. Hence, it was not surprising that the average between-groups sum of squares was lower in each split half than for the entire data set for all five variables of interest.

**Table 4.11. Weighted Group Correlations Used in Multiple Variable Analysis**

| | Need for Analysis | Group Stewardship |
|---|---|---|
| Need for Analysis | 1.00 | 0.51 |
| Group Stewardship | 0.51 | 1.00 |
| External Perspective | 0.50 | **0.81** |
| Experiment | 0.45 | **0.63** |
| Internal Collaboration | 0.47 | **0.79** |
| Proactive Behaviors | 0.46 | **0.85** |
| No. Groups | 108 | 108 |

Calculations weighted by number responses in group.
All correlations significant at $p \leq 0.001$

4. For the relationship between group stewardship and internal collaboration MRA found a multiplexed group-level relationship. Therefore hierarchical regression was used to determine if need for analysis significantly interacted with group stewardship to influence the magnitude of the dependent variable. Consistent with the hypothesized causal sequence, the following process was used.

a. In step one need for analysis and group stewardship were entered as independent variables and the internal collaboration construct as the outcome (criterion) variable. The proportion of variance explained, $R^2$, was calculated using using SPSS.
b. In step two the interaction term, need for analysis x group stewardship, was entered into the regression equation. The regression equation and the proportion of variance explained were calculated.
c. An F-test was used to determine if the incremental proportion of variance explained due to the interaction term was significant. (If the incremental proportion of variance explained by introduction of the interaction term is significant, then need for analysis moderates the effect of group stewardship on internal collaboration.)

Table 4.12 shows the results of the hierarchical regression. The incremental variance explained is not significant, the F-test is only significant at $p = 0.605$. A scatterplot showing the relationship between group stewardship and internal collaboration is shown in Figure 4.3. No meaningful difference in the group stewardship – internal collaboration relationship between low and high analysis groups is evident in the scatterplot.

**Table 4.12. Hierarchical Regression to Test Interaction Effect**

| Step | Variable | Unstandardized Coefficients | | t | Signi-ficance | $R^2$ |
|---|---|---|---|---|---|---|
| | | B | Std. Error | | | |
| 1 | (Constant) | 0.819 | 0.324 | 2.528 | 0.013 | 0.632 |
| | Need for Analysis | 0.090 | 0.076 | 1.181 | 0.240 | |
| | Grp Stewardship | 0.779 | 0.072 | 10.874 | 0.000 | |
| 2 | (Constant) | -0.068 | 1.738 | -0.039 | 0.969 | 0.633 |
| | Need for Analysis | 0.296 | 0.404 | 0.732 | 0.466 | |
| | Grp Stewardship | 0.986 | 0.405 | 2.436 | 0.017 | |
| | Analysis x Group Stewardship | -0.048 | 0.092 | -0.519 | 0.605 | |

Number groups = 108 weighted by number responses for each group.

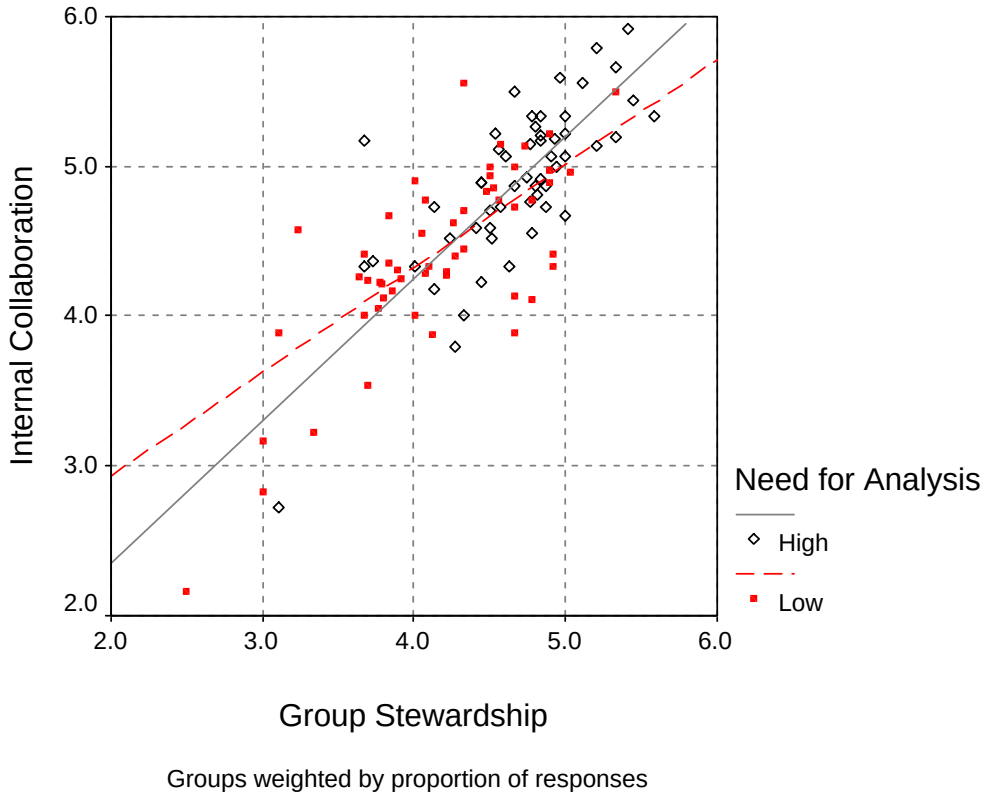



Figure 4.3. Scatterplot showing the relationship between group stewardship and internal collaboration for groups with low and high needs for analysis.

In summary, Hypothesis 7 was only partially supported. No moderation of the group stewardship – experiment or group stewardship – internal collaboration relationships was found. The need for analysis did affect the level of the relationship between group stewardship and two group behaviors.

- As the need for analysis increased to a higher level, the group stewardship – external perspective relationship changed from a group-level relationship toward an emerging plant-level relationship (where a weak plant relationship was found at level two but no whole-group relationship was found at level one).
- As the need for analysis increased to a higher level the group stewardship – proactive behaviors relationship changed from an individual to a group-level relationship. This implies the need for analysis increases the likelihood that group members will collectively work together proactively.

# CHAPTER 5 CONCLUSIONS AND INTERPRETATIONS

This chapter draws together results from the previous two chapters. The methodology chapter presented findings relating to the validity of group stewardship and three distinct learning behavior scales. The results chapter tested hypotheses relating to the roles of group stewardship, group learning and group proactive behaviors in work groups. In this chapter the analysis results will be interpreted and conclusions about what has been learned will be presented. This chapter has eight sections.



## 5.1 CONTRIBUTIONS IN DEFINING GROUP STEWARDSHIP AND ITS ANTECEDENTS

Management practitioners and a few researchers have written conceptual works about the potential benefits of stewardship. For example, Davis et al. (1997b) proposed that stewards are motivated to act in the best interests of their principals, internally motivated, and willing to act in concert with others. They also proposed constructs that would be expected to be distinct from and contribute to the development of stewardship including being in a structural situation that promotes effective action, identification with the organization, high value commitment, and trusting relationships. Pierce et al. (2001) list and differentiate four related constructs (i.e., psychological ownership, commitment, identification, and internalization of goals or values) and suggest they may be related to desirable consequences such as stewardship and organizational citizenship behavior.

While others have described stewardship and its antecedents, this research addresses some of the needs for research in stewardship others have identified. For example, Davis et al. (1997b) call for empirical testing of a stewardship construct, research into the mechanisms that promote the development of stewardship, and the relative importance of constructs promoting the development of stewardship. This research has addressed these needs.

- The group stewardship scale developed and tested in this research has good reliability. Exploratory construct analysis followed by confirmatory construct analysis showed that it is distinct from psychological ownership, identification, and internalized goals and values.
- Fifteen constructs identified as potential antecedents were found to be significantly correlated with group stewardship and therefore the mechanisms through which group stewardship may be developed. Further, the appropriate level of analysis for each correlation, individual, group or plant, was identified.
- A subset of four group-level constructs were identified which taken together explain 82% of the variance in the presence of group stewardship in this research data set. These four constructs include one related to task design (need for analysis), two related to group relationships (group potency and affective trust), and one addressing the work group's relationship with the organization (identification with the organization). These four constructs should be useful for practitioners seeking to develop group stewardship or other researchers seeking a prioritized or reduced set of variables to use in the study of group stewardship.

Refining the definition of group stewardship. This research also resulted in a refinement of the originally proposed definition of group stewardship. The original definition stated group stewardship is a collectively held sense of responsibility to act as *co-owners or partners* in the best interests of the organization. However, the two survey items relating to group members feeling like partners or owners cross-loaded with other constructs including psychological ownership and identification with the organization. While psychological ownership is about "what's mine" or something people take upon themselves as their own, stewardship is accepting a charge to act in behalf of or as an overseer for the true owner. As was described in section 2.1.2, a problem with teams can be development of an inwardly-focused closed system that does not adequately incorporate external information (St. Clair et al., 2000). The development of an inwardly-focused closed system could be a manifestation of a collective sense of psychological ownership developed by a group that fails to recognize its true charge is to oversee its sphere of responsibility *in behalf of* the organization's stakeholders. After consideration of the factor analysis results, the proposed definition of group stewardship needed to be changed to keep the concept conceptually distinct from psychological ownership. A review of the roots of the

stewardship concept (section 2.2.2) found stewardship involves not only utilizing ones resources, but also seeking ways to renew or improve what is managed. Therefore, group stewardship was redefined as a collectively held sense of responsibility to *oversee and improve performance in the group's area of responsibility* in accordance with the best interests of the organization.

Antecedents of Group Stewardship. This research identified fifteen task, group, and organizational constructs associated with the presence of group stewardship. Four of these constructs explain 82% of the variance in the degree to which group stewardship was present: affective trust, group potency, need for analysis, and identification with the organization. Given that organizations attempting to utilize work groups generally fail to utilize complementary sets of work practices (see section 2.1.1 and Osterman, 1994), these results should be especially useful to managers or management systems engineers who design the systems within which people work. While one cannot make people collectively decide to engage in their work as stewards, one can work on the "roots" of group stewardship. The subset of four constructs could be used to provide a concise set of factors to diagnose problems or design an intervention to develop group stewardship by targeting group-level factors. The full set of fifteen constructs could be used to assess the work system in depth and to consider factors that must be addressed at the individual or plant (organization) level.

Significant relationships with the development of group stewardship were found at the individual, group and organizational levels of analysis. The presence of constructs relating to development of group stewardship at three organizational levels suggests that development of group stewardship requires not only the breadth of a systems approach to group-level constructs, but also attention to the "depth" of the approach from individual through organizational-level constructs.

The finding that perceptions of supportive supervision and receipt of information and resources tended to operate at the individual level of analysis is consistent with leader-member exchange (LMX) theory (Graen & Cashman, 1975). LMX suggests leaders develop relationships with each of their subordinates on a dyadic basis rather than with the group as a whole. These dyads may form quickly and remain stable over time (Liden, Wayne, & Stilwell, 1993). Higher quality relationships are characterized by higher levels of support and guidance. Thus, managers need to be aware of and address individual relationships.

The extent of the perceived pay-performance linkage appeared to relate to the development of stewardship at the plant level. This is an example of a construct that upper management must address. Just as plant or organizational managers must design the system within which groups work, they must also assure the recognition-reward system is consistent with they way group members are being expected to act.

## 5.2 GROUP STEWARDSHIP AND WORK GROUP EFFECTIVENESS

As was described in chapter 2 (section 2.1.4), measures of work group effectiveness generally fall into three categories: the group's productive output, contributions to group well-being, and the extent to which group processes increase the group's viability or capability to work together in the future. Measures associated with each of these effectiveness categories were addressed in this research. All were found to be positively associated with the extent to which group stewardship was present.

Group supervisors provided two subjective assessments of work group productive outputs: group performance and group customer service. The assessments of group outputs were correlated with group member and supervisor perceptions of work group characteristics. The most significant correlations are shown in Table 5.1. Supervisor outcome ratings were more highly correlated with supervisor than group member perceptions of group characteristics, but

**Table 5.1. The Correlation between Work Group Characteristics and Productive Outputs**
(Group characteristics rated by group members and supervisors, outputs rated by supervisors)

| Productive Output Constructs | Performance | Customer Service | Performance | Customer Service |
|---|---|---|---|---|
| Perceptions of Groups Rated by: | Group Members | | Group Supervisors | |
| Clear Purpose | 0.224 $^{*}$ | 0.104 | 0.545 $^{***}$ | 0.351 $^{***}$ |
| Affective Trust | 0.144 | 0.209 $^{*}$ | 0.627 $^{***}$ | 0.679 $^{***}$ |
| Boundary Management | -- | -- | 0.316 $^{***}$ | 0.512 $^{***}$ |
| Group Potency | 0.155 | 0.211 $^{*}$ | 0.655 $^{***}$ | 0.578 $^{***}$ |
| Psychological Ownership | 0.016 | 0.044 | -- | -- |
| Identification with the Organization | 0.011 | -0.014 | -- | -- |
| Group Stewardship | 0.184 $^{+}$ | 0.204 $^{*}$ | 0.670 $^{***}$ | 0.633 $^{***}$ |

N = 100 work groups, $^{+}$ $p \leq 0.10$, $^{*}$ $p \leq 0.05$, $^{**}$ $p \leq 0.01$, $^{***}$ $p \leq 0.001$
-- indicates the group characteristic was not rated

generally showed the same patterns of relatively higher or lower correlation with group characteristics. It is interesting that different constructs appear to be related to performance and customer service. Group member perceptions of clear purpose and group stewardship were the most highly correlated with performance, indicating that as group members feel they clearly understand what is expected and collectively accept responsibility to act, they are more likely to be rated as a high performing group. In contrast, customer service tended to be rated highest when group members shared feelings that would be expected to facilitate collective responsiveness: group potency, affective trust, and group stewardship. Perhaps this implies that while overall performance ratings may be associated with a clear understanding and acceptance of the group's duty, customer service may be more strongly associated with perceived capability to collectively respond to changing customer requirements.

It is also extremely significant to compare the correlations of group stewardship, psychological ownership, and identification with the organization with the performance and customer service ratings. Only group stewardship was significantly related to supervisor outcome ratings. This underscores the contribution of the concept of group stewardship. A collective sense of psychological ownership could lead to a group becoming inwardly focused or self-centered without respect to alignment with organizational needs. While identification with the organization is likely to lead to employees feeling a sense of "home" in the workplace and even reduce levels of turnover, by itself identification with the organization is not enough. The feelings that "this organization is our home" or "we expect to remain members of this organization" are quite distinct from a commitment to act.

These findings support the idea that psychological ownership and identification with the organization facilitate the development of group stewardship, but do not act directly to enhance group-level outcomes. When properly directed, psychological ownership can lead to acceptance of responsibility. Identification with the organization can lead to a decision to remain and enable the development of close working relationships and collective skills.

Employee job satisfaction, a measure of the group well-being was also assessed. The presence of group stewardship was correlated with the degree of employee job satisfaction at $r = 0.728$. Only identification with the group ($r = 0.781$), identification with the organization ($r = 0.741$), and psychological ownership ($r = 0.745$) are more highly correlated with employee job satisfaction. However, when group stewardship is added to a regression equation with each of

these three constructs, the increase in $R^2$ is significant at $p \leq 0.001$. Therefore group stewardship contributes meaningful information to understanding the extent to which employee job satisfaction occurs in addition to what is contributed by other variables, further supporting the usefulness of the construct.

The contribution of group stewardship to the third measure of group effectiveness, the extent to which group processes increase the group's viability or capability to work together, was also supported by this research. As was mentioned in section 2.1.4, innovation may be one of the greatest competitive advantages available through the use of work groups. The fact that the use of TQM and problem solving groups doubled from 1992 to 1997 (Osterman, 2000), supports the idea that organizations are seeking innovation and continuous improvement. Thus the three dimensions of group learning and group proactive behaviors are an important aspect of work group capabilities. Group stewardship was found to be strongly and positively associated with the presence of all three dimensions of group learning as well as with proactive behaviors (see Table 4.5).

While there are severe limitations to the conclusions that can be drawn from the mediation tests performed as part of this research, it appears that group stewardship may mediate the relationship between work conditions and learning behaviors. Testing of mediating effects is most appropriately done in longitudinal studies where cause and effect relationships can be tested. The commonly used approach to mediation testing prescribed by Baron and Kenny (1986) appears to be described in much of the social science methodology literature as an approach to describe the effect of a mediating variable following a programmed intervention. In such cases the causal sequence is clear: intervention, mediating activities, outcomes. However, in cross-sectional field studies with hypothesized antecedents, mediating attitudes and behavioral outcomes, the causal sequence is hardly as clear. Regression cannot determine causality, only correlation. The hypothesized causal relationships tested in this research could actually operate in the opposite direction. For example, a shared sense of group stewardship could promote the development of affective trust and group potency. Or the relationship could be reciprocally related and self-reinforcing. In other words, group potency could lead to group stewardship and learning, which in turn reinforces group potency.

Given the above concerns, it can be said that the relationships between work conditions and group learning behaviors are consistent with the hypothesis that group stewardship acts as a

mediator enabling group learning behaviors. That is, the results of mediation analysis are consistent with what would be found if task, group, and organizational conditions do indeed influence the development of group stewardship which in turn motivates group learning and proactive behaviors.

The mediation analyses for Hypothesis 5 presented in Appendix C.4, Tables C.11 and C.12, point out the practical significance of group stewardship in promoting group learning and proactive behaviors. In each of the 16 relationships tested between the four antecedent and four learning and proactive behaviors, the addition of group stewardship to the regression equation added significantly to the amount of variance explained at $p \leq 0.001$. (See columns labeled $R^2$ and Sig $F$ change (1-3).) The increase in $R^2$ ranged from six to 50 percent with a median increase of 18 percent. Further, using weighted group means, group stewardship is more highly correlated with the four group learning and proactive behavior constructs than any of the eleven task, group, and organizational attitude constructs.

### 5.3 IMPORTANCE OF THE THREE DIMENSIONS OF GROUP LEARNING

Faced with rapid rates of change in technology, customer expectations, globablization, and corporate downsizing, organizations increasingly need innovation, flexibility, and cooperative behaviors from their employees. If, as Senge (1990) proposes, teams are the fundamental learning unit in modern organizations that can support these needs, then heightening our understanding of what group learning is and how it is developed is of utmost importance.

This research has begun to fill the need for better understanding of the multi-dimensional nature of group learning. If group learning is to be developed and if practitioners are to diagnose work groups to improve the extent of group learning, a clear understanding of the dimensions of group learning is critical. Group learning has generally been described as a process involving both cognitive and action-oriented processes (see section 1.2.2). However, previous group learning research has failed to find distinct cognition and action constructs (Dechant & Marsick, 1993) or has used a one-dimensional group learning scale (Edmondson, 1999b). Through adapting of individual-level learning strategy scales developed in training (Warr & Downing, 2000) and call center settings (Holman et al., 2000) to the group level, this research found distinct cognitive and action-oriented scales.

The three group learning scales developed as part of this research meet discriminant validity tests, have very acceptable reliability, and are consistent with learning theory. The

integration of an external perspectives construct relates to cognitive learning strategies. The internal collaboration and experimentation constructs are clearly action-oriented.

These three learning constructs have practical applications for managers and researchers. There may be a progression among the concepts from external perspective (an input) to internal collaboration (a process) to experimentation (an outcome) through which new ideas are proven and implemented. For example, if a manager does not see new ideas being implemented or the performance of a group fails to improve, then it is likely that experiments with new ways of working are not occurring. Of course the manager could simply begin encouraging the group to begin experimenting more by trying ideas ("just try anything!"). However, given the three learning constructs emerging from this research, a manager's ability to help the group improve should be enhanced. Failure to experiment could be a lack of openness to new ideas. However, it could also be due to a lack of internal collaboration, the process through which insights are shared, developed, and formed into new ideas. Or the failure to learn new ways of working could be because the group does not have external information or formal processes to integrate new information into its processes. Or the failure to learn could be due to a lack of group stewardship motivating desire for action even when all necessary conditions and capabilities are present.

The mediation analyses studying the relationship between task, group, and organizational antecedent constructs and group learning and proactive behaviors provided interesting insights into how each behavior is supported. Group stewardship fully mediated many of the relationships. However, each group behavior was associated directly with a different set of antecedents. This suggests particular constructs should be of special interest in seeking to troubleshoot or identify best practices in a group's learning and proactive behaviors. For each of the learning and proactive behavior constructs, the antecedents strongly associated with its presence after controlling for the extent of group stewardship are listed below.

- External perspective ← identify with organization
- Internal collaboration ← identify with organization and affective trust
- Experimentation ← need for analysis and affective trust
- Proactive behaviors ← group potency and affective trust

These findings suggest that if a particular group behavior is problematic, then specific characteristics of the work environment may be important to assess and improve. For example,

if group members fail to collaborate, in addition to reviewing the level of group stewardship, it would be especially important to determine if group members identify with the organization and if affective trust between group members is present. Additionally, the finding that different constructs are associated with each of the behaviors supports the need for a broadly-based systematic approach to develop group learning behaviors.

Stewart's (2000) meta-analysis of work group research found intrateam processes had a large positive correlation with group member satisfaction. This research supports that finding. The three dimensions of group learning were significantly positively correlated with employee job satisfaction: $r = 0.564$ for experimentation, $r = 0.697$ for internal collaboration and $r = 0.705$ for external perspective.

Two of the proposed learning constructs, integrating internal perspectives and crossing external boundaries to share information, did not emerge from factor analysis as distinct scales. In exploratory construct analysis the items from these scales tended to load on two or more constructs. One possibility is that these behaviors did not clearly exist within the groups surveyed, but might exist within other groups. Another possibility is that these behaviors tend to be done primarily by individuals. For example, within a work group it is possible that only one or two people function as ambassadors to share information. Another possibility is that the groups surveyed tended to rely on their supervisors to manage boundary interfaces and did not view crossing boundaries as a group behavior.

That integration of internal perspectives and boundary crossing activities did not emerge as distinct constructs may be a matter of practical significance to managers. To the extent that groups as a whole do not see themselves filling these roles, it will be critical that supervisors facilitate groups to assure these activities do occur. Druskat and Wheeler (under review) found that effective coaches of self managed teams are those who are able to both effectively coach processes within the team and manage external internal interfaces for their teams to assure a bi-directional flow of information in and out of the team.

## 5.4 INSIGHTS FROM WORK GROUP OBSERVATION FORM ANALYSIS

Supervisor survey responses tended to differ from group member responses to similar questions. That supervisor ratings were biased higher is not surprising. It is likely supervisors believe they are supporting their work groups well, giving them feedback and providing them with meaningful assignments. However, the lack of correlation between supervisor and group

member perceptions is troublesome. It seems to highlight the need for more communication and understanding between work groups and their supervisors. It would seem difficult to effectively supervise a group when one does not know the extent or direction of change in the perceptions of those being supervised.

A striking example of the disconnect between supervisor and group member perceptions occurred with respect to group member autonomy. There was a complete mismatch between the observation form items supervisors and group members associated with autonomy. (See Table 3.23.) Supervisors associated giving the work group authority to control the pace at which work is done with autonomy. However there was no correlation between autonomy and control over the pace of work from the group member perspective. In fact autonomy item AUTO3, the freedom to determine *how* work is done, was significantly negatively correlated with control over the pace of work.

This difference in perceptions about autonomy and control over the pace of work shows the importance of supervisors viewing work design from the group members' perspective. Supervisors are often preeminently concerned with the quantity and quality of work performed. They may feel that delegating responsibility for the pace of work is a significant form of autonomy. However, group members may feel control over the production pace is simply managers delegating more responsibility and interfering with harmony among group members by asking them to make interpersonal decisions with which they may not be comfortable.

From a research perspective, the group member supervisor gap points to the need to choose with care who provides an evaluation. For example, having a supervisor evaluate an antecedent construct to avoid utilizing the same source for multiple constructs being assessed may not be useful if the supervisor perceptions are not probing the same underlying concepts that would be important to group members.

From a managerial perspective, the general tendency for supervisor perceptions to be favorably biased and uncorrelated with group member perceptions points out the need for supervisory feedback mechanisms that include information about the well being of employees and work groups. Many methods such as employee surveys, focus groups, skip level meetings, and communication sessions are available for use. Balanced scorecard systems can include the voice of the employee in addition to process, customer and financial information.

## 5.5 JUSTIFICATION FOR AGGREGATION AND LEVELS OF ANALYSIS ISSUES

Several different techniques are available to assess the appropriateness of aggregating individual-level data to a higher-level entity. Within and Between Analysis (WABA) with relaxation of the practical significance criteria prescribed by Dansereau et al. (1984) was used to assess levels of aggregation in this research. Two other methods frequently used in group research are $r_{wg}$, an assessment of within-group interrater agreement (James et al., 1993) and, ICC(1), intraclass correlation which uses a one-way analysis of variance to assess the significance of the proportion of variance due to the group (see Kenny & La Voie, 1985). The purpose of this brief discussion is not to argue for the use of one technique over another, but to consider the results and usefulness of each approach.

The technique chosen in this research to justify aggregation and assess the significance of correlations between constructs had a significant impact on which variables were aggregated to the group level for analysis and whether any variables would be considered for aggregation to the organization level of analysis. As is shown in Table 5.2, intraclass correlation would have been the least stringent approach; it would have justified aggregation of all constructs to the group level of analysis. WABA and $r_{wg}$ each suggest some constructs should not be aggregated, but differ considerably as to which constructs should be aggregated. While an aggregation criteria of $r_{wg} \geq 0.70$ would suggest individual data should be used for eight constructs, WABA suggests one of these eight be analyzed using individual data, six should be aggregated to the group level, and one should be aggregated to the plant level for analysis. Both approaches conclude group means should not be used to assess the group stewardship - internalization of organizational values correlation, but for different reasons. WABA I analysis finds a significant group effect for each construct. However WABA II analysis finds both significant between-group and within-group correlations of a similar magnitude. Therefore the relationship is equivocal with no clear group effect and individual data should be used. Interrater agreement would suggest group stewardship should be aggregated to the group level while internalization of organization values should not be aggregated meaning the researcher should neither perform a correlation of individual responses nor group means for these two constructs.

There may be some benefits of collaboratively using WABA and the concept of within-group variance embodied in $r_{wg}$. The WABA technique used in this research provided useful insight into the type of variance within and between constructs enabling a reasoned approach to

## Table 5.2. Comparison of Inferences from Aggregation Tests

| | Interrater Agreement | | Intraclass Correlation | | | Within and Between Analysis | | |
|---|---|---|---|---|---|---|---|---|
| Construct | $r_{wg}$ | $\geq 0.70$[a] | F-test[b] | Sig.[c] | ICC(1)[d] | Group | Plant | Data Source[e] |
| Clear Purpose | 0.737 | Yes | 2.245 | 0.000 | 0.153 | wholes | equivocal | Wt Group Mean |
| Need for Analysis | 0.759 | Yes | 2.288 | 0.000 | 0.157 | wholes | equivocal | Wt Group Mean |
| Affective Trust | 0.654 | **No** | 3.086 | 0.000 | 0.232 | wholes | equivocal | Wt Group Mean |
| Identify with Group | 0.694 | **No** | 2.338 | 0.000 | 0.163 | wholes | equivocal | Wt Group Mean |
| Internalize Group Values | 0.681 | **No** | 2.071 | 0.000 | 0.134 | wholes | equivocal | Wt Group Mean |
| Meaningful Work | 0.774 | Yes | 3.554 | 0.000 | 0.270 | wholes | equivocal | Wt Group Mean |
| Group Potency | 0.777 | Yes | 2.786 | 0.000 | 0.206 | wholes | equivocal | Wt Group Mean |
| Autonomy | 0.640 | **No** | 1.996 | 0.000 | 0.126 | wholes | equivocal | Wt Group Mean |
| Internalize Org Values | 0.647 | **No** | 2.121 | 0.000 | 0.140 | equivocal | equivocal | **Individual** |
| Identify with Organization | 0.681 | **No** | 2.534 | 0.000 | 0.182 | wholes | equivocal | Wt Group Mean |
| Psychological Ownership | 0.550 | **No** | 2.375 | 0.000 | 0.166 | wholes | equivocal | Wt Group Mean |
| Supportive Supervision | 0.708 | Yes | 2.569 | 0.000 | 0.185 | equivocal | equivocal | **Individual** |
| Information & Resources | 0.755 | Yes | 2.909 | 0.000 | 0.217 | equivocal | equivocal | **Individual** |
| Pay-perform-ance Link | 0.456 | **No** | 2.258 | 0.000 | 0.154 | wholes | wholes | **Wt Plant Mean** |
| Group Stewardship | 0.764 | Yes | 2.507 | 0.000 | 0.179 | | | |
| External Perspective | 0.761 | Yes | 2.209 | 0.000 | 0.149 | wholes | equivocal | Wt Group Mean |
| Experiment | 0.758 | Yes | 2.568 | 0.000 | 0.185 | wholes | equivocal | Wt Group Mean |
| Internal Collaboration | 0.780 | Yes | 3.020 | 0.000 | 0.227 | wholes | equivocal | Wt Group Mean |
| Proactive Behaviors | 0.741 | Yes | 2.540 | 0.000 | 0.183 | wholes | equivocal | Wt Group Mean |
| Employee Job Satisfaction | 0.737 | Yes | 2.599 | 0.000 | 0.188 | wholes | equivocal | Wt Group Mean |

[a] Criteria to justify aggregation = 0.70

[b] Between-groups one-way ANOVA used to justify aggregation

[c] Criteria for aggregation is significant F-test

[d] used adjusted avg. group size for unequal group size = 6.89

[e] use means weighted for number responses in entity, the inferences given are for group stewardship's relationship with other constructs in the table.

aggregation decisions at multiple levels of analysis. When WABA suggests aggregation to the group level, this does not necessarily imply that all members within the group are identical. It does suggest that there is enough difference between groups relative to the within-group variance that use of group means is the most appropriate representation of the entities. At this point the *concept* embodied within $r_{wg}$ analysis could be useful. When WABA infers aggregation, the researcher may still wish to know how much variance is within groups or to what extent all groups are very similar; this is what $r_{wg}$ attempts to do. So $r_{wg}$ is potentially useful after one has reached the decision to aggregate using WABA analysis (Dansereau & Yammarino, 2000).

However, if one wishes to study within-group variance, it may be more useful to review the mean within-group variance or the coefficient of variation rather than $r_{wg}$. The mean within-group variance and the coefficient of variation use all group data. When calculating the mean $r_{wg}$ for a construct, values less than zero are set to zero before the mean is calculated. Therefore part of the information for groups with large within-group variance is lost, effectively understating the effect of those groups' variances when calculating $r_{wg}$. This means $r_{wg}$ will be a biased indicator whenever some individual group values are less than zero.

## 5.6 THE MODERATING EFFECT OF NEED FOR ANALYSIS ON GROUP LEARNING

The results of testing Hypothesis 7 need to be considered tentatively in view of the range restriction of values that occurred when the data set was split for multiple relationship analysis. However, it does appear that for at least two of the constructs considered the degree of need for analysis affects whether the relationship between constructs occurs at the individual, group or plant level.

However, the expected interaction effect was not found between group stewardship and group behaviors. While at first this was surprising, upon further reflection the degree of need for analysis would not necessarily be expected to moderate the extent to which learning or proactive behaviors occur. For example, as the degree of complexity of a task increases, if the change in complexity of analysis (such as for a computational procedure) is well within an individual's or group's capability to resolve, then no change in internal collaboration may be seen.

It is likely that the kind of change in a group's task is more likely to influence the degree to which group learning behaviors occur and which of the three learning behaviors will be called upon to meet the challenge. Very different learning responses would be expected to meet change associated with new members joining a group versus the need to modify current practices when

the level or urgency of work is changed to meet customer demands, or when the market changes require development of entirely new methods, processes and products (Baldwin, Danielson, & Wiggenhorn, 1997).

Therefore, another possibility is that the moderating effect of need for analysis may occur between learning behaviors and measures of outcomes such as performance, innovation and customer service. In other words, groups may be continually learning and proactively trying new processes, but the observed effect will be most apparent when a significant problem or opportunity requiring analysis or creativity is encountered.

## 5.7 REVISED OPERATIONAL MODEL

The proposed group effectiveness model presented in Figure 1.2 needs to be revised to incorporate what has been learned through this research. The model was intended to show the antecedents and outcomes of group stewardship. It was not intended to imply that group stewardship is the only motivational concept influencing group processes. For example, performance-for-reward (exchange) or fear-based relationships could also motivate group performance. Neither was the model intended to imply that group learning is the only group process through which group outcomes are generated.

The simple context (input) → group stewardship → group learning (process) → output nature of the originally proposed group effectiveness model was not supported by this research. The hypothesized model proposed task, group and organizational context constructs would act only indirectly through group stewardship to influence group learning. However, the antecedents were found to act directly as well as indirectly to influence the extent of group learning and proactive behaviors. Similarly, it was found that group stewardship appears to act both directly as well as indirectly through group behaviors to influence group outcomes. In view of the more complex relationships found in this research, a revised operational model is shown in Figure 5.1.

The relationships shown in the revised operational model are consistent with and add to our understanding of Cohen and Bailey's (1997) heuristic model of group effectiveness presented in Figure 1.1. The findings are consistent with the heuristic model as support was found for both direct and indirect relationships between elements of the model. This research adds to our understanding of the model by suggesting important elements that should be included in the group psychosocial traits and internal and external processes portions of the model. Group

stewardship is a psychosocial trait. Group learning and proactive behaviors fit within the internal and external process portion of the model.

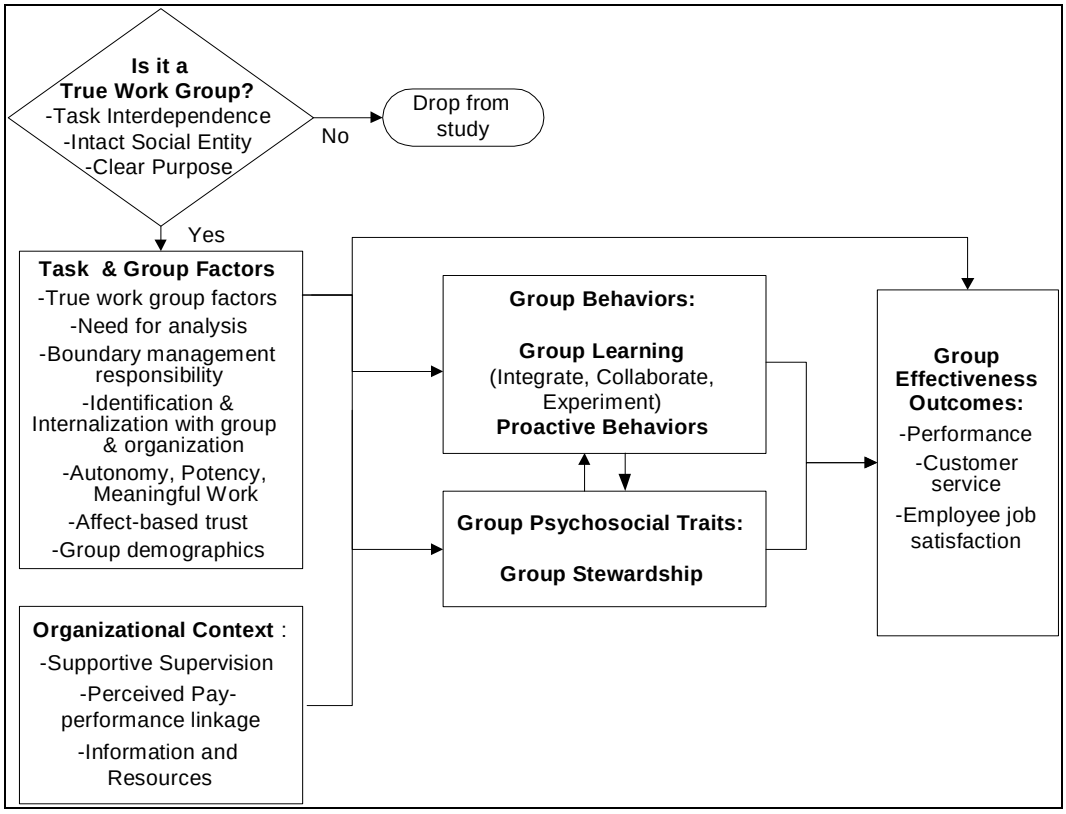



**Figure 5.1. Revised Operational Model**

## 5.8 LIMITATIONS OF THIS RESEARCH

A primary limitation of this research is the cross-sectional nature of the study. Given the desire to develop a measure of group stewardship and validate the multidimensional nature of group learning, a cross-sectional approach was appropriate. However, a study conducted at one point in time cannot establish cause and effect relationships. Further, the research approach could not conclusively test the existence of mediating effects; it only could determine the extent to which relationships among constructs were consistent with hypothesized mediating roles.

A second limitation of this research relates to the generalizability of the findings to other group types. The sample size was large spanning groups in ten manufacturing and service locations in the eastern portion of the United States. However, the groups were generally traditionally managed or supervisor led with significant input from group members. There were no truly self-managed production work teams in this study. Further, as the domain of this

research was intact work teams, other team types including management, project, and parallel work teams were intentionally excluded.

A third limitation relates to the need for analysis construct and the degree of analysis required by groups in this study. The need for analysis measure used in this research had sufficient reliability for exploratory research; a more reliable measure is needed. While there was a wide range of work complexity and need for analysis among groups studied, the need for analysis required appeared to primarily relate to task-related problem solving. Analysis requirements could be described as low to moderate, typical of manufacturing and service companies in the geographic area of this research. Therefore, generalizing findings to situations with higher complexity of task, process coordination, or business uncertainty may not be appropriate.

Finally, the outcome measures in this study were subjective ratings. Prior to administering the survey, each site was visited and common outcome measures were sought. However, no common measures of productivity, quality, employee job satisfaction, or safety could be found that were available for all groups at all sites. Therefore, while the diversity of plants involved in the study supports generalizability and the stability of construct analysis results, it created a weakness in the ability to objectively measure outcomes.

# CHAPTER 6 FUTURE RESEARCH

This research has created new questions for further research while contributing to our understanding of group stewardship and group learning. This chapter describes eight potential areas for additional research relating to group stewardship and learning.

## 6.1 ASSESS GENERALIZABILITY OF FINDINGS

Additional research could be done to determine if the construct structures for group stewardship and learning are invariant across production and service work groups. This research was conducted with a mix of production and service employees. A preliminary exploratory construct analysis was done looking at the construct structures for production and service employees. The construct structures appeared to be similar all production and service group data was used together for the balance of the analysis. Additional work could be done with a sufficiently large sample of production and service employees to split the sample by work type. Confirmatory construct analysis could then be used to determine if the construct structure was the same for both halves.

The findings of this research could also be tested on other group types. This research was conducted using intact natural work groups. However, the construct structures and construct relationships could also be tested with management, project, and parallel work teams. It would be especially interesting to learn more about the constructs that enable group stewardship and learning behaviors to emerge in groups that do not have long periods of time to develop a sense of within-group potency and affective trust, two constructs highly related to group stewardship in the intact work teams studied in this research.

## 6.2 REFINEMENT OF INTERDEPENDENCE, INTACT SOCIAL ENTITY, AND NEED FOR ANALYSIS SCALES

The interdependence, intact social entity, and need for analysis scales need further development to improve scale reliability. Several issues need to be addressed with these scales. Some of the scale items may need rewording. For example, one intact social entity items, “our work group is distinct from other work groups in this organization,” did not load to the same construct as the other two scale items. This question may have been misunderstood to mean “our group is different” rather than the presence of clear definition as to who is on which team. A second problem is that the top anchor points on some scales need to be increased to avoid the highest scale response (I strongly agree) being the response mode. A third need may be to assure

the interdependence scales map to a single form of the underlying construct. For example, the interdependence scale used in this research may tap into initiated and received interdependence.

### 6.3 Replicate or Expand the Number of Group Learning Constructs

There may be more dimensions within group learning than the three that emerged from this research. For example, only three of the proposed five learning constructs emerged from construct analysis. The integration of perspectives within the work group construct would seem to be important for effective groups to reach consensus or evaluate and improve upon their performance. The construct relating to crossing boundaries external to the group would seem to be an important part of staying connected to the environment and generalizing what has been learned to others. It would be interesting to learn why these constructs did not emerge as distinct constructs. Perhaps these behaviors were not typical of the groups surveyed. Or, perhaps crossing boundaries external to the group would emerge as a distinct construct from research with other groups where boundary-spanning activities are a clear requirement for effectiveness in carrying out the core work of the group.

### 6.4 Test the Effect of Group Stewardship and Learning with Objective Outcome Measures

Testing the relationship between group stewardship and group learning with objective outcome measures could provide rich insights. This research suggests the three learning behaviors could fill different roles in developing the outcomes such as performance, quality, safety, innovation, customer service, and employee job satisfaction. As learning would seem to be related to changes in the level of responses or the ability to adapt in a changing environment, ideally the study would be longitudinal. This would permit assessment of the rate of change associated with group stewardship and group learning.

### 6.5 Conduct Longitudinal Analysis of Group Performance

In addition to the benefits longitudinal research would provide to understanding the extent or rate of change in learning outcomes, longitudinal research would also permit further understanding the cause and effect relationships among constructs influencing group stewardship and group learning. Only correlation, but not the direction of causation between constructs can be inferred from cross-sectional research. Further, mediation effects inherently imply an effect over time and cannot be assessed with certainty when using only cross-sectional data.

## 6.6 CONDUCT DATA ENVELOPMENT ANALYSIS

The use of data envelopment analysis (DEA) could potentially provide information to identify best-in-class performance. The techniques utilized in this research assess relationships among means, the average performance level. DEA seeks to determine the best performing units (BPUs) given a set of input conditions and output measures. Therefore, use of DEA could be useful in determining best-in-class performance to enable benchmarking. Further, DEA does not appear to have been used in the analysis of team performance. It would be interesting to contrast the insights gained from DEA with traditional parametric approaches to the analysis of group performance.

## 6.7 VIRTUAL TEAMS AND GROUP STEWARDSHIP AND GROUP LEARNING

Understanding the development of group stewardship and group learning within virtual teams could enhance our ability to effectively develop this type of team. The ability to develop effective virtual teams is becoming increasingly important to many industries where teams may be separated by time, distance, or reporting relationships and work together for limited periods of time. In contrast, this research was conducted almost exclusively with co-located intact work groups which generally had several years to develop interpersonal relationships that would support affective trust and group potency, two concepts that were shown to be strongly related to the development of group stewardship. It would be interesting to learn if the same constructs lead to the development of group stewardship in virtual teams. If so, it would be valuable to learn what practices lead to the development of group potency and affective trust in an environment when group members typically do not work in close physical proximity to each other. Finally, it would be interesting to learn to what extent group stewardship is an important motivator of behaviors in effective virtual teams. Other constructs such as strong leadership or the perception of significant promised rewards could work in conjunction with or in place of group stewardship to enable effective virtual teams.

## 6.8 DETERMINING THE EFFECT OF GROUP DEMOGRAPHICS

The influence of demographics on the development of group learning and group stewardship would be of interest to researchers and managers. The role of diversity has been studied to understand its influence on constructs such as group conflict and performance (Pelled et al., 1999). Managers could be interested in understanding the effects of demographics and constructs such as group size to aid in the formation of teams. The primary purpose of this

research was to develop scales for group stewardship and learning and study the way in which these constructs are correlated with work group conditions and outcomes. However, a hierarchical regression entering demographic information in step one and task, group and organizational characteristics in step two found several demographic variables significantly correlated with group stewardship and learning at $p \leq 0.05$:

- Higher levels of gender diversity were negatively correlated with the development of group stewardship.
- Average years with the organization was positively correlated with the development of group stewardship and the extent of experimenting.
- As the average age of group members increased the extent of experimenting tended to decrease.
- Groups with higher levels of education tended to have more internal collaboration.

Further research could lead to understanding of the conditions under which demographics influence group stewardship and group learning.

# REFERENCES


Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Albanese, R., Dacin, M. T., & Harris, I. C. (1997). Dialogue: Agents as stewards. *Academy of Management Review, 22*(3), 609-611.

Alderfer, C. P. (1977). Group and Intergroup Relations. In J. R. a. S. Hackman, J. L. (Ed.), *Improving life at work* . Santa Monica, CA: Goodyear.

Allison, P. D. (1978). Measures of inequality. *American Sociological Review, 43*, 865-880.

Amabile, T. M. (1989). The creative environment scales: Work environment inventory. *Creativity Research Journal, 2*, 231-253.

Ancona, D. G., & Caldwell, D. F. (1992). Bridging the boundary: External activity and performance in organizational teams. *Administrative Science Quarterly, 37*(4), 634-655.

Ashforth, B., & Mael, F. (1989). Social Identity Theory and the Organization. *Academy of Management Review, 14*(1), 20-39.

Axtell, C. M., Holman, D. J., Unsworth, K. L., Wall, T. D., Waterson, P. E., & Harrington, E. (2000). Shopfloor Innovation: Facilitating the Suggestion and Implementation of Ideas. *Journal of Occupational and Organizational Psychology, 72*, 263-285.

Bagozzi, R., & Yi, Y. (1989). The degree of intention formation as a moderator of the attitude-behavior relationship. *Social Psychology Quarterly, 52*(3), 266-279.

Bailey, D. E., Van Aken, E. M., & Cohen, S. G. (1998). What Makes a Team? Issues of Aggregating Individual Responses to Group Level Measures. In *Proceedings of the Industrial Engineering Research Conference May 9-10, 1998.* Banff, Alberta: Institute of Industrial Engineers

Bailey, D. E., Van Aken, E. M., & Cohen, S. G. (working paper). Testing for groupness: A theory-based approach to aggregation issues in work group research. .

Baldwin, T. T., Danielson, C., & Wiggenhorn, W. (1997). The evolution of learning strategies in organizations: From employee development to business redefinition. *Academy of Management Executive, 11*(4), 47-58.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173-1182.

Becker, T. E., & Billings, R. S. (1993). Profiles of commitment: An empirical test. *Journal of Organizational Behavior, 14*, 177-190.

Becker, T. E., Billings, R. S., Eveleth, D. M., & Gilbert, N. L. (1996). Foci and bases of employee commitment: Implications for job performance. *Academy of Management Journal, 39*(2), 464-482.

Bible, K. J. (1979). Salt Lake City, Utah: The Church of Jesus Christ of Latter-day Saints.

Bion, W. R. (1961). *Experiences in Groups*. New York: Basic Books.

Bliese, P. D., & Halverson, R. R. (1998). Group Size and Measures of Group-level Properties: An Examination of Eta-squared and ICC Values. *Journal of Management, 24*(2), 157-172.

Bligh, M. C., Meindl, J. R., & Hatch, M. J. (2000). , *From Organizational Culture to Identification: Integrating Complementary Constructs* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Block, P. (1996). *Stewardship: Choosing Service over Self-Interest*. San Francisco, CA: Berrett-Koehler Publishers.

Bontis, N., & Crossan, M. M. (1999). *Managing an organizational learning system by aligning stocks and flows of knowledge.* Paper presented at the 3rd International Organizational Learning Conference, Lancaster, UK.

Boussofiane, A., Dyson, R. G., & Thanassoulis, E. (1991). Applied data envelopment analysis. *European Journal of Operational Research, 52*, 1-15.

Bowen, D. E., & Lawler, E. E. (1995). Empowering service employees. *Sloan Management Review, 36*(4), 73-84.

Byrne, B. M. (2001). *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming.* Mahwah, NJ: Lawrence Erlbaum Associates.

Campion, M. A., Papper, E. M., & Medsker, G. J. (1996). Relations between work team characteristics and effectiveness: A replication and extension. *Personnel Psychology, 49*(2), 429-452.

Cangelosi, V. E., & Dill, W. R. (1965). Organizational learning: Observations toward a theory. *Administrative Science Quarterly, 10*, 175-203.

Cannon-Bowers, J. A., Salas, E., & Convers, S. A. (1993). Shared mental models in expert team decision making. In N. J. Castellan (Ed.), *Individual and Group Decision Making* (pp. 221-246). Hillsdale, NJ: Lawrence Erlbaum Associates.

Cappelli, P. (2000). Managing without commitment. *Organizational Dynamics, 28*(4), 11-24.

Cappelli, P., & Rogovsky, N. (1998). Employee involvement and organizational citizenship: implications for labor law reform and "lean production". *Industrial and Labor Relations Review, 51*(4), 633-653.

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management, 23*(3), 239-290.

Cohen, S. G., Ledford, G. E. J., & Spreitzer, G. M. (1996). A predictive model of self-managing work team effectiveness. *Human Relations, 49*(5), 643-676.

Covey, S. (1998). We're in this together. *Incentive, 172*(8), 21.

Covey, S. R. (1989). *The Seven Habits of Highly Effective People*. New York: Simon and Schuster.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297-334.

Crossan, M., M., Lane, H. W., White, R. E., & Djurfeldt, L. (1995). Organizational learning: Dimensions for a theory. *The International Journal of Organizational Analysis, 3*(4), 337-360.

Crossan, M. M., Lane, H. W., & White, R. E. (1999). An organizational learning framework: From intuition to institution. *Academy of Management Review, 24*(3), 522-537.

Daft, R., & MacIntosh, N. (1981). A tentative exploration into the amount and equivocality of information processing in organizational work units. *Administrative Science Quarterly, 26*, 207-224.

Daft, R. L., & Huber, G. P. (1987). How organizations learn: A communication framework. *Research in the Sociology of Organizations, 5*, 1-36.

Daft, R. L., & Lengel, R. (1986). Organization information requirements, media richness and structural design. *Management Science, 32*, 554-571.

Daft, R. L., & Weick, K. E. (1984a). Toward a model of organizations as interpretation systems. *Academy of Management Review, 9*, 284-295.

Daft, R. L., & Weick, K. E. (1984b). Toward a model of organizations as interpretive systems. *Academy of Management Review, 9*, 284-295.

Dansereau, F., Alutto, J. A., & Yammarino, F. J. (1984). *Theory Testing in Organizational Behavior: The Varient Approach*. Englewood Cliffs, NJ: Prentice-Hall.

Dansereau, F., Chandrasekaran, G., Dumas, M., Coleman, D. F., Ehrlich, S., & Bagchi, D. (1986). *Data Enquiry that Tests Entity and Correlational/Causal Theories*. Williamsville, NY: The Institute for Theory Testing.

Dansereau, F., & Yammarino, F. J. (2000). Within and between analysis: The varient paradign as an underlying approach to theory building and testing. In K. J. K. a. S. W. J. Kozlowski (Ed.), *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions* (pp. 425-466). San Francisco: Jossey-Bass.

David, F. R., Pearce, J. A. I., & Randolph, W. A. (1989). Linking technology and structure to enhance group performance. *Journal of Applied Psychology, 74*(2), 233-241.

Davis, J. H., Schoorman, F. D., & Donaldson, L. (1997a). Dialogue: Davis, Schoorman, and Donaldson reply: The distinctiveness of agency theory and stewardship theory. *Academy of Management Review, 22*(3), 611-613.

Davis, J. H., Schoorman, F. D., & Donaldson, L. (1997b). Toward a stewardship theory of management. *Academy of Management Review, 22*(1), 20-47.

Dechant, K., & Marsick, V. (1993). *Team learning survey: Facilitator guide*. King of Prussia, PA: Organizational Design and Development, Inc.

Dechant, K., & Marsick, V. J. (1991). *In search of the learning organization: Toward a conceptual model of collective learning.* Paper presented at the Eastern Academy of Management, Hartford, CT.

Deckop, J. R., Mangel, R., & Cirka, C. C. (1999). Getting more than you pay for: Organizational citizenship behavior and pay-for-performance plans. *Academy of Management Journal, 42*(4), 420-428.

DeVillis, R., F. (1991). *Scale Development: Theory and Applications*. (Vol. 26). Newbury Park, CA: Sage Publications.

DiBella, A. J., & Nevis, E. C. (1998). *How Organizations Learn*. San Francisco: Jossey-Bass.

Donaldson, L., & Davis, J. H. (1991). Stewardship theory or agency theory: CEO governance and shareholder returns. *Australian Journal of Mangement, 16*(1), 49-64.

Druskat, V. U., & Pescosolido, A. T. (2000). , *The Content of Effective Teamwork Mental Models in Self-managing Team: Ownership, Learning, and Heedful Interrelating* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Druskat, V. U., & Wheeler, J. V. (under review). Managing from the boundary: The effective leadership of self-managing teams.

Dunphy, D., & Bryant, B. (1996). Teams: Panaceas or prescriptions for improved perfromance. *Human Relations, 49*(5), 677-699.

Edmondson, A. (1999a). A safe harbor: Social psychological condition enabling boundary spanning in work teams. In B. Mannix, M. Beale, & R. Wageman (Eds.), *Research on Groups and Teams* . Greenwich, CT: JAI Press, Inc.

Edmondson, A. C. (1999b). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 4*(2), 350-383.

Edmondson, A. C., Bohmer, R. M., & Pisano, G., P. (2000). *Disrupted routines: Effects of team learning on new technology adaptation* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Eisenberger, R., & Fasolo, P. D.-L., V. (1990). Perceived organizational support. *Journal of Applied Psychology, 71*, 500-507.

Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of Management Review, 14*(1), 57-74.

Elby, L. T., Freeman, D. M., Rush, M. C., & Lance, C. E. (1999). Motivational bases of affective organizational commitment: A partial test of an integrative theoretical model. *Journal of Occupational and Organizational Psychology, 72*, 463-483.

Fiol, C. M., & Lyles, M. A. (1985). Organizational learning. *Academy of Management Review, 10*(4), 803-813.

Fisher, K. (Ed.). (1994). *Diagnostic Issues for Work Teams*. New York: Guilford Publications.

George, J. M., & Zhou, J. (2001). When openness to experience and conscientiousness are related to creative behavior: An interactional approach. *Journal of Applied Psychology, 86(3) 513-524*.

Gephart, M. A., Marsick, V. J., & Van Buren, M. E. (1997). *Finding common and uncommon ground among learning organization models.* Paper presented at the Fourth Annual AHRD Conference, Atlanta, Georgia.

Gibson, J. L., Ivancevich, J. M., & Donnelly, J. H. (1991). *Orgnizations*. Homewood, IL: Irwin.

Gittleman, M., Horrigan, M., & Joyce, M. (1998). "Flexible" workplace practices: Evidence from a nationally representative survey. *Industrial and Labor Relations Review, 52*(1), 99-115.

Gladstein, D. L. (1984). Groups in context: A model of task group effectiveness. *Administrative Science Quarterly, 29*, 499-517.

Gnywali, D. R., Stewart, A. C., & Grant, J. H. (1998). Deconstructing organizational learning processes and knowledge: An empirical examination. *Working paper*.

Graen, G., & Cashman, J. (1975). A role-making model of leadership in formal organizations: A developemntal approach. In J. H. L.Larson (Ed.), *Leadership Frontiers* (pp. 143-165). Kent, OH: Kent State University Press.

Graham, J. W., & Organ, D. W. (1993). Commitment and the covenantal organization. *Journal of Managerial Issues, 5*(4), 483-502.

Guzzo, R. A., & Shea, G. P. (1990). Group performance and intergroup relations in organizations. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology* (2nd ed., Vol. 3, pp. 269-313). Palo Alto, CA: Consulting Psychologists Press.

Hackman, J. R. (1982). *A Set of Methods for Research on Work Teams* (Technical Report #1). New Haven, CT: Yale School of Organization and Management.

Hackman, J. R. (Ed.). (1987). *The Design of Work Teams*. New Jersey: Prentice-Hall.

Hackman, J. R. (1990). *Groups that Work (and those that Don't)*. San Francisco: Jossey-Bass Inc.

Hackman, J. R., & Oldham, R. T. (1976). Motivation through the design of work: Test of a theory. *Organization and Human Performance, 16*, 250-279.

Hackman, J. R., & Oldman, G. R. (1980). *Work Redesign*. Reading, MA: Addison-Wesley.

Hair, J. F. J., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate Data Analysis*. (Fifth ed.). Upper Saddle River, NJ: Prentice Hall.

Hedberg, B. (1981). How organizations learn and unlearn. In P. Nystrom & W. Starbuck (Eds.), *Handbook of Organizational Design* (Vol. 1, pp. 6). Oxford: Oxford University.

Holman, D., Epitropaki, O., & Fernie, S. (2000). , *Learning strategies, innovation and work design* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Holman, D., Epitropaki, O., & Fernie, S. (in press). Understanding learning strategies in the workplace: A construct analytic investigation. *Journal of Occupational and Organisational Psychology*.

Hunter, L. W. (2000). The adoption of innovative work practices in service establishments. *International Journal of Human Resource Management, 11*(3), 477-496.

Ichniowski, C., Kochan, T. A., Levine, D., Olson, C., & Strauss, G. (1996). What works at work: Overview and assessment. *Human Relations, 35*(3), 299-333.

James, L. R. (1982). Aggregation Bias in Estimates of Perceptual Agreement. *Journal of Applied Psychology, 67*(2), 219-229.

James, L. R., Demaree, R. G., & Wolf, G. (1993). $r_{wg}$: An Assessment of Within-Group Interrater Agreement. *Journal of Applied Psychology, 78*(2), 306-309.

Jehn, K. A. (1995). A multimethod examination of the benefits and detriments of intragroup conflict. *Administrative Science Quarterly, 40*(2), 256-282.

Jones, J. E., & Bearley, W. L. (1994). *Group development assessment: Facilitator guide*. King of Prussia, PA: HRDQ.

Kasl, E., Marsick, V. J., & Dechant, K. (1997). Teams as learners: A research-based model of team learning. *Journal of Applied Behavioral Science, 33*(2), 227-246.

Katzenbach, J. R., & Smith, D. K. (1993). *The Wisdom of Teams: Creating the High-Performance Organization*. Boston: Harvard Business School Press.

Kenny, D. A., Kashy, D. A., & Bolger, N. (1998). Data analysis in social psychology. In S. T. F. D.T. Gilbert, & G. Lindzey (Ed.), *The Handbook of Social Psychology* (Vol. 1, pp. 233-265). Boston: McGraw Hill.

Kenny, D. A., & La Voie, L. (1985). Separating individual and group effects. *Journal of Personality and Social Psychology, 48*(2), 339-348.

Kim, D. H. (1993). The link between individual and organizational learning. *Sloan Management Review, 35*(3), 37-50.

Kirkman, B. L., & Rosen, B. (1997). A model of work team empowerment. In R. W. Woodman & W. A. Pasmore (Eds.), *Research in Organizational Change and Development* (Vol. 10, pp. 131-167). Greenwich, CT: JAI Press.

Kirkman, B. L., & Rosen, B. (1999). Beyond self-management: Antecedents and consequences of team empowerment. *Academy of Management Journal, 42*(1), 58-74.

Klein, K. J., Bliese, P. D., Kozlowski, S. W. J., Dansereau, F., Gavin, M. B., Griffin, M. A., Hofmann, D. A., James, L. R., Yammarino, F. J., & Bligh, M. C. (2000). Multilevel analytical techniques: Commonalities, differences, and continuing questions. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions* . San Francisco: Jossey-Bass.

Klimoski, R., & Mohammed, S. (1994). Team mental model: Construct or metaphor. *Journal of Management, 20*(2), 403-437.

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: contextual temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions* . San Francisco: Jossey-Bass.

Kurstedt, H. A. J., Pedro, M. M., & Kwang, S. L. (1988). *Engineering analogs in management.* Paper presented at the Ninth Annual Conference.

Lawler, E. E. (1992a). *The Ultimate Advantage.* San Francisco: Jossey-Bass.

Lawler, E. E., & Cohen, S. G. (1992). Designing pay systems for teams. *ACA Journal*(Autumn), 6-18.

Lawler, E. E., Mohrman, S. A., & Ledford, G. E. (1998). *Strategies for high performance organizations*. San Francisco: Jossey-Bass.

Lawler, E. E., Mohrman, S. A., & Ledford, G. E. J. (1992). *Employee Involvement and Total Quality Management: Practices and Results in Fortune 1000 Companies*. San Francisco: Jossey-Bass.

Lawler, E. J. (1992b). Affective attachments to nested groups: A choice-process theory. *American Sociological Review, 57*(3), 327-339.

Levine, J. M., & Moreland, R. L. (1998). Small groups. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The Handbook of Social Psychology* (Vol. 2, pp. 415-469). Boston: McGraw-Hill.

Levine, J. M., Resnick, L. B., & Higgins, E. T. (1993). Social foundations fo cognition. *Annual Review of Psychology, 44*, 585-612.

Lewis, J. D., & Weigert, A. (1985). Trust as a social reality. *Social Forces, 63*, 967-985.

Liden, R. C., Wayne, S. J., & Stilwell, D. (1993). A longitudinal study on the early development of leader-member exchanges. *Journal of Applied Psychology, 78(4)*, 662-674.

Linstead, S., & Grafton-Small, R. (1992). On reading organizational culture. *Organizational Studies, 13*(3), 331-355.

London, M., Larsen, H. H., & Thisted, L. N. (1999). Relationships between feedack and self-development. *Group and Organization Management, 24*(1), 5-27.

Love, M. S., & Macy, G. (2000). *The case for the work group.* Paper presented at the 2000 Annual Conference of the Midwest Academy of Management, Chicago, IL.

Lynn, G. S. (1998). New product team learning: Developing and profiting from your knowledge capital. *California Management Review, 40*(4), 74-93.

Mael, F., & Ashforth, B. E. (1992). Alumni and their alma mater: A partial test of the reformulated model of organizational identification. *Journal of Organizational Behavior, 13*, 103-123.

Mael, F. A., & Tetrick, L. E. (1992). Identifying organizational identification. *Educational and Psychological Measurement, 52*, 813-824.

March, J. G. (1991). Exploration and exploitation in organization learning. *Organization Science, 2*, 71-87.

Markham, S. E. (2000). *A Visual Explanation of WABA: An Overview.* Paper presented at Professional Development Workshop, Academy of Management Annual Meeting, Toronto.

Martin, J., & Siehl, C. (1983). Organizational culture and counterculture: An uneasy symbiosis. *Organizational Dynamics*(Autumn, 1983), 52-64.

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology, 85*(2), 273-283.

Mayer, R. C., & Schoorman, F. D. (1992). Predicting participation and production outcomes through a two-dimensional model of organizational commitment. *Academy of Management Journal, 35*(3), 671-684.

McAllister, D. J. (1995). Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal, 38*(1), 24-59.

McClure, B. A. (1990). The group mind: Generative and regressive groups. *The Journal for Specialists in Group Work, 15*, 159-170.

McNeil, I. R. (1985). Relational contracts: What we do and do not know, *Wisconsin Labor Law Review* (pp. 483-525). Madison, WI: Law School of the University of Wisconsin--Madison.

Mishra, K. E., Spreitzer, G. M., & Mishra, A. K. (1998). Preserving employee morale during downsizing. *Sloan Management Review, 39*(2), 83-95.

Mohammed, S., Klimoski, R., & Rentsch, J. R. (2000). The measurement of team mental models: We have no shared schema. *Organizational Research Methods, 3*(2), 123-165.

Mohrman, S. A., Cohen, S. G., & Mohrman, A. M. (1995). *Designing Team-Based Organizations: New Forms for KNowledge Work.* San Francisco: Josey-Bass.

Montemayor, E. F. (1994). A model for aligning teamwork and pay. *ACA journal*(Summer), 18-25.

Morrison, E. W., & Phelps, C., C. (1999). Taking charge at work: Extrarole efforts to initiate workplace change. *Academy of Management Journal, 42*(4), 403-419.

Mowday, R. T., Porter, L. W., & Steers, R. M. (1982). *Employee-Organization Linkages: The Psychology of Commitment, Absenteeism, and Turnover*. New York: Academic Press.

Muniz, E. J., Bowers, C. A., Stout, R. J., & Salas, E. (1998). *The validation of a team situational measure.* Paper presented at the 3rd Annual symposium and Exhibition on Situational Awareness in the Tactical Air Environment, Ptuxent River, MD.

Nunnally, J. D. (1978). *Psychometric theory*. (2nd ed.). New York: McGraw-Hill.

Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual constructs at work. *Academy of Management Journal, 39*(3), 607-634.

Orasanu, J., & Salas, E. (1993). Team decision making in complex environments. In G. A. Klein, J. Orasanu, R. Calderwood, & C. E. Zsambok (Eds.), *Decision Making in Action: Models and Methods* . Norwod, NJ: Ablex.

O'Reillly, C. A. I., Chatman, J., & Caldwell, D. F. (1991). People and organizational culture: A profile comparison approach to assessing person-organization fit. *Academy of Management Journal, 34*(3), 487-516.

Osterman, P. (1988). *Employment Futures: Reorganization, Dislocation, and Public Policy*. New York: Oxford University Press.

Osterman, P. (1994). How common is workplace transformation and who adopts it? *Human Relations, 47*(2), 173-188.

Osterman, P. (2000). Work reorganization in an era of resturcturing: Trends in diffusion and effects on employee welfare. *Industrial and Labor Relations Review, 53*(2), 179-196.

Ouchi, W. G. (1980). Markets, bureaucracies, and clans. *Administrative Science Quarterly, 48*, 776-801.

Parker, S. K., & Sprigg, C. A. (1999). Minimizing strain and maximizing learning: The role of job demands, job control and proactive personality. *Journal of Applied Psychology, 84*(6), 925-939.

Pasmore, W. A. (1988). *Designing Effective Organizations*. New York: John Wiley & Sons.

Pearce, C. L., & Ensley, M. D. (2000). , *Shared cognition, team dynamics and team effectiveness* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, Design, and Analysis: An Integrated Approach*. Hillsdate, NJ: Lawrence Erlbaum Associates.

Pedler, M., Burgoyne, J., & Boydell, T. (1991). *The Learning Company: A Strategy for Sustainable Development*. London: McGraw-Hill.

Pelled, L. H., Eisenhardt, K. M., & Xin, K. R. (1999). Exploring the black box: An analysis of work group diversity, conflict and performance. *Administrative Science Quarterly, 44*(1), 1-28.

Perrow, C. (1967). A framework for the comparative analysis of organizations. *American Sociological Review, 32*(2), 194-208.

Pierce, J. L., Kostova, T., & Dirks, K. T. (2001). Towards a theory of psychological ownership in organizations. *Academy of Management Review*, *26*(2), 298-310.

Pierce, J. L., Van Dynne, L., & Cummings, L. L. (1992). *Psychological ownership: A conceptual and operational examination.* Paper presented at the Southern Management Association, Valdosta, GA.

Polley, D., & Ribbens, B. (1998). Sustaining self-managed teams: A process approach to team wellness. *Team Performance Management, 4*(1), 3-21.

Polley, D., & Van Dyne, D. (1994). The limits and liabilities of self-managing work teams. In M. M. Beyerlein & D. A. Johnson (Eds.), *Advances in Interdisciplinary Studies of Work Teams* (Vol. 1, pp. 1-38). Greenwich, CN: JAI Press.

Pratt, M. G., & Dutton, J. E. (2000). Owning up or opting out: The role of identities and emotions in issue ownership. In N. Ashkanasy, C. Hartel, & W. Zerbe (Eds.), *Emotions in the Workplace: Research, Theory, and Practice* (pp. 103 - 129). Westport, CT: Quorum Books.

Preston, L. E. (1998). Dialogue: Agents, stewards, and stakeholders. *Academy of Management Review, 23*(1), 9-13.

Quinn, R. E. (1988). *Beyond Rational Management: Mastering the Paradoxes and Competing Demands of High Performance.* San Francisco, CA: Jossey-Bass Inc.

Quinn, R. E., O'Neill, R. M., & St. Clair, L. (2000). Conclusion: The Perils of Responsiveness in Modern Organizations: A Framework for Problem Identification. In R. E. Quinn, R. M.

O'Neill, & L. St. Clair (Eds.), *Pressing Problems in Modern Organizations* (pp. 243-264). New York: American Management Association.

Rentsch, J. R., Heffner, T. S., & Duffy, L. T. (1994). What you know is what you get from experience. *Group and Organization Management, 19*(4), 450-474.

Rhoades, L., & Eisenberger, R. (2000). , *Employee commitment to the organization: The contribution of perceived organizational support* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Robinson, S. L. (1996). Trust and breach of the psychological contract. *Administrative Science Quarterly, 41*, 574-599.

Romme, A. G. L., & Ron, D. (1997). Mapping the landscape of organizational learning. *European Management Journal, 15*(1), 68-68.

Rouse, W. B., Cannon-Bowers, J., & Salas, E. (1992). The role of mental models in team performance in complex systems. *IEEE Transactions on Systems, Man, and Cybernetics, 22*(6), 1296-1308.

Rouse, W. B., & Morris, N. M. (1986). On looking into the black box: Prospects and limits in the search for mental models. *Psychological Bulletin, 100*, 349-363.

Rousseau, D. M. (1989). Psychological and implied contracts in organizations. *Employee Responsibilities and Rights Journal, 2*(2), 121-139.

Saavedra, R., & Van Dyne, L. (1999). Social exchange and emotional investment in work groups. *Motivation and Emotion, 23*(2), 105-123.

Salas, E., Dickenson, A. M., Converse, P. E., & Tannenbaum, A. S. (1992). Toward an understanding of team performance. In R. W. Swezey & E.Salas (Eds.), *Teams: their Training and Performance* (pp. 5-27). Cambridge MA: MIT Press.

Saunier, A. M., & Hawk, E. J. (1994). Realizing the potential of teams through team-based rewards. , *26*(4), 24-33.

Scheck, C. L., & Kinicki, A. J. (2000). , *The role of stress and coping as teams evolve: An integrative model of group development* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Senge, P. M. (1990). *The Fifth Discipline*. New York: Doubleday Currency.

Shalley, C. E., & Gilson, L. L. (2000). , *Individual, job, and contextual constructs: Effects on creative performance and work-related affective outcomes* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Shalley, C. E., Gilson, L. L., & Blum, T. C. (2000). Matching creativity requirements and the work environment: Effects on satisfaction and intentions to leave. *Academy of Management Journal, 43*(2), 215-223.

Sharma, S., Durand, R. M., & Gur-Arie, O. (1981). Identification and analysis of moderator variables. *Journal of Marketing Research, 18*, 291-300.

Shaw, D. G., & Schneier, C. E. (1995). Team measurement and rewards: How some companies are getting it right. *Human resource planning, 8*(3), 34-48.

Shaw, M. E. (1981). *Group Dynamics*. (3rd ed.). New York: McGraw-Hill.

Shea, G. P., & Guzzo, R. A. (Eds.). (1987). *Groups as human resources*. (Vol. 5). Greenwich, CT: JAI Press.

Simon, H. A. (1991). Bounded rationality and organizational learning. *Organization Science, 2*, 125-133.

Sitkin, S. B. (1992). Learning through failure: The strategy of small losses, *Research in Organizational Behavior* (Vol. 14, pp. 231-266). Stamford, CT: JAI Press.

Sitkin, S. B., Sutcliffe, K., M., & Weick, K. E. (1998). Organizational learning. In R. C. Dorf (Ed.), *Technology Management Handbook* . Berkeley, CA: CRC Press.

Sitkin, S. B., Sutcliffe, K. M., & Schroeder, R. G. (1994). Distinguishing control from learning in total quality management: A contingency perspective. *Academy of Management Review, 19*(3), 537-564.

Soukhanov, A. H. (Ed.). (1984). *Webster's II New Riverside University Dictionary*. Boston, MA: Riverside Publishing Co.

Spreitzer, G. M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal, 38*, 1442-1465.

Spreitzer, G. M., & Mishra, A. K. (1999). Giving up control without losing control. *Group and Organization Management, 24*(2), 155-187.

St. Clair, L., Quinn, R. E., & O'Neill, R. M. (2000). The perils of responsiveness in modern organizations: A framework for problem identification. In R. E. Quinn, R. M. O'Neill, & L. S. Clair (Eds.), *Pressing Problems in Modern Organizations* (pp. 243-264). New York: AMACOM.

Stata, R. (1989). Organizational learning: The key to management innovation. *Sloan Management Review, 30*(3), 63-74.

Stavropoulos, D. N. (1988). *Oxford Greek-English Learner's Dictionary*. (1st ed.). Oxford: Oxford University Press.

Steiner, I. D. (1972). *Group Processes and Productivity*. New York: Academic Press.

Stewart, G. L. (2000). *Meta-analysis of work teams research published between 1977 and 1998.* Paper presented at the Academy of Management Annual Meeting 2000, Toronto.

Stout, R. J., Salas, E., & Fowkles, J. E. (1997). Enhancing teamwork in complex environments through team training. *Journal of Psychotherapy, Psyodrama and Sociometry, 49*(4), 163-186.

Sundstrom, E., De Meuse, K. P., & Futrell, D. (1990). Work teams: Applications and effectivenesws. *American Psychologist, 45*(2), 120-133.

Sutcliffe, K. M., Sitkin, S., & Browning, L. B. (1997). *Tailoring process management to situational requirement: Beyond the control and exploration dichotomy.* Paper presented at the National Academy of Science Workshop on Integrating Social Science Theory and Research on Quality Improvement, Berkeley, CA.

Taylor, J. C., & Felton, D. F. (1993). *Performance by Design*. Englewood Cliffs, NJ: Prentice Hall.

Teachman, J. D. (1980). Analysis of population diversity. *Sociological Methods and Research, 8,* 342-362.

Thomas, K., & Jansen, E. (1996). *Intrinsic Motivation in the Military: Models and Strategic Importance* . Arlington, VA: Eighth Quadrennial Review of Military Compensation.

Thomas, K. W., & Tymon, W. G. J. (1997). Bridging the motivation gap in total quality. *Quality Management Journal, 4*(2), 80-96.

Thomas, K. W., & Velthouse, B. A. (1990). Cognitive elements of empowerment: An "interpretive" model of intrinsic task motivation. *Academy of Management Journal, 38*(4), 666-681.

Tierney, P., & Farmer, S. M. (2000). *Creative self-efficacy: Potential antecedents and relationship to creative performance* . Presented at Academy of Management Annual Meeting 2000, Toronto.

Tinseley, H. E. A., & Tinseley, D. J. (1987). Uses of construct analysis in counseling psychology research. *Journal of Counseling Psychology, 34,* 414-424.

Tompkins, T. C. (1995). Role of diffusion in collective learning. *The International Journal of Organizational Analysis, 3*(1), 69-85.

Tsui, A. S., Pearce, J. L., Porter, L. W., & Tripoli, A. M. (1997). Alternative approaches to the employee-organization relationship: Does investment in employees pay off? *Academy of Management Journal, 40*(5), 1089-1121.

Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin, 63,* 384-389.

Tuckman, B. W., & Jensen, M. A. (1977). Stages of small group development revisited. *Group and Organization Studies, 2,* 419-427.

Turner, W., Mize, J. H., Case, K. E., & Nazemetz, J. W. (1993). *Introduction to Industrial and Systems Engineering*. (3rd ed.). Englewood Cliffs, N.J.: Prentice Hall.

Ulrich, D., Jick, T., & Von Glinow, M. A. (1993). High impact learning: Building and diffusing learning capability. *Organizational Dynamics, 22*(2), 52-66.

Van Buren, M. E., & Lucandano, L. (1995). *ASTD's Guide to Learning Organization Assessment Instruments* . Alexandra, VA: American Society for Training and Development.

Van de Ven, A. H., Angle, H. L., & Poole, M. S. (Eds.). (1989). *Research on the Management of Innovation: The Minnesota Studies*. New York: Harper and Row.

Van de Ven, A. H., Delbecq, A. L., & Koenig, R. J. (1976). Determinant of coordination modes within organizations. *American Sociological Review, 41*(2), 322-338.

Van de Walle, D., Van Dyne, L., & Kostova, T. (1995). Psychological ownership: An empirical examination of its consequences. *Group and Organization Management, 20*(2), 210-226.

Van Dyne, L., Graham, J. W., & Dienesch, R. M. (1994). Organizational citizenship behavior: construct redefinition, measurement, and validation. *Academy of Management Journal, 37*(4), 765-802.

Waddock, S. (2000). *Social capital, vision, and the search for meaning in turbulent times.* Paper presented at the Academy of Management 2000 Annual Conference, Toronto.

Walsh, J. P., & Fahey, L. (1986). The role of negotiated belief structures in strategy making. *Journal of Management, 12*, 325-338.

Warr, P., & Downing, J. (2000). Learning strategies, learning anxiety and knowledge acquisition. *British Journal of Psychology, 91*(3), 311-334.

Watkins, K. E., & Marsick, V. J. (1993). *Sculpting the Learning Organization*. San Francisco: Jossey-Bass.

Watkins, K. E., & Marsick, V. J. (1996). *Creating the Learning Organization*. (Vol. 1). Alexandria, VA: American Society for Training and Development.

Watkins, K. E., Yang, B., & Marsick, V. J. (1997). Measuring dimensions of the learning organization. In R. Tarraco (Ed.), *Proceedings of Fourth Annual AHRD* . Baton Rouge, LA: Academy of Human Resource Development.

Weick, K. (1979). *The social psychology of organizing*. Reading, MA: Addison-Wesley.

Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly, 38*, 357-381.

Weisbord, M. R. (1987). *Productive Workplaces: Organizing and Managing for Dignity, Meaning and Community*. San Francisco: Jossey-Bass.

Wenger, D. M. (1995). A computer network model of human transactive memory. *Social Cognition, 13*, 319-339.

Wilson, L., Van Aken, E., & Frazier, D. (1998). *Achieving high performance work systems through policy deployment: A case application.* Paper presented at the 1998 International Conference on Work Teams.

Woodman, R. W., Sawyer, J. E., & Griffin, R. W. (1993). Toward a theory of organizational creativity. *Academy of Management Review, 18*(2), 293-321.

Yang, B., Watkins, K. E., & Marsick, V. J. (2000). The construct of learning organization dimensions, measurement, and validation. *Manuscript submitted for publication.*

Yeung, A. K., Ulrich, D. O., Nason, S. W., & Von Glinow, M. A. (1999). *Organizational Learning Capability*. New York: Oxford University Press.

# APPENDIX A. PILOT TEST

This appendix includes the pilot test survey and related information. The pilot test surveys were administered during June and July, 2000. Ten work groups at Electro-Tec Corporation in Blacksburg, Virginia and one work group at Kollmorgen Corporation in Radford, Virginia participated. This appendix contains the following sections:

- A.1. The survey given to work group members titled "Work Group Assessment - Employee Perceptions." (Notes: The employee job satisfaction questions 123-126 were only in the survey given to Kollmorgen Employees. Responses were marked on a Scantron form for scoring by University Testing Services.)
- A.2. The survey taken by supervisors titled "Work Group Assessment – Supervisor Perceptions." (Note: To permit the survey to fit within page margins used throughout this document, the font size has been reduce from the original 12 point font and margins have been increased.)
- A.3. A list of items associated with each construct. Where a similar question was given to both members of the work group (employees) and supervisors, the wording from the employee survey is shown.

## A.1 WORK GROUP ASSESSMENT - EMPLOYEE PERCEPTIONS

The questions in this survey are intended to obtain your perceptions about groups in which you work – the type of work the group does and how the group works together. The term work group has been use throughout this survey as a general label for any type of group or team. The term organization refers to the organization you group exists within.

Please answer all questions in the survey; if a question does not seem to be applicable, it may be that the question does not describe your work group at the present time. In this case, you would answer strongly disagree.

Answer questions honestly. It is critical if the information is to be valuable and useful to your group. This survey is confidential and the privacy of your responses will be protected. No one at your organization will see these survey responses. The responses will be summarized only for the entire work group.

Use a number 2 lead pencil to mark you answers on the answer sheet.

Please complete the forms at the top of the page as follows:

| | |
|---|---|
| NAME: | write the name of your work group |
| ID Number: | write in the number of years you have been an employee of the organization. |
| Seat No. | enter the number of people in your work group (to the best of your knowledge). |

For each question on the following pages, please indicate the extent to which you feel the statement describes the group in which you work at the present time. Please circle the appropriate response from strongly disagree (1) to strongly agree (6).

| | |
|---|---|
| 1 - Strongly Disagree | 4 – Tend to Agree |
| 2 – Disagree | 5 – Agree |
| 3 – Tend to Disagree | 6 – Strongly Agree |

1. Our group has responsibility for maintaining contact with other work groups that affect our work.
2. I feel a sense of ownership for my work group.
3. My group accomplishes its objectives.
4. There is a set patterns in our workdays.
5. My work group gets support from other groups in the organization when needed.
6. People in this group sometimes reject others for being different.
7. Increased productivity means higher pay for employees.
8. Members of my work group are extremely glad that they chose this organization to work for over others they considered at the time they joined.
9. In this group, someone always makes sure that we stop to reflect on the group work processes.
10. We maintain contact with people outside our team who have information we need to do our work
11. When our group is working, it feels like a team rather than a collection of individuals.
12. My group makes a difference in this organization.
13. The type of work done by our group is fairly consistent so people do the same job in the same way most of the time.
14. When needed, my work group gets support from other departments to perform its activities.
15. It is safe to take a risk in this group.
16. Performance on our work actually has little impact on any incentive pay award.
17. Members of my work group really care about the fate of this organization.
18. People in this work group often speak up to test assumptions about issues under discussion.
19. Our group builds and manages relationships external to our group.
20. My work group has a clearly defined purpose.
21. We feel that the work we do is meaningful.
22. There is a lot of variety in my group's work
23. My work group can get important information when needed.
24. It is difficult to ask other members of this group for help.
25. Our performance has little impact on our pay.
26. Members of my work group feel this is the best of all possible organizations for which to work.
27. We invite people from outside our work group to present information or have discussions with us.
28. My work group coordinates with those who receive our work.
29. Goals and objectives we must achieve to fulfil our work group's purpose are clear.
30. Our group feels that its purpose is important.
31. Our group's jobs frequently require problem solving.
32. We understand top management's vision for how the organization will be successful.
33. No one in this group would deliberately act in a way that undermines my efforts.
34. If the things my work group values were different, I would not be as attached to my group.
35. Our group members feel a collective sense of responsibility for our work.
36. We offer to share its ideas with other groups.
37. People in this work group generally have one-person jobs; that is, people can complete most of the jobs on their own, with no help from others.

1 - Strongly Disagree
2 – Disagree
3 – Tend to Disagree
4 – Tend to Agree
5 – Agree
6 – Strongly Agree

38. Our purpose and goals clearly define what is expected of our work group.
39. We believe that our work is significant.
40. Tasks in our work group usually require thinking time before they can be completed.
41. We understand the strategies and goals that that will be used to achieve top management's vision.
42. Working with members of this group, my unique talents are valued and utilized.
43. My attachment to my work group is primarily based on the similarity of my values and those represented by my group.
44. My work group feels a sense of ownership for the work we do.
45. My work group makes things happen even when the odds are against it.
46. Our group members need information and advice from other group members in order to do their work.
47. My entire work group understands our group's purpose.
48. Our group feels that its tasks are worthwhile.
49. Completing our work rarely requires generating new ideas.
50. Our group can use other group's resources when needed.
51. We are evaluated based on the group's performance.
52. Since starting this job, my personal values and those of my work group have become more similar.
53. When we do our work, we do what's best for the organization.
54. My work group fixes things it does not like.
55. Each member of the work group must do his work well in order for others to do their jobs well.
56. Our group is allowed to do almost anything to do a high-quality job.
57. We can get a lot done when we work hard.
58. Tasks in our work group require making choices, but we often can't be sure what the results will be until much later.
59. Our group receives feedback that helps us understand how we are doing compared to other groups.
60. We are rewarded based on the group's performance.
61. The reason I prefer my work group to others is because of what it stands for, that is, its values.
62. People in my work group often do things in their own self-interest.
63. My work group always looks for better ways to perform its work.
64. Our work must pass progressively to several group members before our group's task can be completed.
65. Our group can make significant choices without waiting to be told by management.
66. Our group Is confident in its ability perform our job.
67. In doing our work we often encounter difficult problems that can't be solved until new solutions are developed.
68. The feedback our group receives compares our performance to our goals.
69. We are assigned performance goals or standards that focus on our work group or unit.
70. Members of my work group are willing to put in a great deal of effort beyond that normally expected in order to help this organization be successful.

1 - Strongly Disagree
2 – Disagree
3 – Tend to Disagree
4 – Tend to Agree
5 – Agree
6 – Strongly Agree

71. We act as if the work we do were for our own business.
72. My work group tackles problems head-on.
73. Our group can do its work well even when some members do not perform at a satisfactory level.
74. We have a lot of choice in determining what we do to solve problems.
75. Our group feels self-assured about its capabilities to work together as a team.
76. In general, our supervisor asks the group for advice when making decisions
77. Our group receives feedback that shows how our performance has changed over time.
78. Our group is held accountable for a collective goal.
79. Members of my work group talk up this organization to my friends as a great organization to work for.
80. In my work group we feel as if we're partners in making this organization successful.
81. My work group addresses issues before they become major problems
82. When someone criticizes my work group, it feels like a personal insult.
83. Our group is permitted to determine as a team how things are done
84. Group members have mastered the skills necessary to do their jobs.
85. In general, our supervisor uses the group's suggestions and ideas when making decisions.
86. Our group receives feedback that helps determine the areas in which we need education and development.
87. This organization provides employees the opportunity to learn new skills.
88. Most members of my work group would accept almost any type of job assignment in order to keep working for this organization.
89. Our work group regularly takes time to improve its work processes.
90. Members of our work group understand how our performance measures fit with organization objectives.
91. When I talk about my group, I usually say "we" rather than "they."
92. We have considerable opportunity to determine as a team what things are done.
93. We know how to take charge of problems that require immediate attention.
94. In general, our supervisor encourages our group to take control of its work.
95. The feedback our group receives helps us understand how others view our performance.
96. In this organization, employees are trained on skills that prepare them for future jobs.
97. Members of my work group find that our values and the organization's values are very similar.
98. Group members try out new approaches to their jobs as a result of working together.
99. My work group's goals are aligned with organizational goals.
100. My work group's successes are my successes.
101. My work group has a positive impact on this organization's customers.
102. The jobs in our work group require doing the same thing over and over again.
103. In general, our supervisor encourages our group to figure out the causes/solutions to its problems.
104. If you make a mistake in this group, it will often be held against you.
105. This organization provides employees with employment security.
106. Members of my work group are proud to tell others that we are part of this organization.
107. Our group members go out and get all the information they possibly can from others – such as from customers or other parts of the organization.

| | |
|---|---|
| 1 - Strongly Disagree | 4 – Tend to Agree |
| 2 – Disagree | 5 – Agree |
| 3 – Tend to Disagree | 6 – Strongly Agree |

108. My work group's decisions are based on the values and principles of the larger organization.
109. When someone praises my group, it feels like a personal compliment.
110. My group has a positive impact on other employees who depend on us.
111. In our work group there is a specific "right way" to do things.
112. In general, our supervisor trusts our group.
113. Members of this group are able to bring up problems and tough issues.
114. This organization fills job openings by promoting capable employees within the organization.
115. This organization really inspires the very best in the way our group performs its job.
116. Our group frequently seeks new information that leads us to make important changes.
117. Our group's efforts are aligned with the organization's goals.

Please indicate your responses to the following questions on your answer sheet.

118. How many years have you been part of your present work group?
① 0-2
② 3-5
③ 6-8
④ 9-11
⑤ 12-14
⑥15 or more

119. What is your gender
① male
② female

120. What is your highest level of education?
① Some elementary, middle or high school.
② High school graduate or high school equivalency.
③ Some college or vocational training beyond high school.
④ Graduated form vocational school or associate degree.
⑤ Graduated from college or university.
⑥ Completed a graduate degree.

121. What is your age in years?
① 18-25
② 26-33
③ 33-41
④ 42-49
⑤ 50-57
⑥ 58-65
⑦ 66 or more

122. How long have you worked for this organization?
① 0-2
② 3-5
③ 6-8
④ 9-11
⑤ 12-14
⑥15 or more

Please indicate how you personally feel about your job by indicating how much you agree with each of these statements.

| | |
|---|---|
| 1 - Strongly Disagree | 4 – Tend to Agree |
| 2 – Disagree | 5 – Agree |
| 3 – Tend to Disagree | 6 – Strongly Agree |

123. Generally speaking I am very satisfied with this job.
124. I frequently think of quitting this job.
125. I am generally satisfied with the kind of work I do in this job.
126. I feel a great sense of personal satisfaction when I do this job well.

## A.2 WORK GROUP ASSESSMENT - SUPERVISOR PERCEPTIONS

The questions in this survey are intended to obtain your perceptions about work group(s) you supervise – the type of work the group(s) does, the way groups work together, and group performance. The term work group has been use throughout this survey as a general label for any type of group or team. The term organization refers to the organization you group exists within, Electro-Tec, in Blacksburg, Virginia.

Please answer all questions in the survey; if a question does not seem to be applicable, it may be that the question does not describe your work group at the present time. In this case, you would answer strongly disagree.

Answer questions honestly. It is critical if the information is to be valuable and useful to your group. This survey is confidential and the privacy of your responses will be protected. No one at your organization will see these survey responses. The responses will be summarized only for the entire work group.

Please do not discuss the questions, your opinions, or your responses with others until after you have completed this survey.

For each question you will be asked the extent to which you agree the statement describes the work group at the present time. Please circle the appropriate response from strongly disagree (1) to strongly agree (6). After you read each question, please provide a response for each work group you supervise (e.g., twist, machine shop, engineering). Please list the groups for which you will be responding on the lines below as well as in the column headings on the following pages.

a. _____

b. _____

c. _____

Please turn the page and begin the survey.

| Scale: 1 - Strongly Disagree<br>2 – Disagree<br>3 – Tend to Disagree<br>4 – Tend to Agree<br>5 – Agree<br>6 – Strongly Agree | Work Group | | |
|---|---|---|---|
| | a. | b. | c. |
| 1. The group has responsibility for maintaining contact with other work groups that affect our work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 2. Group members need information and advice from other group members in order to do their work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 3. The group can make significant choices without waiting to be told by management. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 4. This group has a positive impact on other employees who depend on us. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 5. Group members believe that their work is significant. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 6. Group members have mastered the skills necessary to do their jobs. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 7. The type of work done by the group is fairly consistent so people do the same job in the same way most of the time. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 8. Tasks in the work group require making choices, but they often can't be sure what the results will be until much later. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 9. People in the work group often do things in their own self-interest. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 10. Group members go out and get all the information they possibly can from others – such as from customers or other parts of the organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 11. The group offers to share its ideas with other groups. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 12. This work group addresses issues before they become major problems | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 13. The group produces high quality products/services. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 14. The group meets or exceeds its goals. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 15. Group members successfully solve problems that slow down their work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 16. They maintain contact with people outside the team who have information needed to do their work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 17. Each member of the work group must do his work well in order for others to do their jobs well. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 18. Group members have alot of choice in determining what they do to solve problems. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 19. This group accomplishes its objectives. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 20. The group feels that its tasks are worthwhile. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 21. Group members know how to take charge of problems that require immediate attention. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 22. There is a lot of variety in this group's work | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 23. In doing their work group members often encounter difficult problems that can't be solved until new solutions are developed. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 24. Group members act as if the work they do were for their own business. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 25. The group frequently seeks new information that leads to important changes. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 26. The work group makes things happen even when the odds are against it. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 27. Members of our work group understand how their performance measures fit with organization objectives. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |

| Scale: 1 - Strongly Disagree<br>2 – Disagree<br>3 – Tend to Disagree<br>4 – Tend to Agree<br>5 – Agree<br>6 – Strongly Agree | Work Group | | |
|---|---|---|---|
| | a. | b. | c. |
| 28. The group works out internal or external customer problems in a timely manner. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 29. Group members complete their tasks on time. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 30. The group comes up with inventive ideas. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 31. Members builds and manage relationships external to the group. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 32. Work must pass progressively to several group members before our group's task can be completed. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 33. This group is permitted to determine as a team how things are done | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 34. The group makes a difference in this organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 35. The group can get a lot done when we work hard. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 36. The jobs in this work group require doing the same thing over and over again. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 37. The group's jobs frequently require problem solving. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 38. Group members feel a collective sense of responsibility for their work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 39. In this work group people feel as if they are partners in making this organization successful. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 40. In this group, someone always makes sure that they stop to reflect on the group work processes. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 41. The work group fixes things it does not like. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 42. The work group's goals are aligned with organizational goals. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 43. The group is very reliable when working on internal or external customer requests. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 44. The group makes sure that products and services meet or exceed quality standards. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 45. The group Introduce new procedures to improve the work it does. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 46. Group members coordinate with those who receive their work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 47. The group can do its work well even when some members do not perform at a satisfactory level. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 48. The group has considerable opportunity to determine as a team what things are done. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 49. Group members feel that the work they do is meaningful. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 50. This group Is confident in its ability perform our job. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 51. In this work group there is a specific "right way" to do things. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 52. Tasks in the work group usually require thinking time before they can be completed. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 53. The work group feels a sense of ownership for the work they do. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 54. This work group regularly takes time to improve its work processes. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 55. People in this work group often speak up to test assumptions about issues under discussion. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 56. This work group always looks for better ways to perform its work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |

| Scale: 1 - Strongly Disagree<br>2 – Disagree<br>3 – Tend to Disagree<br>4 – Tend to Agree<br>5 – Agree<br>6 – Strongly Agree | Work Group | | |
|---|---|---|---|
| | a. | b. | c. |
| 57. The work group's decisions are based on the values and principles of the larger organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 58. This group follows through on complaints and requests. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 59. The group responds quickly when problems come up. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 60. Group members do problem solving in creative, clever ways. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 61. People in this work group generally have one-person jobs; that is, people can complete most of the jobs on their own, with no help from others. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 62. The group is allowed to do almost anything to do a high-quality job. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 63. The work group has a positive impact on this organization's customers. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 64. The group feels that its purpose is important. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 65. The group feels self-assured about its capabilities to work together as a team. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 66. There a set patterns in the group's workdays. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 67. Completing this group's work rarely requires generating new ideas. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 68. When they do their work, the team does what's best for the organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 69. Group members try out new approaches to their jobs as a result of working together. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 70. Group members invite people from outside their work group to present information or have discussions with them. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 71. This work group tackles problems head-on. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 72. Group efforts are aligned with achieving the organization's goals. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 73. The group provides a satisfactory level of service to internal and external customers. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 74. This group is a productive team. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 75. The group finds innovations and potential improvements. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |

A.3 Items Associated with Pilot Test Survey ItemsTable A.1 displays the constructs and survey items used in the pilot test. The following abbreviations are used in the table headings:

Code #: As questions in the survey will be in a randomized order, the code number uniquely identifies each item by construct and number within the construct.
Emp Q#: Question number in employee survey
SQ# Question number in supervisor survey
Rev coded: "R" indicates question is reverse coded
CA All: Cronbachs Alpha when all pilot test items were used
CA Reco: Conbachh's Alpha with items recommended for study marked by an "X"

**Table A.1 Survey Items and Reliabilities by Construct**

| Code # | Emp Q# | Supv. Q# | Rev coded | Survey item | CA All | CA Reco |
|---|---|---|---|---|---|---|
| **Boundary Management** | | | | | 0.76 | 0.76 |
| bmgt1 | 1 | 1 | | Our group has responsibility for maintaining contact with other work groups that affect our work. | | x |
| bmgt2 | 10 | 16 | | We maintain contact with people outside our team who have information we need to do our work | | X |
| bmgt3 | 19 | 31 | | Our group builds and manages relationships external to our group. | | X |
| bmgt4 | 28 | 46 | | My work group coordinates with those who receive our work. | | X |
| **Interdependence** | | | | | 0.39 | 0.51 |
| intr1 | 37 | 61 | R | People in this work group generally have one-person jobs; that is, people can complete most of the jobs on their own, with no help from others. | | |
| intr2 | 46 | 2 | | Our group members need information and advice from other group members in order to do their work. | | X |
| intr3 | 55 | 17 | | Each member of the work group must do his work well in order for others to do their jobs well. | | X |
| intr4 | 64 | 32 | | Our work must pass progressively to several group members before our group's task can be completed. | | X |
| intr5 | 73 | 47 | R | Our group can do its work well even when some members do not perform at a satisfactory level. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Intact Social Entity** (questions from Indentification with Group were used) | | | | | 0.55 | 0.59 |
| ise1 | 82 | | | When someone criticizes my work group, it feels like a personal insult. | | X |
| ise2 | 91 | | | When I talk about my group, I usually say "we" rather than "they." | | X |
| ise3 | 100 | | | My work group's successes are my successes. | | X |
| ise4 | 109 | | | When someone praises my group, it feels like a personal compliment. | | X |
| ise5 | 2 | | | I feel a sense of ownership for my work group. | | |
| ise6 | 11 | | | When our group is working, it feels like a team rather than a collection of individuals. | | |
| **Clear Purpose** | | | | | 0.76 | 0.76 |
| clrp1 | 20 | | | My work group has a clearly defined purpose. | | X |
| clrp2 | 29 | | | Goals and objectives we must achieve to fulfil our work group's purpose are clear. | | X |
| clrp3 | 38 | | | Our purpose and goals clearly define what is expected of our work group. | | X |
| clrp4 | 47 | | | My entire work group understands our group's purpose. | | X |
| **Autonomy** | | | | | 0.70 | 0.70 |
| auto1 | 56 | 62 | | Our group is allowed to do almost anything to do a high-quality job. | | X |
| auto2 | 65 | 3 | | Our group can make significant choices without waiting to be told by management. | | |
| auto3 | 74 | 18 | | We have a lot of choice in determining what we do to solve problems. | | X |
| auto4 | 83 | 33 | | Our group is permitted to determine as a team how things are done | | X |
| Auto5 | 92 | 48 | | We have considerable opportunity to determine as a team what things are done. | | X |
| **Impact** | | | | | 0.58 | 0.58 |
| impt1 | 101 | 63 | | My work group has a positive impact on this organization's customers. | | X |
| impt2 | 110 | 4 | | My group has a positive impact on other employees who depend on us. | | X |
| impt3 | 3 | 19 | | My group accomplishes its objectives. | | X |
| impt4 | 12 | 34 | | My group makes a difference in this organization. | | X |
| **Meaningfulness of Work** | | | | | 0.73 | 0.73 |
| mean1 | 21 | 49 | | We feel that the work we do is meaningful. | | X |
| mean2 | 30 | 64 | | Our group feels that its purpose is important. | | X |

| | | | | | | |
|---|---|---|---|---|---|---|
| mean3 | 39 | 5 | | We believe that our work is significant. | | X |
| mean4 | 48 | 20 | | Our group feels that its tasks are worthwhile. | | X |
| **Potency** | | | | | 0.70 | 0.82 |
| potn1 | 57 | 35 | | We can get a lot done when we work hard. | | |
| potn2 | 66 | 50 | | Our group Is confident in its ability perform our job. | | X |
| potn3 | 75 | 65 | | Our group feels self-assured about its capabilities to work together as a team. | | X |
| potn4 | 84 | 6 | | Group members have mastered the skills necessary to do their jobs. | | X |
| potn5 | 93 | 21 | | We know how to take charge of problems that require immediate attention. | | X |
| **Routineness of Work** | | | | | 0.37 | 0.48 |
| rout1 | 102 | 36 | | The jobs in our work group require doing the same thing over and over again. | | X |
| rout2 | 111 | 51 | | In our work group there is a specific "right way" to do things. | | |
| rout3 | 4 | 66 | | There a set patterns in our workdays. | | |
| rout4 | 13 | 7 | | The type of work done by our group is fairly consistent so people do the same job in the same way most of the time. | | X |
| rout5 | 22 | 22 | R | There is a lot of variety in my group's work | | X |
| **Need for Analysis** to do work (Analysis items 1-3 have CA = 0.68) | | | | | 0.58 | 0.62 |
| anal1 | 31 | 37 | | Our group's jobs frequently require problem solving. | | X |
| anal2 | 40 | 52 | | Tasks in our work group usually require thinking time before they can be completed. | | X |
| anal3 | 49 | 67 | R | Completing our work rarely requires generating new ideas. | | X |
| anal4 | 58 | 8 | | Tasks in our work group require making choices, but we often can't be sure what the results will be until much later. | | |
| anal5 | 67 | 23 | | In doing our work we often encounter difficult problems that can't be solved until new solutions are developed. | | X |
| **Supportive Supervision** (Leader Behaviors) | | | | | 0.84 | 0.83 |
| SSup1 | 76 | | | In general, our supervisor asks the group for advice when making decisions | | X |
| Ssup2 | 85 | | | In general, our supervisor uses the group's suggestions and ideas when making decisions. | | X |
| Ssup3 | 94 | | | In general, our supervisor encourages our group to take control of its work | | X |

| | | | | | | |
|---|---|---|---|---|---|---|
| Ssup4 | 103 | | | In general, our supervisor encourages our group to figure out the causes/solutions to its problems. | | |
| SSup5 | 112 | | | In general, our supervisor trusts our group. | | X |
| Availability of **Information and Resources** to do work | | | | | 0.74 | 0.74 |
| IRes1 | 5 | | | My work group gets support from other groups in the organization when needed. | | X |
| IRes2 | 14 | | | When necessary, my work group gets support from other departments to perform its activities. | | X |
| IRes3 | 23 | | | My work group can get important information when needed. | | X |
| IRes4 | 32 | | | We understand top management's vision for how the organization will be successful. | | X |
| IRes5 | 41 | | | We understand the strategies and goals that that will be used to achieve top management's vision. | | X |
| IRes6 | 50 | | | Our group can use other group's resources when needed. | | X |
| **Evaluative Feedback Given to Group** | | | | | 0.84 | 0.85 |
| Efbk1 | 59 | | | Our group receives feedback that helps us understand how we are doing compared to other groups. | | |
| Efbk2 | 68 | | | The feedback our group receives compares our performance to our goals. | | X |
| Efbk3 | 77 | | | Our group receives feedback that shows how our performance has changed over time. | | X |
| Efbk4 | 86 | | | Our group receives feedback that helps determine the areas in which we need education and development. | | X |
| Efbk5 | 95 | | | The feedback our group receives helps us understand how others view our performance. | | X |
| **Psychological Safety** | | | | | 0.51 | 0.63 |
| PSaf1 | 104 | | R | If you make a mistake in this group, it will often be held against you. | | |
| PSaf2 | 113 | | | Members of this group are able to bring up problems and tough issues. | | |
| PSaf3 | 6 | | R | People in this group sometimes reject others for being different. | | X |
| PSaf4 | 15 | | | It is safe to take a risk in this group. | | |
| PSaf5 | 24 | | R | It is difficult to ask other members of this group for help. | | X |
| PSaf6 | 33 | | | No one in this group would deliberately act in a way that undermines my efforts. | | X |
| PSaf7 | 42 | | | Working with members of this group, my unique talents are valued and utilized. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Unit(Group)-level Focus** taken by management | | | | | 0.58 | 0.58 |
| UFcu1 | 51 | | | We are evaluated based on the group's performance. | | |
| UFcu2 | 60 | | | We are rewarded based on the group's performance. | | X |
| UFcu3 | 69 | | | We are assigned performance goals or standards that focus on our work group or unit. | | X |
| UFcu4 | 78 | | | Our group is held accountable for a collective goal. | | X |
| **Investment in Employees** | | | | | 0.77 | 0.74 |
| Ivst1 | 87 | | | This organization provides employees the opportunity to learn new skills. | | X |
| Ivst2 | 96 | | | In this organization, employees are trained on skills that prepare them for future jobs | | X |
| Ivst3 | 105 | | | This organization provides employees with employment security. | | |
| Ivst4 | 114 | | | This organization fills job openings by promoting capable employees within the organization. | | X |
| Perceived **Pay-Performance Linkage** | | | | | 0.33 | 0.57 |
| PPL1 | 7 | | | Increased productivity means higher pay for employees. | | |
| PPL2 | 16 | | R | Performance on our work actually has little impact on any incentive pay award. | | X |
| PPL3 | 25 | | R | Our performance has little impact on our pay. | | X |
| **Internalized Values** | | | | | 0.69 | 0.74 |
| IValu1 | 34 | | | If the things my work group values were different, I would not be as attached to my group. | | |
| IValu2 | 43 | | | My attachment to my work group is primarily based on the similarity of my values and those represented by my group. | | X |
| IValu3 | 52 | | | Since starting this job, my personal values and those of my work group have become more similar. | | X |
| IValu4 | 61 | | | The reason I prefer my work group to others is because of what it stands for, that is, its values. | | X |
| **Organizational Commitment** | | | | | 0.81 | 0.87 |
| OrgC1 | 70 | | | Members of my work group are willing to put in a great deal of effort beyond that normally expected in order to help this organization be successful. | | |
| OrgC2 | 79 | | | Members of my work group talk up this organization to my friends as a great organization to work for. | | X |

| | | | | | | |
|---|---|---|---|---|---|---|
| OrgC3 | 88 | | | Most members of my work group would accept almost any type of job assignment in order to keep working for this organization. | | |
| OrgC4 | 97 | | | Members of my work group find that our values and the organization's values are very similar | | X |
| OrgC5 | 106 | | | Members of my work group are proud to tell others that we are part of this organization. | | X |
| OrgC6 | 115 | | | This organization really inspires the very best in the way our group performs its job. | | X |
| OrgC7 | 8 | | | Members of my work group are extremely glad that they chose this organization to work for over others they considered at the time they joined. | | X |
| OrgC8 | 17 | | | Members of my work group really care about the fate of this organization. | | |
| OrgC9 | 26 | | | Members of my work group feel this is the best of all possible organizations for which to work. | | X |
| **Group Stewardship** | | | | | 0.73 | 0.77 |
| Stew1 | 35 | 38 | | Our group members feel a collective sense of responsibility for our work. | | |
| Stew2 | 44 | 53 | | My work group feels a sense of ownership for the work we do. | | X |
| Stew3 | 53 | 68 | | When we do our work, we do what's best for the organization. | | X |
| Stew4 | 62 | 9 | R | People in my work group often do things in their own self-interest. | | |
| Stew5 | 71 | 24 | | We act as if the work we do were for our own business. | | X |
| Stew6 | 80 | 39 | | In my work group we feel as if we're partners in making this organization successful. | | X |
| **Group Learning Behaviors** | | | | | 0.78 | 0.79 |
| LrnB1 | 89 | 54 | | Our work group regularly takes time to improve its work processes. | | X |
| LrnB2 | 98 | 69 | | Group members try out new approaches to their jobs as a result of working together. | | X |
| LrnB3 | 107 | 10 | | Our group members go out and get all the information they possibly can from others – such as from customers or other parts of the organization. | | X |
| LrnB4 | 116 | 25 | | Our group frequently seeks new information that leads us to make important changes. | | X |
| LrnB5 | 9 | 40 | | In this group, someone always makes sure that we stop to reflect on the group work processes. | | |
| LrnB6 | 18 | 55 | | People in this work group often speak up to test assumptions about issues under discussion. | | X |

| | | | | | | |
|---|---|---|---|---|---|---|
| LrnB7 | 27 | 70 | | We invite people from outside our work group to present information or have discussions with us. | | X |
| **Proactiveness** | | | | | 0.80 | 0.79 |
| ProA1 | 36 | 11 | | We offer to share its ideas with other groups. | | |
| ProA2 | 45 | 26 | | My work group makes things happen even when the odds are against it. | | X |
| ProA3 | 54 | 41 | | My work group fixes things it does not like. | | X |
| ProA4 | 63 | 56 | | My work group always looks for better ways to perform its work. | | X |
| ProA5 | 72 | 71 | | My work group tackles problems head-on. | | X |
| ProA6 | 81 | 12 | | My work group addresses issues before they become major problems | | X |
| **Alignment** | | | | | 0.77 | 0.77 |
| Algn1 | 90 | 27 | | Members of our work group understand how our performance measures fit with organization objectives. | | X |
| Algn2 | 99 | 42 | | My work group's goals are aligned with organizational goals. | | X |
| Algn3 | 108 | 57 | | My work group's decisions are based on the values and principles of the larger organization. | | X |
| Algn4 | 117 | 72 | | Our group's efforts are aligned with achieving the organization's goals. | | X |
| **Customer Service** | | | | | 0.83 | 0.83 |
| CSrv1 | | 13 | | The group produces high quality products/services. | | X |
| CSrv2 | | 28 | | The group works out internal or external customer problems in a timely manner. | | X |
| CSrv3 | | 43 | | The group is very reliable when working on internal or external customer requests. | | |
| CSrv4 | | 58 | | This group follows through on complaints and requests. | | X |
| CSrv5 | | 73 | | The group provides a satisfactory level of service to internal and external customers. | | X |
| **Group Performance** | | | | | 0.89 | 0.83 |
| Perf1 | | 14 | | The group meets or exceeds its goals. | | X |
| Perf2 | | 29 | | Group members complete their tasks on time. | | X |
| Perf3 | | 44 | | The group makes sure that products and services meet or exceed quality standards. | | |
| Perf4 | | 59 | | The group responds quickly when problems come up. | | X |
| Perf5 | | 74 | | This group is a productive team. | | X |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Innovation** | | | | | 0.91 | 0.91 |
| Inno1 | | 15 | | Group members successfully solve problems that slow down their work. | | |
| Inno2 | | 30 | | The group comes up with inventive ideas. | | X |
| Inno3 | | 45 | | The group Introduce new procedures to improve the work it does. | | X |
| Inno4 | | 60 | | Group members do problem solving in creative, clever ways. | | X |
| Inno5 | | 75 | | The group finds innovations and potential improvements. | | X |
| **Employee Job Satisfaction** | | | | | 0.27 | 0.76 |
| Esat1 | 123 | 123 | | Generally speaking I am very satisfied with this job. | | X |
| Esat2 | 124 | 124 | R | I frequently think of quitting this job | | |
| Esat3 | 125 | 125 | | I am generally satisfied with the kind of work I do in this job. | | X |
| ESat4 | 126 | 126 | | I feel a great sense of personal satisfaction when I do this job well. | | X |

# APPENDIX B. THE FIELD SURVEY INSTRUMENT

This appendix includes the surveys used in the field test. The following sections are included in this appendix:

- B.1. A comparison of items used in the pilot test and the final field survey instruments.
- B.2. The survey to be given to work group members.
- B.3. The survey to be given to supervisors of work groups. (These survey items will be identical to the one given to work group members except the referent will be the group supervised.)
- B.4. Work Group Observation Form to record descriptive information about work groups.

## B.1 COMPARISON OF ITEMS USED IN THE PILOT TEST AND FIELD SURVEY INSTRUMENTS

Building on results of the pilot test and further literature review since the pilot test, the items proposed for the proposed field survey were adjusted. Underlined words indicate changes. The code numbers match those used in the field survey (not the pilot study).

**Table B.1 Comparison of Pilot Test and Proposed Field Survey Instrument**

| Code # | Pilot Test Items | Proposed Field Survey Items |
|---|---|---|
| **Clear Purpose** | | |
| clrp1 | My work group has a clearly defined purpose. | --same-- |
| clrp2 | Goals and objectives we must achieve to fulfill our work group's purpose are clear. | --same-- |
| clrp3 | Our purpose and goals clearly define what is expected of our work group. | --same-- |
| clrp4 | My entire work group understands our group's purpose. | --same-- |
| **Intact Social Entity** | | |
| ise1 | Used questions relating to identification – see identification for pilot test questions | Our group members know who is and is not a member of this group. |
| ise2 | | Our work group is distinct from other work groups in the organization. |
| ise3 | | It is clear to us which people are members of our work group. |
| **Interdependence** | | |
| intr1 | People in this work group generally have one-person jobs; that is, people can complete most of the jobs on their own, with no help from others. | I cannot accomplish my task without information or materials from other members of my team. |
| intr2 | Our group members need information and advice from other group members in order to do their work. | Other members of my work group depend on me for information or materials needed to perform their tasks. |
| intr3 | Each member of the work group must do his work well in order for others to do their jobs well. | Within my work group, jobs performed by group members are dependent on one another. |
| | Our work must pass progressively to several group members before our group's task can be completed. | --dropped from survey-- |

| Code # | Pilot Test Items | Proposed Field Survey Items |
|---|---|---|
| | Our group can do its work well even when some members do not perform at a satisfactory level. | --dropped from survey-- |
| **Boundary Management Responsibility**. Changed to tap into responsibility (supv only) | | |
| bmgt1 | Our group has responsibility for maintaining contact with other work groups that affect our work. | Our group has responsibility to maintain contact with other work groups. |
| bmgt2 | We maintain contact with people outside our team who have information we need to do our work | Our group has responsibility to maintain contact with those who receive our work (internal or external customers). |
| bmgt3 | My work group coordinates with those who receive our work. | Our group has responsibility to maintain contact with people who supply us parts or information to do our work. |
| bmgt4 | Our group builds and manages relationships external to our group. | Our group has responsibility to maintain contact with upper level managers. |
| **Identify with Work Group (Organization)**. (In proposed survey, use each question once with respect to the group and once with respect to the organization.) | | |
| Idg1/ Ido1 | When someone criticizes my work group, it feels like a personal insult. | When someone criticizes this work group (organization), it feels like a personal insult. |
| Idg2/ Ido2 | When I talk about my group, I usually say "we" rather than "they." | When I talk about this group (organization), I usually say "we" rather than they. |
| Idg3/ Ido3 | My work group's successes are my successes. | This group's (organization's) successes are my successes. |
| Idg4/ Ido4 | When someone praises my group, it feels like a personal compliment. | When someone praises this group (organization) it feels like a personal compliment. |
| Idg5/ Ido5 | I feel a sense of ownership for my work group. **Drop: Psychological Ownership** | I'm very interested in what others think about this group (organization). |
| Idg6/ Ido6 | When our group is working, it feels like a team rather than a collection of individuals. | --dropped from survey-- |
| **Internalized Values of Work Group (Organization).** In proposed field survey, use each question once for the work group and once for the organization. Used internalized values of group and organization commitment scales in pilot test. (Subsequent to pilot test I learned the org. commitment scale has been shown to tap into intent to remain and motivation to work versus values.) | | |
| Ival1 | If the things my work group values were different, I would not be as attached to my group. | If the values of this [organization, group] were different, I would not be as attached to this [organization, group]. |
| Ival2 | My attachment to my work group is primarily based on the similarity of my values and those represented by my group. | My attachment to [organization, group] is primarily based on the similarity of my values and those represented by this [organization, group]. |

| Code # | Pilot Test Items | Proposed Field Survey Items |
|---|---|---|
| Ival3 | Since starting this job, my personal values and those of my work group have become more similar. | Since starting this job, my personal values and those of this [organization, group] have become more similar. |
| IVal4 | The reason I prefer my work group to others is because of what it stands for, that is, its values. | The reason I prefer this [organization, group] to others is because of what it stands for. |
| **Autonomy**. (Questions given more consistent stem, item 1 changed back to be closer to item in [Kirkman, 1999 #96], dropped "as a team" in items 4&5. | | |
| Auto1 | Our group is allowed to do almost anything to do a high-quality job. | Our group feels a sense of freedom in what it does. |
| | Our group can make significant choices without waiting to be told by management. | --dropped from survey-- |
| Auto2 | We have a lot of choice in determining what we do to solve problems. | Our group has a lot of choice in determining what we do to solve problems. |
| Auto3 | Our group is permitted to determine as a team how things are done | Our group determines *how* things are done |
| Auto4 | We have considerable opportunity to determine as a team what things are done. | Our group determines *what* things are done. |
| **Impact.** Item 3 not highly correlated with other impact items in pilot test. | | |
| impt1 | My work group has a positive impact on this organization's customers. | --same-- |
| impt2 | My group has a positive impact on other employees who depend on us. | --same-- |
| impt3 | My group accomplishes its objectives. | My group has a positive impact in helping the organization accomplish its objectives. |
| impt4 | My group makes a difference in this organization. | --same-- |
| **Meaningfulness of Work** | | |
| mean1 | We feel that the work we do is meaningful. | --same-- |
| mean2 | Our group feels that its purpose is important. | --same-- |
| mean3 | We believe that our work is significant. | --same-- |
| Mean4 | Our group feels that its tasks are worthwhile. | --same-- |
| **Potency** | | |
| | We can get a lot done when we work hard. | --dropped-- |
| Potn1 | Our group Is confident in its ability perform our job. | --same-- |
| Potn2 | Our group feels self-assured about its capabilities to work together as a team. | --same-- |

| Code # | Pilot Test Items | Proposed Field Survey Items |
|---|---|---|
| Potn3 | Group members have mastered the skills necessary to do their jobs. | --same-- |
| Potn4 | We know how to take charge of problems that require immediate attention. | --same-- |
| **Routineness of Work** | | |
| | The jobs in our work group require doing the same thing over and over again. | --dropped from survey-- |
| | In our work group there is a specific "right way" to do things. | --dropped from survey-- |
| | There a set patterns in our workdays. | --dropped from survey-- |
| | The type of work done by our group is fairly consistent so people do the same job in the same way most of the time. | --dropped from survey-- |
| | There is a lot of variety in my group's work | --dropped from survey-- |
| **Need for Analysis** to do work. Pilot test reliability was acceptable with three items. Kept four items to help develop a reliable pool. Reworded several items to get wording down to 8th grade level and increase readability score. | | |
| anal1 | Our group's jobs frequently require problem solving. | The jobs our group does frequently require problem solving. |
| anal2 | Tasks in our work group usually require thinking time before they can be completed. | --same-- |
| anal3 | Completing our work rarely requires generating new ideas. | New ideas are rarely required to complete our work. |
| anal4 | In doing our work we often encounter difficult problems that can't be solved until new solutions are developed. | New solutions are often needed to solve problems we find while doing our work. |
| **Supportive Supervision** | | |
| Ssup1 | In general, our supervisor asks the group for advice when making decisions | --same-- |
| | In general, our supervisor uses the group's suggestions and ideas when making decisions. | --dropped-- |
| Ssup2 | In general, our supervisor encourages our group to take control of its work | --same-- |
| Ssup3 | In general, our supervisor encourages our group to figure out the causes & solutions to its problems. | --same-- |
| Ssup4 | In general, our supervisor trusts our group. | --same-- |
| **Information and Resources** | | |
| | My work group gets support from other groups in the organization when needed. | --dropped-- |

| Code # | Pilot Test Items | Proposed Field Survey Items |
|---|---|---|
| ires2 | When necessary, my work group gets support from other departments to perform its activities. | -- dropped -- |
| ires3 | My work group can get information when needed. | --dropped— |
| ires4 | We understand top management's vision for how the organization will be successful. | --same-- |
| ires5 | We understand the strategies and goals that that will be used to achieve top management's vision. | --dropped -- |
| ires6 | Our group can use other group's resources when needed. | --dropped -- |
| **Evaluative Feedback Given to Group** | | |
| | Our group receives feedback that helps us understand how we are doing compared to other groups. | --dropped from survey-- |
| Efbk1 | The feedback our group receives compares our performance to our goals. | --same -- |
| Efbk2 | Our group receives feedback that shows how our performance has changed over time. | --same-- |
| Efbk3 | Our group receives feedback that helps determine the areas in which we need education and development. | --same-- |
| Efbk4 | The feedback our group receives helps us understand how others view our performance. | --same-- |
| **Psychological Safety** (dropped/replaced) | | **Affect-based Trust** |
| Trst1 | If you make a mistake in this group, it will often be held against you. | We have a sharing relationship. Group members can freely share ideas, feelings, and hopes. |
| Trst2 | Members of this group are able to bring up problems and tough issues. | We can talk freely to group members about difficulties we are having at work and know that they will want to listen. |
| Trst3 | People in this group sometimes reject others for being different. | We would feed a sense of loss if a group member was transferred and we could no longer work together. |
| Trst4 | It is safe to take a risk in this group. | If we share problems with group members, we know they will be helpful and caring. |
| Trst5 | It is difficult to ask other members of this group for help. | Our group has worked together to form close working relationships. |
| | No one in this group would deliberately act in a way that undermines my efforts. | |

| Code # | Pilot Test Items | Proposed Field Survey Items |
|---|---|---|
| | Working with members of this group, my unique talents are valued and utilized. | |
| **Unit Focus**. Dropped scale. Kept other highly correlated items. | | |
| | We are evaluated based on the group's performance. | --dropped-- |
| | We are rewarded based on the group's performance. | --dropped-- |
| | We are assigned performance goals or standards that focus on our work group or unit. | --dropped-- |
| | Our group is held accountable for a collective goal. | --dropped-- |
| **Investment in Employees**. Dropped scale. Kept other highly correlated items. | | |
| ivst1 | This organization provides employees the opportunity to learn new skills. | --same-- |
| ivst2 | In this organization, employees are trained on skills that prepare them for future jobs. | --same-- |
| ivst3 | This organization provides employees with employment security. | --same-- |
| ivst4 | This organization fills job openings by promoting capable employees within the organization. | --same-- |
| Perceived **Pay Performance Linkage** | | |
| ppl1 | Increased productivity means higher pay for employees. | --same-- |
| ppl2 | Performance on our work actually has little impact on any incentive pay award. | Our performance actually has little impact on any incentive pay award. |
| ppl3 | Our performance has little impact on our pay. | Our performance actually has little impact on our base rate of pay. (hourly rate or salary) |
| **Organizational Commitment** | | |
| | Members of my work group are willing to put in a great deal of effort beyond that normally expected in order to help this organization be successful. | --dropped-- |
| | Members of my work group talk up this organization to my friends as a great organization to work for. | --dropped-- |
| | Most members of my work group would accept almost any type of job assignment in order to keep working for this organization. | --dropped-- |

| Code # | Pilot Test Items | Proposed Field Survey Items |
|---|---|---|
| | Members of my work group find that our values and the organization's values are very similar | --dropped-- |
| | Members of my work group are proud to tell others that we are part of this organization. | --dropped-- |
| | This organization really inspires the very best in the way our group performs its job. | --dropped-- |
| | Members of my work group are extremely glad that they chose this organization to work for over others they considered at the time they joined. | --dropped-- |
| | Members of my work group really care about the fate of this organization. | --dropped-- |
| | Members of my work group feel this is the best of all possible organizations for which to work. | --dropped-- |
| **Group Stewardship.** Reliability of pilot test scale was >0.7. But reading since pilot test pointed out the need to distinguish stewardship from psychological ownership (what's mine!) | | |
| Stew1 | Our group members feel a collective sense of responsibility for our work. | Our group members feel a shared sense of responsibility for our work. |
| Stew2 | My work group feels a sense of ownership for the work we do. | Our work group feels a sense of accountability for the work we do. |
| Stew3 | When we do our work, we do what's best for the organization. | Our group members want to do what is best for the organization. |
| | People in my work group often do things in their own self-interest. | --dropped, psychological ownership-- |
| Stew4 | We act as if the work we do were for our own business. | We feel as if the work we do were for our own business. |
| Stew5 | In my work group we feel as if we're partners in making this organization successful. | In our work group we feel as if we're partners in making this organization successful. |
| **Psychological Ownership** | | |
| Pown1 | | I feel a very high degree of personal ownership for this organization. |
| Pown2 | | This is my organization. |
| Pown3 | | I sense that this organization is ours. |
| Pown4 | | I sense that this is my organization. |
| Pown5 | | This is our organization. |
| **Learning Behaviors.** Pilot test scale had both cognition and action-oriented behaviors. Subsequent to pilot test, separate scales were found for cognition and action behaviors. | | |
| | Our work group regularly takes time to improve its work processes. | --dropped-- |

| Code # | Pilot Test Items | Proposed Field Survey Items |
|---|---|---|
| | Group members try out new approaches to their jobs as a result of working together. | --dropped-- |
| | Our group members go out and get all the information they possibly can from others – such as from customers or other parts of the organization. | --dropped-- |
| | Our group frequently seeks new information that leads us to make important changes. | --dropped-- |
| | In this group, someone always makes sure that we stop to reflect on the group work processes. | --dropped-- |
| | People in this work group often speak up to test assumptions about issues under discussion. | --dropped-- |
| | We invite people from outside our work group to present information or have discussions with us. | --to crossing boundaries scale-- |
| **Experiment (Learning – action)** | | |
| exp1 | | Rather than spend time reading or asking someone's advice, we often try things out to learn how they work. |
| exp2 | | We try out new things by applying them in practice. |
| exp3 | | We test new ideas to help ourselves learn. |
| **Cross Boundaries External to Group (Learning – action)** | | |
| cbex1 | | We offer to share its ideas with other groups. |
| cbex2 | | We invite people from outside our work group to present information or have discussions with us. |
| cbex3 | | We maintain contact with people outside our team who have information we need to do our work |
| cbex4 | | Our work group coordinates with those who receive our work. |
| **Cross Boundaries Internal to Group (Learning – action)** | | |
| cbin1 | | We ask other group members questions when we are uncertain about something |
| cbin2 | | We get other group members to help us when we need assistance. |
| cbin3 | | We ask other group members for more information they have when we need it. |

| | | |
|---|---|---|
| **Frame/Reframe (Learning – cognition)** | | |
| fram1 | | We often think about how our work fits into the "bigger picture" at our organization |
| fram2 | | We try to think how the different parts of our organization fit together. |
| fram3 | | We try to think how our work relates to that of others. |
| **Integrate Perspectives (Learning – cognition)** | | |
| intg1 | | Our group works out which are the key points of our jobs and which are less important. |
| intg2 | | Our group generally tries to understand how new information fits into how we should do our work. |
| intg3 | | Our group thinks about new information and its implications for our work rather than merely concentrating on the facts given. |
| Intg4 | | In order to understand something about our work better, we think about how new ideas make sense in terms of what we already know. |
| **Proactiveness** | | |
| | We offer to share its ideas with other groups. | --dropped -- |
| Proa1 | My work group makes things happen even when the odds are against it. | Our work group makes things happen even when the odds are against it. |
| Proa2 | My work group fixes things it does not like. | Our work group fixes things it does not like. |
| Proa3 | My work group always looks for better ways to perform its work. | Our work group always looks for better ways to perform its work. |
| Proa4 | My work group tackles problems head-on. | Our work group tackles problems head-on. |
| Proa5 | My work group addresses issues before they become major problems | Our work group addresses issues before they become major problems |
| **Alignment** | | |
| | Members of our work group understand how our performance measures fit with organization objectives. | --dropped-- |
| | My work group's goals are aligned with organizational goals. | --dropped-- |
| | My work group's decisions are based on the values and principles of the larger | --dropped-- |

| | | |
|---|---|---|
| | organization. | |
| | Our group's efforts are aligned with achieving the organization's goals. | --dropped-- |
| **Customer Service (supervisors only)** | | |
| Csrv1 | The group produces high quality products/services. | --same-- |
| Csrv2 | The group works out internal or external customer problems in a timely manner. | --same-- |
| | The group is very reliable when working on internal or external customer requests. | --dropped-- |
| Csrv3 | This group follows through on complaints and requests. | --same-- |
| Csrv4 | The group provides a satisfactory level of service to internal and external customers. | --same-- |
| **Group Performance** | | |
| Perf1 | The group meets or exceeds its goals. | The group meets or exceeds its goals. |
| Perf2 | Group members complete their tasks on time. | --same-- |
| | The group makes sure that products and services meet or exceed quality standards. | --dropped-- |
| Perf3 | The group responds quickly when problems come up. | The group responds quickly when problems come up. |
| Perf4 | This group is a productive team. | This group is productive. |
| **Innovation** | | |
| | Group members successfully solve problems that slow down their work. | --dropped -- |
| | The group comes up with inventive ideas. | --dropped -- |
| | The group introduces new procedures to improve the work it does. | --dropped -- |
| | Group members do problem solving in creative, clever ways. | --dropped -- |
| | The group finds innovations and potential improvements. | --dropped -- |
| **Employee Job Satisfaction** | | |
| Esat1 | Generally speaking I am very satisfied with this job. | --same-- |
| | I frequently think of quitting this job | --dropped -- |
| Esat2 | I am generally satisfied with the kind of work I do in this job. | --same-- |
| Esat3 | I feel a great sense of personal satisfaction when I do this job well. | --same-- |

## B.2 SURVEY FOR WORK GROUP MEMBERS

The questions in this survey are intended to obtain your perceptions about the group and organization in which you work. The term work group has been use throughout this survey as a general label for any type of group or team. The term organization refers to the establishment at the place (business address) where you work – whether it is the entire company, a plant, district office, or a field office.

Use a number 2 lead pencil to mark you answers on the answer sheet. If you need to change an answer on the scoring sheet, please erase completely before correcting your response.

Please enter in the following information in the places indicated at the top of your answer sheet:

| Area on answer sheet | Information to enter |
|---|---|
| NAME: | Write the name of your work group |
| ID Number | Enter the group number the survey administrator gives you for your work group. Enter the number at the far right side of the space, then circle the corresponding numbers below. |

For most questions on the following pages, you will be asked to indicate the extent to which you feel the statement describes the group in which you work at the present time or your organization. Please circle the appropriate response ranging from strongly disagree (1) to strongly agree (6).

Please answer all questions in the survey; if a question does not seem to be applicable, it may be that the question does not describe your work group at the present time. In this case, you would answer strongly disagree.

Answer questions honestly. It is critical if the information is to be accurate and useful to your group. This survey is confidential and the privacy of your responses will be protected. No one at your organization will see these survey responses. The responses will be summarized and reported to provide averages for the entire work group.

Thank you for your help.

**Section 1** – These statements ask about <u>your group and the work it does</u>. Please indicate the extent to which you agree with each statement.

| | |
|---|---|
| 1 - Strongly Disagree | 4 – Tend to Agree |
| 2 – Disagree | 5 – Agree |
| 3 – Tend to Disagree | 6 – Strongly Agree |

1. The jobs our group does frequently require problem solving.
2. My work group has a clearly defined purpose.
3. I'm very interested in what others think about this group.
4. Within my work group, jobs performed by group members are dependent on one another.
5. The reason I prefer this group to others is because of what it stands for.
6. Group members have mastered the skills necessary to do their jobs.
7. Tasks in our work group usually require thinking time before they can be completed.
8. Goals and objectives we must achieve to fulfill our work group's purpose are clear.
9. My work group has a positive impact on this organization's customers.
10. Our group members know who is and is not a member of this group
11. We feel that the work we do is meaningful.
12. We know how to take charge of problems that require immediate attention.
13. New ideas are rarely required to complete our work.
14. Our purpose and goals clearly define what is expected of our work group.
15. My group has a positive impact on other employees who depend on us.
16. Our work group is distinct from other work groups in the organization.
17. Our group feels that its purpose is important.
18. We have a sharing relationship. Group members can freely share ideas, feelings, and hopes.
19. New solutions are often needed to solve problems we find while doing our work.
20. My entire work group understands our group's purpose.
21. My group has a positive impact in helping the organization accomplish its objectives.
22. It is clear to us which people are members of our work group.
23. We believe that our work is significant.
24. We can talk freely to group members about difficulties we are having at work and know that they will want to listen.
25. Our group feels a sense of freedom in what it does
26. When someone criticizes this work group, it feels like a personal insult.
27. My group makes a difference in this organization.
28. If the values of this group were different, I would not be as attached to this group.
29. Our group feels that its tasks are worthwhile.
30. We would feed a sense of loss if a group member was transferred and we could no longer work together.
31. Our group has a lot of choice in determining what we do to solve problems.

32. When I talk about this group, I usually say "we" rather than "they."
33. I cannot accomplish my task without information or materials from other members of my group.
34. My attachment to this group is primarily based on the similarity of my values and those represented by the group.
35. Our group is confident in its ability perform our job.
36. If we share problems with group members, we know they will be helpful and caring.
37. Our group determines how things are done.
38. This group's successes are my successes.
39. Other members of my work group depend on me for information or materials needed to perform their tasks.
40. Since starting this job, my personal values and those of this group have become more similar.
41. Our group feels self-assured about its capabilities to work together as a team.
42. Our group has worked together to form close working relationships.
43. Our group determines what things are done.
44. When someone praises this group it feels like a personal compliment.

**Section 2** – These statements ask about the organization within which your group does its work. Please indicate the extent to which you agree with each statement.

| | |
|---|---|
| 1 - Strongly Disagree | 4 – Tend to Agree |
| 2 – Disagree | 5 – Agree |
| 3 – Tend to Disagree | 6 – Strongly Agree |

45. The feedback our group receives compares our performance to our goals.
46. When I talk about this organization, I usually say "we" rather than they.
47. My attachment to organization is primarily based on the similarity of my values and those represented by this organization.
48. This organization fills job openings by promoting capable employees within the organization.
49. In general, our supervisor asks the group for advice when making decisions
50. Our group receives feedback that shows how our performance has changed over time.
51. This organization's successes are my successes.
52. Since starting this job, my personal values and those of this organization have become more similar.
53. Increased productivity means higher pay for employees.
54. In general, our supervisor encourages our group to take control of its work
55. Our group receives feedback that helps determine the areas in which we need education and development.
56. When someone praises this organization it feels like a personal compliment.
57. The reason I prefer this organization to others is because of what it stands for.
58. Our performance actually has little impact on any incentive pay award.

59. In general, our supervisor encourages our group to figure out the causes & solutions to our problems.
60. The feedback our group receives helps us understand how others view our performance.
61. I'm very interested in what others think about this organization.
62. This organization provides employees the opportunity to learn new skills.
63. Our performance actually has little impact on our base rate of pay. (hourly rate or salary)
64. In general, our supervisor trusts our group.
65. When someone criticizes this organization, it feels like a personal insult.
66. If the values of this organization were different, I would not be as attached to this organization.
67. In this organization, employees are trained on skills that prepare them for future jobs.

**Section 3** – These statements describe how you might feel about the way your group works. Please indicate the extent to which you agree with each statement.

| | |
|---|---|
| 1 - Strongly Disagree | 4 – Tend to Agree |
| 2 – Disagree | 5 – Agree |
| 3 – Tend to Disagree | 6 – Strongly Agree |

68. We offer to share its ideas with other groups.
69. Rather than spend time reading or asking someone's advice, we often try things out to learn how they work.
70. Our group generally tries to understand how new information fits into how we should do our work.
71. This is our organization.
72. Our work group feels a sense of accountability for the work we do.
73. We invite people from outside our work group to present information or have discussions with us.
74. We try out new things by applying them in practice.
75. Our group thinks about new information and its implications for our work rather than merely concentrating on the facts given.
76. Our work group makes things happen even when the odds are against it.
77. Our group members want to do what is best for the organization.
78. We maintain contact with people outside our team who have information we need to do our work.
79. We test new ideas to help ourselves learn.
80. In order to understand something about our work better, we think about how new ideas make sense in terms of what we already know.
81. Our work group fixes things it does not like.
82. We feel as if the work we do were for our own business.
83. Our work group coordinates with those who receive our work.
84. We often think about how our work fits into the "bigger picture" at our organization.

85. I feel a very high degree of personal ownership for this organization.
86. Our work group always looks for better ways to perform its work.
87. In our work group we feel as if we're partners in making this organization successful.
88. We ask other group members questions when we are uncertain about something
89. We try to think how the different parts of our organization fit together.
90. This is my organization.
91. Our work group tackles problems head-on.
92. Generally speaking I am very satisfied with this job.
93. We get other group members to help us when we need assistance.
94. We try to think how our work relates to that of others.
95. I sense that this organization is ours.
96. Our work group addresses issues before they become major problems
97. I am generally satisfied with the kind of work I do in this job.
98. We ask other group members for more information they have when we need it.
99. Our group works out which are the key points of our jobs and which are less important.
100. I sense that this is my organization.
101. Our group members feel a shared sense of responsibility for our work.
102. I feel a great sense of personal satisfaction when I do this job well.

**Section 4** – General questions.

103. How many years have you been part of your present work group?
    1) less than six months
    2) 6 to 11 months
    3) 1 or 2 years
    4) 3 or 4 years
    5) 5 or 6 years
    6) 7 years or more

104. What is your gender?
    1) male
    2) female

105. What is your highest level of education?
    1) Some elementary, middle or high school.
    2) High school graduate or high school equivalency.
    3) Some college or vocational training beyond high school.
    4) Graduated form vocational school or associate degree.
    5) Graduated from college or university.
    6) Completed a graduate degree.
    7)

106. What is your age (in years)?
   1) 17-24
   2) 25-32
   3) 33-40
   4) 41-48
   5) 49-56
   6) 57-64
   7) 65 or more

107. How many years have you worked for this organization?
   1) 0-2
   2) 3-5
   3) 5-10
   4) 11-15
   5) 16-20
   6) 21 or more

## B.3 WORK GROUP ASSESSMENT - SUPERVISOR PERCEPTIONS

The questions in this survey are intended to obtain your perceptions about work group(s) you supervise – the type of work the group(s) does, the way groups work together, and group performance. The term work group has been use throughout this survey as a general label for any type of group or team. The term organization refers to the establishment at the place (business address) where you work – whether it is the entire company, a plant, district office, or a field office.

For most questions on the following pages, you will be asked to indicate the extent to which you feel the statement describes the group in which you work at the present time or your organization. Please circle the appropriate response ranging from strongly disagree (1) to strongly agree (6).

Please answer all questions in the survey; if a question does not seem to be applicable, it may be that the question does not describe your work group at the present time. In this case, you would answer strongly disagree.

Answer questions honestly. It is critical if the information is to be valuable and useful to your group. This survey is confidential and the privacy of your responses will be protected. No one at your organization will see these survey responses. The responses will be summarized only for the entire work group.

Please do not discuss the survey questions, your opinions, or your responses with others until after you have completed this survey.

After you read each question, please provide a response for each work group you supervise. Please list the groups for which you will be responding on the lines below as well as in the column headings on the following pages.

a. _____

b. _____

c. _____

Please turn the page and begin the survey.

| Scale: 1 – Strongly Disagree 4 – Tend to Agree<br>2 – Disagree 5 – Agree<br>3 – Tend to Disagree 6 – Strongly Agree | Work Group | | |
|---|---|---|---|
| | a. | b. | c. |
| **Section 1 – Statements about the groups and the work they do** | | | |
| 1. Jobs the group does frequently require problem solving. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 2. The group determines what things are done. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 3. The group's purpose and goals clearly define what is expected. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 4. Work group members depend on each other for information or materials needed to perform their tasks. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 5. The group's purpose is important. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 6. Group members know how to take charge of problems that require immediate attention. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 7. Tasks the group does usually require thinking time before they can be completed. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 8. The group has responsibility to maintain contact with other work groups | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 9. The entire work group understands its purpose. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 10. Within this work group, jobs performed by group members are dependent on one another. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 11. The group's work is significant. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 12. Group members have a sharing relationship. Group members can freely share ideas, feelings, and hopes. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 13. New ideas are rarely required to complete the group's tasks. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 14. The group has responsibility to maintain contact with those who receive its work (internal or external customers) | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 15. The work group has a positive impact on this organization's customers. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 16. Group members know who is and is not a member of this group | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 17. The group feels that its tasks are worthwhile. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 18. Group members can talk freely to each other about difficulties they are having at work and know that others will want to listen. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 19. New solutions are often needed to solve problems the group finds while doing its work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 20. The group has responsibility to maintain contact with people who supply it with parts or information to do its work | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 21. The group has a positive impact on other employees who depend on them. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 22. The work group is distinct from other work groups in the organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 23. The group is confident in its ability perform its job. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 24. Group members would feed a sense of loss if a group member was transferred and they could no longer work together. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 25. Group members have freedom in what they do. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 26. The group has responsibility to maintain contact with upper level managers | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 27. The group has a positive impact in helping the organization accomplish its objectives. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 28. It is clear to the group which people are members of this work group. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 29. The group feels self-assured about its capabilities to work together as a team. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 30. If group members share problems with others in the group, they know others will be helpful and caring. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |

| Scale: 1 – Strongly Disagree 4 – Tend to Agree<br>2 – Disagree 5 – Agree<br>3 – Tend to Disagree 6 – Strongly Agree | Work Group | | |
|---|---|---|---|
| | a. | b. | c. |
| 31. The group has a lot of choice in determining what it does to solve problems. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 32. This work group has a clearly defined purpose. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 33. The group makes a difference in this organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 34. The work group members do is meaningful. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 35. Group members have mastered the skills necessary to do their jobs. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 36. The group has worked together to form close working relationships. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 37. The group determines how things are done | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 38. Goals and objectives the group must achieve to fulfill its purpose are clear. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 39. Group members cannot accomplish their tasks without information or materials from other members of the team. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| **Section 2 – The organization within which groups work** | | | |
| 40. The group receives feedback comparing its performance to its goals. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 41. In this organization, work group members are trained on skills that prepare them for future jobs | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 42. In general, I ask the group for advice when making decisions | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 43. The group receives feedback that shows how its performance has changed over time. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 44. This organization fills job openings by promoting capable work group members within the organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 45. In general, I encourages the group to take control of its work | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 46. The group receives feedback that helps determine the areas in which group members need education and development. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 47. Increased productivity means higher pay for employees. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 48. In general, I encourage the group to figure out the causes and solutions to their problems. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 49. The feedback the group receives helps it understand how others view its performance. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 50. Group performance actually has little impact on any incentive pay award. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 51. In general, I trust the group. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 52. This organization provides work group members the opportunity to learn new skills. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 53. Group performance actually has little impact on its base rate of pay. (hourly rate or salary) | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| **Section 3 – Feelings about the *way* groups work** | | | |
| 54. Group members offer to share their ideas with other groups. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 55. Group members get other group members to help when they need assistance. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 56. The group often thinks about how its work fits into the "bigger picture" at our organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 57. Group members think about new information and its implications for their work rather than merely concentrating on the facts given. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 58. The work group always looks for better ways to perform its work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 59. The work group feels a sense of accountability for the work it does. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 60. Group members invite people from outside the work group to present information or have discussions with them. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 61. Group members ask each other information they have when they need it. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |

| Scale: 1 – Strongly Disagree 4 – Tend to Agree<br>2 – Disagree 5 – Agree<br>3 – Tend to Disagree 6 – Strongly Agree | Work Group | | |
|---|---|---|---|
| | a. | b. | c. |
| 62. Group members try to think how the different parts of the organization fit together. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 63. In order to understand something about their work better, group members think about how new ideas make sense in terms of what they already know. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 64. Group members tackle problems head-on. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 65. Group members want to do what is best for the organization. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 66. The group maintains contact with people outside the team who have information needed to do their work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 67. Rather than spend time reading or asking someone's advice, group members often try things out to learn how they work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 68. The group tres to think how their work relates to that of others. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 69. The work group makes things happen even when the odds are against it. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 70. The work group addresses issues before they become major problems | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 71. Group members feel as if the work they do were for their own business. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 72. The work group coordinates with those who receive its work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 73. Group members try out new things by applying them in practice. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 74. The group works out which are the key points of their jobs and which are less important. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 75. The work group fixes things it does not like. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 76. Group members feel a shared sense of responsibility for their work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 77. Work group members feel as if they're partners in making this organization successful. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 78. Group members ask other group members questions when they are uncertain about something | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 79. Group members test new ideas to help themselves learn. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 80. The group generally tries to understand how new information fits into how they should do their work. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| **Section 4 – Work group results** | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 81. The group produces high quality products/services. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 82. Generally speaking group members are very satisfied with their jobs. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 83. The group meets or exceeds its goals. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 84. The group works out internal or external customer problems in a timely manner. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 85. Group members complete their tasks on time. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 86. Group members are generally satisfied with the kind of work they do in their jobs. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 87. This group follows through on complaints and requests. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 88. The group responds quickly when problems come up. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 89. Group members feel a great sense of personal satisfaction when they do their jobs well. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 90. The group provides a satisfactory level of service to internal and external customers. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |
| 91. This group is a productive. | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |

| | Work Group | | |
|---|---|---|---|
| **Section 5 – General Questions** | a. | b. | c. |
| 92. How long have you supervised this work group?<br>1) less than six months<br>2) 6 to 11 months<br>3) 1 or 2 years<br>4) 3 or 4 years<br>5) 5 or 6 years<br>6) 7 years or more | 1 2 3 4 5 6 | 1 2 3 4 5 6 | 1 2 3 4 5 6 |

| | |
|---|---|
| 93. What is your gender?<br>1) male<br>2) female | 1 2 |
| 94. What is your highest level of education?<br>1) Some elementary, middle or high school.<br>2) High school graduate or high school equivalency.<br>3) Some college or vocational training beyond high school.<br>4) Graduated form vocational school or associate degree.<br>5) Graduated from college or university.<br>6) Completed a graduate degree. | 1 2 3 4 5 6 |
| 95. What is your age (in years)?<br>1) 17-24<br>2) 25-32<br>3) 33-40<br>4) 41-48<br>5) 49-56<br>6) 57-64<br>7) 65 or more | 1 2 3 4<br>5 6 7 |
| 96. How many years have you worked for this organization?<br>1) 0-2<br>2) 3-5<br>3) 6-10<br>4) 11-15<br>5) 16-20<br>6) 21 or more | 1 2 3 4 5 6 |

**B.4 WORK GROUP OBSERVATION FORM**

**Background Information for Stewardship & Learning Study**

**Please return to:** **Rick Groesbeck (540) 231-2006 rgroesbe@vt.edu**
**250 NEB (0118)**
**Virginia Tech**
**Blacksburg, VA 24061**

**1) General Information:** Dates Form Completed: _____

Company name: _____ Observer's name: _____

Primary contact's name: _____ Position: _____

Phone: _____ E-mail address: _____

| **Work Group Name** | | | | |
|---|---|---|---|---|
| **2) Group Information:** | | | | |
| a. Describe what the group does (what it builds, provides, etc.) | | | | |
| b. Classification: product, service, or describe other (management, . . .) | Product, Service<br>Other: _____ | Product, Service<br>Other: _____ | Product, Service<br>Other: _____ | Product, Service<br>Other: _____ |
| c. Position in hierarchy (level, title of manager) | | | | |
| d. Number group members | | | | |
| e. Group age: (formed less than 2 months ago, 2-6 months, … six years +) | | | | |
| f. # people in group for six months (or since formed if less than 6 months). | | | | |

| **Work Group Name** | | | | |
|---|---|---|---|---|
| **3) Work group conditions** | | | | |
| a. Does the group have a dedicated space? | | | | |
| b. Extent members can see each other and communicate easily? | | | | |
| c. Is group all working on the same shift? | | | | |
| d. Interdependence: % time in each - **see key** 1)independent, 2)sequential, 3)reciprocal, 4)group flow | 1)Indep __ 2)Pooled___ 3) Seq ___ 4) Recip____ | 1)Indep __ 2)Pooled___ 3) Seq ___ 4) Recip____ | 1)Indep __ 2)Pooled___ 3) Seq ___ 4) Recip____ | 1)Indep __ 2)Pooled___ 3) Seq ___ 4) Recip____ |
| e. Members have different roles - **see key** | | | | |
| f. Ability to assess work quality & quantity of work – **see key** | | | | |
| g. Evidence of performance feedback system. | | | | |
| h. Pay-performance system | Merit: ____%. I, G, O Incentive: ___%. I, G, O | Merit: ____%. I, G, O Incentive: ___%. I, G, O | Merit: ____%. I, G, O Incentive: ___%. I, G, O | Merit: ____%. I, G, O Incentive: ___%. I, G, O |
| **4) Work Group Authority** – for each responsibility (a-e) note who decides (1)member of management, (2)group leader, (3)group members such as those in coordinator or "star point" roles, (4) group as a unit, (5) other – describe. | | | | |
| a. Group member task assignments | | | | |
| b. The pace at which work is performed | | | | |

| **Work Group Name** | | | | |
|---|---|---|---|---|
| c. The processes used, the way the work is done. | | | | |
| d. Behaviors and attendance standards | | | | |
| e. Changes in group membership | | | | |
| f. Group leadership structure-**see key** | | | | |
| g. Frequency, duration & content of full group meetings | | | | |
| h. Overall classification of group management, comments–**see key** | | | | |
| **5) Group task** | | | | |
| a. How challenging are the tasks?-**see key** | | | | |
| b. Degree of collective initiative, judgement & discretion-**see key** | | | | |
| c. Extent of technology versus group member control of processes | | | | |
| d. Feedback/relationship with those receiving the group's work-**key** | | | | |
| e. Extent to which group effort could influence the process quality, quantity or innovation. | | | | |

| **Work Group Name** | | | | |
|---|---|---|---|---|
| **6) Performance data for groups** – data to facilitate comparisons across groups – or subjective rating if required | | | | |
| a. Quantity of work | | | | |
| b. Quality of work | | | | |
| c. Material usage, scrap or byproduct rate | | | | |
| d. Safety, housekeeping | | | | |
| e. Other | | | | |
| **7) Other noteworthy information** | | | | |
| a. Did anything change in the organization or group or during the last couple of weeks that may significantly influence survey responses. | | | | |
| b. Have any major problems arisen during the last few weeks that would affect the way the groups could be expected to work together? | | | | |
| c. Other notes | | | | |

**Key to assist answering items in Work Group Observation Form**

1) **Contact information**

2) **Group information** to help determine if the group has been together long enough to develop common perspectives, norms, and behaviors that allow people to function as a real work group.

   a) Describe the product of service of the group (i.e., builds motors, answers customer complaint calls).

   b) Enter whether the group primarily provide a product or service. If it is another type of group such as a cross-functional or management group, enter that information.

   c) Locate the group in the organization hierarchy. How many levels are between this group and the organizational head at this site. Does anyone report to the group?

   d) Number people assigned to work in the group.

   e) How long has the work group been organized with its current structure and roles. The intent is to determine how long people have been able to work together to develop group processes and relationships.

   f) Enter the number of people in the group that have been members of the group for six months or more (or since the group was formed if group is less than 6 months old). The intent is to get a feel for the degree of turnover in the group.

**3) Work group conditions**

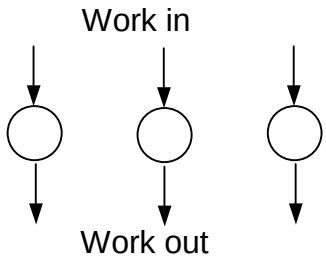
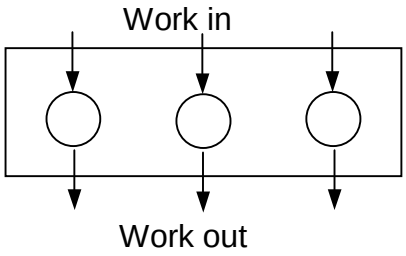
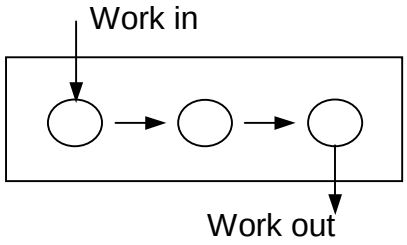
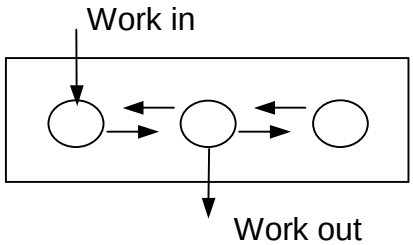
   a) Does the group have its own space to work, does it share its workplace with people on other shifts or departments?

   b) The extent to which the work layout allows group members to communicate (to exchange ideas, coordinate, ask questions, watch the work flow, etc.)

   c) To what extent are group members all working together at the same time? (for example on the same shift).

(3. **Work Group conditions** continued…)

d) Enter the work flow best describing the kind of task interdependence among group members. If significant amounts of more than one type of interdependence are present, indicate the approximate percentage of time group members spend in each type of work.

| | |
|---|---|
| **(1) Independent Work Flows**. Work is performed by people working independently. Work does not flow between people. There is little interaction among those doing the work. People are held individually accountable for their performance. |  |
| **(2) Pooled Group.** Group members work independently with generally equivalent roles. However, group members are collectively responsible for activities (i.e., training) and/or overall performance levels (i.e., quality, quantity). |  |
| **(3) Sequential Interdependence.** Work activities flow sequentially in one direction between group members. Roles are in a prescribed order. (assembly line) |  |
| **(4) Reciprocal Interdependence.** Work flows between group members in a back and forth manner over time. Roles are complementary. |  |

e) Extent to which there is a difference in group member roles

(1) Not at all – no apparent division of labor
few noticeable differences in what different group members do.

(3) Moderate –

(5) Large difference – clear division of labor
some members always do certain things and never do other things
the "pecking order" for various issues is clear.

(3. **Work group conditions** continued …)

f) Ability to measure or assess the acceptability of the group product (whether or not it is actually assessed).
   (1) Impossible to assess acceptability – No observable product or performance to assess. Behavior can be observed and assessed, but behaviors cannot be tied to specific outcomes.
   (3) Partially reliable assessment possible – there is a product with observable properties, but standards are open to dispute.
   Output can be measured, but it is unclear "how much is enough."
   Outcomes can only be indirectly observed (i.e., states of mind or morale).
   (5) Straightforward, reliable assessment possible – Products are directly observable objects or behaviors with objective standards. (i.e., 24-hour delivery)
   Results are directly quantifiable with clear standards.
   Self-confirming answers (i.e., radio that works when repaired)

g) Systems are in place that provide feedback to group members on their performance.
   (1) None - Employees have to guess or ask others to find out how they're doing. There may be some bulletins boards, but information is outdated.
   (3) Some - Some visual feedback or one-to-one information is consistently provided.
   (5) Extensive - Employees receive feedback on the unit's performance on a regular basis in a way that enables them to adjust or improve their performance. Feedback is provided across a multiple dimensions of performance in a way that group members can understand what is important as well as cause and effect relationships.

h) Pay-performance linkage.

- Merit pay increases based upon performance? If yes, maximum % of base pay. If not based on merit, enter "0."
- Incentive pay system? If yes, maximum % of base pay given within last 3 years. If none, enter "0."
- For merit and incentive systems, note the extent merit and incentive pay increases are based upon individual (I), group (G),or organizational (O) performance.

**4) Work group authority**

a-e) Note who makes the decisions about each of these task and policy decisions:

f) Note the leadership structure <u>within</u> the group.
   (1) Formal leader designated by management
   (2) Group member appointed/elected leader by the group
   (3) Formal shared leadership or coordinator roles appointed by the group.
   (4) Consistent informal leadership by one or more group members
   (5) No apparent leadership within the group

h) Overall classification of work group management
   (1) Manager led work group
   (2) Mix of manager led group with significant group process decisions by group.
   (3) A self-managing team (with responsibility to manage *how* its work is to be done).
   (4) A mix between a self-managing team and a mini business unit
   (5) A group which not only manages itself, but has business unit responsibility.

5) **Group Task**

a) How challenging are the tasks to the work group?

(1) Minimally - The task is highly routine and repetitive – there is no novelty or unpredictability in it.
- The task is so simple it requires little skill or expertise
- The task is so easy to execute it requires little concentration or effort
- The skills required are largely rote (i.e., highway toll collection)

(3) Moderate - Some subtasks are simple, while others are demanding
- There is a moderate amount of novelty or unpredictability in the task
- The task requires moderate expertise, concentration and/or effort

(5) High challenge - The task is complex, novel and/or unpredictable
- The skills required are complex or sophisticated
- The task requires a high level of concentration

b) The degree of collective initiative, judgement and discretion required to carry out work on the task. (This question is related to task autonomy, not the degree of self-management performed by the work group.)

(1) Virtually no task-based autonomy or discretion given or required
- The task is so cut and dried that members have no opportunity for decision-making about it.
- Everything is pre-determined by technological, legal or regulatory constraints.

(3) Moderate task autonomy and discretion
- Some aspects of the task allow for autonomous decision-making by the group, while others do not.
- The task itself is highly structured, but unpredictability in equipment or in boundary transactions (i.e., product receipt or shipping) required on-line decision making.

(5) Virtually unlimited task autonomy, high discretion required
- There are no predetermined methods or procedures – the group must fashion/create its own procedures from scratch.
- Task complexity or unpredictability is so high that members must always be ready to analyze what they do or how they do it.

c) Degree to which the work performed is under external/automated control versus under the control of the work group.

(1) Under full control of technology. (Example: group members supply parts)

(3) Significant technological control, but group members do monitor and control a significant amount of the work.

(5) The process is primarily performed by members of the work group.

d) To what extent does the group hear from those who receive or use their product or service about how satisfactory it is (or observe directly the reactions of those people)?

(1) Never – the group has no relationship with customers, distance or time separates the group from those who use its work.

(3) Occasional – periodic direct contact with user of its work – or second hand information - that allows members to assess how its work is evaluated.

(5) Nearly continuous – the group deals directly with those who use its work and receives immediate feedback from them.

( 5. Group task continued …)

e) If the group exerted greater effort than it does at present, to what extent would performance effectiveness be likely to improve as a consequence?
   (1) None/very little – the group has little opportunity to improve outcomes
   (3) Some/uncertain
   (5) Substantial – the group has a significant opportunity to improve its performance or the way in which it process or product/service is completed.

6) **Performance data for group**

a-e) Enter performance evaluation metrics that is common across groups to enable performance comparisons.

7) **Other noteworthy information**

a-b) Note any significant events that have recently occurred or are expected to occur within in the next few weeks that could significantly influence the attitudes of group members taking the survey.

c) Enter other notes that may be important to explain results or differences among work groups not already entered.

# APPENDIX C. ANALYSIS TABLES AND FIGURES

This appendix includes tables and charts not included in the text. These tables and charts relate to the methodology and results chapters.

## C.1 DISCRIMINANT VALIDITY TESTS FOR ORGANIZATIONAL ATTITUDE CONSTRUCTS

### Table C.1 Chi-Squared Test for Added Factor in Model

| Models being compared | Change in $\chi^2$ | Change in degrees of freedom | Significance of Change | Supports Added Factor? |
|---|---|---|---|---|
| 1 factor versus 3 factors | 834.7-405.6 = 429.1 | 119 – 116 = 3 | 0.0000 | Yes |
| 3 factors versus 4 factors | 405.6 – 302.7 = 102.9 | 116 – 113 = 3 | 0.0000 | Yes |

### Table C.2 Test to Verify Correlations between Factors is < 1.0

| Factors being Correlated | | Correlation | Bootstrap Estimate of Std Error | Correlation + 2 x Std Error | Different from 1.0? |
|---|---|---|---|---|---|
| Psychological Ownership | Identify with Organization | 0.837 | 0.023 | 0.883 | Yes |
| Identify with Organization | Internalize Organization Values | 0.869 | 0.028 | 0.925 | Yes |
| Psychological Ownership | Internalize Organization Values | 0.805 | 0.027 | 0.859 | Yes |
| Psychological Ownership | Group Stewardship | 0.695 | 0.043 | 0.781 | Yes |
| Group Stewardship | Internalize Organization Values | 0.621 | 0.050 | 0.721 | Yes |
| Group Stewardship | Identify with Organization | 0.751 | 0.044 | 0.839 | Yes |

### Table C.3 Test to Compare Variance Extracted with the Square of Correlations between Constructs

| Factors for which Variance Extracted and the Square of the Correlation are Compared | | Variance Extracted | | Correlation Squared | Variance Extracted > Correlation Squared |
|---|---|---|---|---|---|
| Factor A | Factor B | Factor A | Factor B | | |
| Psychological Ownership | Identify with Organization | 0.765 | 0.883 | 0.837 | One |
| Identify with Organization | Internalized Organization Values | 0.883 | 0.870 | 0.869 | Yes |
| Psychological Ownership | Internalized Organization Values | 0.765 | 0.870 | 0.805 | One |
| Psychological Ownership | Group Stewardship | 0.765 | 0.778 | 0.695 | Yes |
| Group Stewardship | Internalized Organization Values | 0.778 | 0.870 | 0.621 | Yes |
| Group Stewardship | Identify with Organization | 0.778 | 0.883 | 0.751 | Yes |

## C.2 WABA TABLES FOR HYPOTHESIS 2

**Table C.4 Results of Work Group Analysis for Hypothesis 2: Group Stewardship (x) and Hypothesized Outcomes (y)**

| Construct | (1) ($n_{BX}$ | (2) x $n_{BY}$ | (3) x $r_{BXY}$) | + | (4) ($n_{WX}$ | (5) x $n_{WY}$ | (6) x $r_{WXY}$) | = | (7) $r_{TXY}$ | (8) Z-test | (9) Inference | (10) Between | (11) Within |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| External Perspective | 0.544 *** | 0.520 *** | 0.813 *** | + | 0.839 ns | 0.854 ns | 0.672 *** | = | 0.712 *** | 3.046 ** | wholes | 0.230 | 0.482 |
| Experiment | 0.544 *** | 0.548 *** | 0.629 *** | + | 0.839 ns | 0.836 ns | 0.505 *** | = | 0.542 *** | 1.752 * | wholes | 0.188 | 0.354 |
| Internal Collaboration | 0.544 *** | 0.579 *** | 0.792 *** | + | 0.839 ns | 0.815 ns | 0.539 *** | = | 0.618 *** | 4.494 *** | wholes | 0.250 | 0.369 |
| Proactive Behaviors | 0.544 *** | 0.546 *** | 0.848 *** | + | 0.839 ns | 0.838 ns | 0.721 *** | = | 0.759 *** | 3.238 *** | wholes | 0.252 | 0.507 |

Notes: ns $P > 0.05$ ** $p \leq 0.01$ Column (10) = (1) x (2) x (3)
* $P \leq 0.05$ *** $p \leq 0.001$ Column (11) = (4) x (5) x (6)

Significance tests for columns (1) through (7) based on $i = 747$ individuals and $j = 107$ work groups

**Table C.5 Results of Plant Analysis for Hypothesis 2: Group Stewardship (x) and Hypothesized Outcomes (y)**

| Construct | (1) ($n_{BX}$ | (2) x $n_{BY}$ | (3) x $r_{BXY}$) | + | (4) ($n_{WX}$ | (5) x $n_{WY}$ | (6) x $r_{WXY}$) | = | (7) $r_{TXY}$ | (8) Z-test | (9) Inference | (10) Between | (11) Within |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| External Perspective | 0.528 *** | 0.502 *** | 0.953 *** | + | 0.849 ns | 0.865 ns | 0.763 *** | = | 0.813 *** | 2.191 * | equivocal | 0.252 | 0.561 |
| Experiment | 0.528 *** | 0.498 *** | 0.521 ns | + | 0.849 ns | 0.867 ns | 0.668 *** | = | 0.629 *** | -0.585 ns | equivocal | 0.137 | 0.492 |
| Internal Collaboration | 0.528 *** | 0.496 *** | 0.767 ** | + | 0.849 ns | 0.868 ns | 0.801 *** | = | 0.792 *** | -0.226 ns | equivocal | 0.201 | 0.591 |
| Proactive Behaviors | 0.528 *** | 0.427 * | 0.798 ** | + | 0.849 ns | 0.904 ns | 0.871 *** | = | 0.848 *** | -0.621 ns | equivocal | 0.180 | 0.669 |

Notes: ns $P > 0.05$ ** $p \leq 0.01$ Column (10) = (1) x (2) x (3)
* $P \leq 0.05$ *** $p \leq 0.001$ Column (11) = (4) x (5) x (6)

Significance tests for columns (1) through (7) based on $j = 107$ work groups and $k = 10$ plants

**Table C.6 – WABA Multiple Level Analysis Summarizing Appropriate Levels of Analysis for Group Stewardship and Group Behaviors**

| Group Stewardship with | Inference | | Interpretation | Data source for hypothesis testing |
|---|---|---|---|---|
| | Group level | Plant level | | |
| External Perspective | wholes | wholes | cross-level wholes | weighted plant means |
| Experiment | wholes | equivocal | level-specific whole groups | weighted group means |
| Internal Collaboration | wholes | equivocal | level-specific whole groups | weighted group means |
| Proactive Behaviors | wholes | equivocal | level-specific whole groups | weighted group means |

## C.3 WABA TABLES FOR HYPOTHESIS 4

**Table C.7 Results of Work Group Analysis for Hypothesis 4: Employee Job Satisfaction (y) and Hypothesized Antecedents (x)**

| Construct | (1) ( $n_{BX}$ | (2) x $n_{BY}$ | (3) x $r_{BXY}$ ) | + | (4) ( $n_{WX}$ | (5) x $n_{WY}$ | (6) x $r_{WXY}$) | = | (7) $r_{TXY}$ | (8) Z-test | (9) Inference | (10) Between | (11) Within |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| External Perspective | 0.520 *** | 0.551 *** | 0.705 *** | + | 0.854 ns | 0.835 ns | 0.526 *** | = | 0.577 *** | 2.789 ** | wholes | 0.202 | 0.375 |
| Experiment | 0.548 *** | 0.551 *** | 0.564 *** | + | 0.836 ns | 0.835 ns | 0.412 *** | = | 0.457 *** | 1.906 * | wholes | 0.170 | 0.287 |
| Internal Collaboration | 0.579 *** | 0.551 *** | 0.697 *** | + | 0.815 ns | 0.835 ns | 0.485 *** | = | 0.553 *** | 3.140 *** | wholes | 0.222 | 0.330 |
| Proactive Behaviors | 0.546 *** | 0.551 *** | 0.673 *** | + | 0.838 ns | 0.835 ns | 0.550 *** | = | 0.587 *** | 1.874 * | wholes | 0.202 | 0.385 |

Notes: ns $P > 0.05$ ** $p \leq 0.01$ Column (10) = (1) x (2) x (3)
* $P \leq 0.05$ *** $p \leq 0.001$ Column (11) = (4) x (5) x (6)

Significance tests for columns (1) through (7) based on $i = 747$ individuals and $j = 107$ work groups

**Table C.8 Results of Plant Analysis for Hypothesis 4: Employee Job Satisfaction (y) and Hypothesized Antecedents (x)**

| Construct | (1) ( $n_{BX}$ | (2) x $n_{BY}$ | (3) x $r_{BXY}$ ) | + | (4) ( $n_{WX}$ | (5) x $n_{WY}$ | (6) x $r_{WXY}$) | = | (7) $r_{TXY}$ | (8) Z-test | (9) Inference | (10) Between | (11) Within |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| External Perspective | 0.502 *** | 0.621 *** | 0.906 *** | + | 0.865 ns | 0.784 ns | 0.624 *** | = | 0.000 ** | 1.966 * | equivocal | 0.282 | 0.423 |
| Experiment | 0.498 *** | 0. 621 *** | 0.644 * | + | 0.867 ns | 0.784 ns | 0.537 *** | = | 0.000 ** | 0.421 ns | equivocal | 0.199 | 0.365 |
| Internal Collaboration | 0.496 *** | 0. 621 *** | 0.781 ** | + | 0.868 ns | 0.784 ns | 0.670 *** | = | 0.000 ** | 0.607 ns | equivocal | 0.241 | 0.456 |
| Proactive Behaviors | 0.427 * | 0. 621 *** | 0.748 * | + | 0.904 ns | 0.784 ns | 0.670 *** | = | 0.000 ** | 0.402 ns | equivocal | 0.198 | 0.475 |

Notes: ns $P > 0.05$ ** $p \leq 0.01$ Column (10) = (1) x (2) x (3)
* $P \leq 0.05$ *** $p \leq 0.001$ Column (11) = (4) x (5) x (6)

Significance tests for columns (1) through (7) based on $j = 107$ work groups and $k = 10$ plants

**Table C.9 WABA Multiple Level Analysis Summarizing Appropriate Levels of Analysis for Group Behaviors and Employee Job Satisfaction**

| Employee Job Satisfaction with | Inference | | Interpretation | Data source for hypothesis testing |
|---|---|---|---|---|
| | Group level | Plant level | | |
| External Perspective | wholes | equivocal | level-specific whole groups | weighted group means |
| Experiment | wholes | equivocal | level-specific whole groups | weighted group means |
| Internal Collaboration | wholes | equivocal | level-specific whole groups | weighted group means |
| Proactive Behaviors | wholes | equivocal | level-specific whole groups | weighted group means |

**Table C.10 Components of the WABA Equation for Within and Between Plant-level Correlations for Group Behaviors and Hypothesized Outcomes**

| Construct | (1) ( $n_{BX}$ | (2) x $n_{BY}$ | (3) x $r_{BXY}$ ) | + | (4) ( $n_{WX}$ | (5) x $n_{WY}$ | (6) x $r_{WXY}$) | = | (7) $r_{TXY}$ | (8) Z-test | (9) Inference | (10) Between | (11) Within |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **External Perspective** | | | | | | | | | | | | | |
| Performance | 0.461 ** | 0.480 ** | 0.866 ** | + | 0.888 ns | 0.877 ns | 0.537 *** | = | 0.610 *** | 1.822 * | equivocal | 0.191 | 0.418 |
| Customer Service | 0.461 ** | 0.584 *** | 0.790 ** | + | 0.888 ns | 0.812 ns | 0.592 *** | = | 0.639 *** | 1.000 ns | equivocal | 0.213 | 0.426 |
| **Experiment** | | | | | | | | | | | | | |
| Performance | 0.537 *** | 0.480 ** | 0.135 ns | + | 0.844 ns | 0.877 ns | 0.108 | = | 0.115 | 0.069 ns | null | 0.035 | 0.080 |
| Customer Service | 0.537 *** | 0.584 *** | 0.352 ns | + | 0.844 ns | 0.812 ns | 0.376 *** | = | 0.368 *** | -0.072 ns | equivocal | 0.110 | 0.258 |
| **Internal Collaboration** | | | | | | | | | | | | | |
| Performance | 0.363 ns | 0.480 ** | 0.644 * | + | 0.932 ns | 0.877 ns | 0.611 *** | = | 0.611 *** | 0.142 ns | equivocal | 0.112 | 0.499 |
| Customer Service | 0.363 ns | 0.584 *** | 0.853 ** | + | 0.932 ns | 0.812 ns | 0.654 *** | = | 0.676 *** | 1.232 ns | equivocal | 0.181 | 0.495 |
| **Proactive Behaviors** | | | | | | | | | | | | | |
| Performance | 0.362 ns | 0.480 ** | 0.780 ** | + | 0.932 ns | 0.877 ns | 0.716 *** | = | 0.721 *** | 0.375 ns | equivocal | 0.135 | 0.585 |
| Customer Service | 0.362 ns | 0.584 *** | 0.713 ** | + | 0.932 ns | 0.812 ns | 0.627 *** | = | 0.625 *** | 0.401 ns | equivocal | 0.151 | 0.474 |

Notes: ns $P > 0.05$ ** $p \leq 0.01$ Column (10) = (1) x (2) x (3)
* $P \leq 0.05$ *** $p \leq 0.001$ Column (11) = (4) x (5) x (6)

## C.4 MEDIATION REGRESSION EQUATIONS FOR HYPOTHESIS 5

### Table C.11 Mediation Tests for Hypothesis 5

Summary of regression equation coefficients (Betas) and significance tests (*p*) used to determine if group stewardship mediates the effect of antecedent interdependent variables on **External Perspective** and **Internal Collaboration**. The steps shown in the left hand column are from the procedure described in section 4.3 and Figure 4.2.

| Step | Independent Variable(s) | Dependent Variable | | *Beta* | Std Err | *p* | Mediation Role | Mediation % | t-test | $R^2$ | *Sig F change (step 3-1)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Trust | Ext. Perspective | c | 0.512 | 0.049 | 0.000 | | | | 0.507 | |
| 2 | Trust | Grp. Stewardship | a | 0.613 | 0.044 | 0.000 | | | | 0.651 | |
| 3/4 | Trust and | Ext. Perspective | c' | 0.116 | 0.068 | 0.093 | full | 77% | 6.385 *** | 0.670 | 0.000 |
| | Grp. Stewardship | | b | 0.647 | 0.090 | 0.000 | | | | | |
| 1 | Potency | Ext. Perspective | c | 0.576 | 0.071 | 0.000 | | | | 0.382 | |
| 2 | Potency | Grp. Stewardship | a | 0.774 | 0.059 | 0.000 | | | | 0.618 | |
| 3/4 | Potency and | Ext. Perspective | c' | -0.052 | 0.086 | 0.543 | full | 109% | 7.598 *** | 0.662 | 0.000 |
| | Grp. Stewardship | | b | 0.811 | 0.087 | 0.000 | | | | | |
| 1 | Analysis | Ext. Perspective | c | 0.508 | 0.084 | 0.000 | | | | 0.255 | |
| 2 | Analysis | Grp. Stewardship | a | 0.547 | 0.089 | 0.000 | | | | 0.264 | |
| 3/4 | Analysis and | Ext. Perspective | c' | 0.118 | 0.066 | 0.075 | full | 77% | 5.428 *** | 0.671 | 0.000 |
| | Grp. Stewardship | | b | 0.713 | 0.062 | 0.000 | | | | | |
| 1 | ID with Org. | Ext. Perspective | c | 0.610 | 0.055 | 0.000 | | | | 0.540 | |
| 2 | ID with Org. | Grp. Stewardship | a | 0.598 | 0.062 | 0.000 | | | | 0.464 | 0.000 |
| 3/4 | ID with Org. and | Ext. Perspective | c' | 0.280 | 0.058 | 0.000 | partial | 54% | 6.254 *** | 0.722 | 0.000 |
| | Grp. Stewardship | | b | 0.552 | 0.067 | 0.000 | | | | | |
| 1 | Trust | Int. Collaboration | c | 0.580 | 0.052 | 0.000 | | | | 0.540 | |
| 2 | Trust | Grp. Stewardship | a | 0.613 | 0.044 | 0.000 | | | | 0.651 | |
| 3/4 | Trust and | Int. Collaboration | c' | 0.216 | 0.077 | 0.006 | partial | 63% | 5.399 *** | 0.654 | 0.000 |
| | Grp. Stewardship | | b | 0.593 | 0.101 | 0.000 | | | | | |
| 1 | Potency | Int. Collaboration | c | 0.699 | 0.072 | 0.000 | | | | 0.467 | |
| 2 | Potency | Grp. Stewardship | a | 0.774 | 0.059 | 0.000 | | | | 0.618 | |
| 3/4 | Potency and | Int. Collaboration | c' | 0.163 | 0.097 | 0.097 | full | 77% | 6.172 *** | 0.637 | 0.000 |
| | Grp. Stewardship | | b | 0.693 | 0.099 | 0.000 | | | | | |
| 1 | Analysis | Int. Collaboration | c | 0.516 | 0.095 | 0.000 | | | | 0.218 | |
| 2 | Analysis | Grp. Stewardship | a | 0.547 | 0.089 | 0.000 | | | | 0.264 | |
| 3/4 | Analysis and | Int. Collaboration | c' | 0.090 | 0.076 | 0.240 | full | 83% | 5.351 *** | 0.632 | 0.000 |
| | Grp. Stewardship | | b | 0.779 | 0.072 | 0.000 | | | | | |
| 1 | ID with Org | Int. Collaboration | c | 0.595 | 0.067 | 0.000 | | | | 0.426 | |
| 2 | ID with Org | Grp. Stewardship | a | 0.598 | 0.062 | 0.000 | | | | 0.464 | 0.000 |
| 3/4 | ID with Org and | Int. Collaboration | c' | 0.193 | 0.072 | 0.008 | partial | 68% | 6.225 *** | 0.651 | 0.000 |
| | Grp. Stewardship | | b | 0.673 | 0.082 | 0.000 | | | | | |

Notes: $^{ns}P > 0.05$ * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Sig F change: test of the significance of incremental variance explained by adding mediating variable.

Tests use work group member perceptions (108 groups weighted by number of responses/group)

## Table C.12 Mediation Tests for Hypothesis 5

Summary of regression equation coefficients (Betas) and significance tests (*p*) used to determine if group stewardship mediates the effect of antecedent interdependent variables on **External Perspective** and **Internal Collaboration**. The steps shown in the left hand column are from the procedure described in section 4.3 and Figure 4.2.

| Step | Independent Variable(s) | Dependent Variable | | *Beta* | Std Err | *P* | Mediation Role | Mediation % | t-test | $R^2$ | *Sig F change (step 3-1)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Trust | Experimentation | c | 0.434 | 0.056 | 0.000 | | | | 0.360 | |
| 2 | Trust | Grp. Stewardship | a | 0.613 | 0.044 | 0.000 | | | | 0.651 | |
| 3/4 | Trust and | Experimentation | c' | 0.191 | 0.091 | 0.039 | partial | 56% | 3.212 ** | 0.420 | 0.001 |
| | Grp. Stewardship | | b | 0.397 | 0.120 | 0.001 | | | | | |
| 1 | Potency | Experimentation | c | 0.450 | 0.080 | 0.000 | | | | 0.230 | |
| 2 | Potency | Grp. Stewardship | a | 0.774 | 0.059 | 0.000 | | | | 0.618 | |
| 3/4 | Potency and | Experimentation | c' | -0.038 | 0.115 | 0.739 | full | 109% | 4.976 *** | 0.397 | 0.000 |
| | Grp. Stewardship | | b | 0.630 | 0.117 | 0.000 | | | | | |
| 1 | Analysis | Experimentation | c | 0.430 | 0.087 | 0.000 | | | | 0.186 | |
| 2 | Analysis | Grp. Stewardship | a | 0.547 | 0.089 | 0.000 | | | | 0.264 | |
| 3/4 | Analysis and | Experimentation | c' | 0.195 | 0.082 | 0.019 | partial | 55% | 3.724 *** | 0.427 | 0.000 |
| | Grp. Stewardship | | b | 0.519 | 0.078 | 0.000 | | | | | |
| 1 | ID with Org | Experimentation | c | 0.435 | 0.069 | 0.000 | | | | 0.271 | |
| 2 | ID with Org | Grp. Stewardship | a | 0.598 | 0.062 | 0.000 | | | | 0.464 | 0.000 |
| 3/4 | ID with Org and | Experimentation | c' | 0.143 | 0.085 | 0.098 | full | 67% | 4.425 *** | 0.412 | 0.000 |
| | Grp. Stewardship | | b | 0.489 | 0.097 | 0.000 | | | | | |
| 1 | Trust | Proactive | c | 0.639 | 0.181 | 0.000 | | | | 0.676 | |
| 2 | Trust | Grp. Stewardship | a | 0.613 | 0.044 | 0.000 | | | | 0.651 | |
| 3/4 | Trust and | Proactive | c' | 0.306 | 0.061 | 0.000 | partial | 52% | 6.092 *** | 0.774 | 0.000 |
| | Grp. Stewardship | | b | 0.543 | 0.080 | 0.000 | | | | | |
| 1 | Potency | Proactive | c | 0.797 | 0.060 | 0.000 | | | | 0.622 | |
| 2 | Potency | Grp. Stewardship | a | 0.774 | 0.059 | 0.000 | | | | 0.618 | |
| 3/4 | Potency and | Proactive | c' | 0.327 | 0.078 | 0.000 | partial | 59% | 6.612 *** | 0.755 | 0.000 |
| | Grp. Stewardship | | b | 0.608 | 0.079 | 0.000 | | | | | |
| 1 | Analysis | Proactive | c | 0.506 | 0.094 | 0.000 | | | | 0.216 | |
| 2 | Analysis | Grp. Stewardship | A | 0.547 | 0.089 | 0.000 | | | | 0.264 | |
| 3/4 | Analysis and | Proactive | c' | 0.042 | 0.065 | 0.524 | full | 92% | 5.622 *** | 0.721 | 0.000 |
| | Grp. Stewardship | | b | 0.848 | 0.062 | 0.000 | | | | | |
| 1 | ID with Org | Proactive | c | 0.532 | 0.070 | 0.000 | | | | 0.351 | |
| 2 | ID with Org | Grp. Stewardship | a | 0.598 | 0.062 | 0.000 | | | | 0.464 | 0.000 |
| 3/4 | ID with Org and | Proactive | c' | 0.024 | 0.063 | 0.706 | full | 95% | 7.417 *** | 0.720 | |
| | Grp. Stewardship | | b | 0.850 | 0.072 | 0.000 | | | | | |

Notes: $^{ns}$ $P > 0.05$ * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Sig F change: test of the significance of incremental variance explained by adding mediating variable.
Tests Use Work Group Member Perceptions (108 groups weighted by number of responses)

## C.5 MEDIATION REGRESSION EQUATIONS FOR HYPOTHESIS 6

### Table C.13 Mediation Tests for Hypothesis 6

Summary of regression equation coefficients (Betas) and significance tests ($p$) used to determine if learning behaviors mediate the effect of group stewardship on Employee Job Satisfaction. The steps shown in the left hand column are from the procedure described in section 4.3 and Figure 4.2.

| Step | Independent Variable(s) | Dependent Variable | | *Beta* | Std Err | *p* | Mediation Role | Mediation % | Mediation t-test | $R^2$ | *Significance of change in F (step 3-step 1)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Grp. Stewardship | Employee Job Sat. | c | 0.784 | 0.072 | 0.000 | | | | 0.530 | |
| 2 | Grp. Stewardship | Ext. Perspective | a | 0.770 | 0.054 | 0.000 | | | | | |
| 3/4 | Grp. Stewardship | Employee Job Sat. | c' | 0.490 | 0.119 | 0.000 | partial | 37% | 2.971 ** | 0.568 | 0.003 |
| | Ext. Perspective | | b | 0.381 | 0.125 | 0.003 | | | | | |
| 1 | Grp. Stewardship | Employee Job Sat. | c | 0.784 | 0.072 | 0.000 | | | | 0.530 | |
| 2 | Grp. Stewardship | Int. Collaboration | a | 0.823 | 0.062 | 0.000 | | | | | |
| 3/4 | Grp. Stewardship | Employee Job Sat. | c' | 0.509 | 0.113 | 0.000 | partial | 35% | 2.985 ** | 0.569 | 0.003 |
| | Int. Collaboration | | b | 0.334 | 0.109 | 0.003 | | | | | |
| 1 | Grp. Stewardship | Employee Job Sat. | c | 0.784 | 0.072 | 0.000 | | | | 0.530 | |
| 2 | Grp. Stewardship | Experimentation | a | 0.599 | 0.072 | 0.000 | | | | | |
| 3/4 | Grp. Stewardship | Employee Job Sat. | c' | 0.665 | 0.091 | 0.000 | partial | 15% | 1.999 * | 0.549 | 0.041 |
| | Experimentation | | b | 0.198 | 0.095 | 0.041 | | | | | |
| 1 | Grp. Stewardship | Employee Job Sat. | c | 0.784 | 0.072 | 0.000 | | | | 0.530 | |
| 2 | Grp. Stewardship | Proactive | a | 0.868 | 0.053 | 0.000 | | | | 0.720 | |
| 3/4 | Grp. Stewardship | Employee Job Sat. | c' | 0.604 | 0.134 | 0.000 | none | 23% | 1.568 ns | 0.541 | 0.118 |
| | Proactive | | b | 0.207 | 0.131 | 0.118 | | | | | |

Notes: ns $p > 0.05$, *$p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

Sig F change: test of the significance of incremental variance explained by adding mediating variable.
Tests Use Work Group Member Perceptions (108 groups weighted by number of responses)

## Table C.14 Mediation Tests for Hypothesis 6

Regression tests to determine if learning behaviors mediate the effect of group stewardship on Performance and Customer Service

| Step | Independent Variable(s) | Dependent Variable | | *Beta* | Std Err | *p* | Mediation Role | Mediation % | t-test | $R^2$ | *Sig F change (1-3)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Grp. Stewardship | Performance | c | 0.572 | 0.062 | 0.000 | | | | 0.466 | |
| 2 | Grp. Stewardship | Ext. Perspective | a | 0.762 | 0.094 | 0.000 | | | | | |
| 3 | Grp. Stewardship | Performance | c' | 0.396 | 0.075 | 0.000 | partial | 31% | 3.333 *** | 0.531 | 0.000 |
| | Ext. Perspective | | b | 0.230 | 0.063 | 0.000 | | | | | |
| 1 | Grp. Stewardship | Performance | c | 0.572 | 0.062 | 0.000 | | | | 0.466 | |
| 2 | Grp. Stewardship | Int. Collaboration | a | 0.558 | 0.074 | 0.000 | | | | | |
| 3 | Grp. Stewardship | Performance | c' | 0.404 | 0.073 | 0.000 | partial | 29% | 3.352 *** | 0.534 | 0.000 |
| | Int. Collaboration | | b | 0.300 | 0.080 | 0.000 | | | | | |
| 1 | Grp. Stewardship | Performance | c | 0.572 | 0.062 | 0.000 | | | | 0.466 | |
| 2 | Grp. Stewardship | Experimentation | a | 0.255 | 0.108 | 0.020 | | | | | |
| 3 | Grp. Stewardship | Performance | c' | 0.568 | 0.064 | 0.000 | none | 1% | 0.236 ns | 0.466 | 0.798 |
| | Experimentation | | b | 0.015 | 0.058 | 0.798 | | | | | |
| 1 | Grp. Stewardship | Performance | c | 0.572 | 0.062 | 0.000 | | | | 0.466 | |
| 2 | Grp. Stewardship | Proactive | a | 0.711 | 0.065 | 0.000 | | | | | |
| 3 | Grp. Stewardship | Performance | c' | 0.244 | 0.081 | 0.003 | partial | 57% | 4.853 *** | 0.591 | 0.000 |
| | Proactive | | b | 0.460 | 0.085 | 0.000 | | | | | |
| 1 | Grp. Stewardship | Customer Service | c | 0.598 | 0.070 | 0.000 | | | | 0.427 | |
| 2 | Grp. Stewardship | Ext. Perspective | a | 0.762 | 0.094 | 0.000 | | | | | |
| 3 | Grp. Stewardship | Customer Service | c' | 0.364 | 0.083 | 0.000 | partial | 39% | 3.897 *** | 0.525 | 0.000 |
| | Ext. Perspective | | b | 0.308 | 0.069 | 0.000 | | | | | |
| 1 | Grp. Stewardship | Customer Service | c | 0.598 | 0.070 | 0.000 | | | | 0.427 | |
| 2 | Grp. Stewardship | Int. Collaboration | a | 0.558 | 0.074 | 0.000 | | | | | |
| 3 | Grp. Stewardship | Customer Service | c' | 0.347 | 0.078 | 0.000 | partial | 42% | 4.320 *** | 0.556 | 0.000 |
| | Int. Collaboration | | b | 0.451 | 0.085 | 0.000 | | | | | |
| 1 | Grp. Stewardship | Customer Service | c | 0.598 | 0.070 | 0.000 | | | | 0.427 | |
| 2 | Grp. Stewardship | Experimentation | a | 0.255 | 0.108 | 0.020 | | | | | |
| 3 | Grp. Stewardship | Customer Service | c' | 0.534 | 0.067 | 0.000 | partial | 11% | 2.019 * | 0.514 | 0.000 |
| | Experimentation | | b | 0.254 | 0.061 | 0.000 | | | | | |
| 1 | Grp. Stewardship | Customer Service | c | 0.598 | 0.070 | 0.000 | | | | 0.427 | |
| 2 | Grp. Stewardship | Proactive | a | 0.711 | 0.065 | 0.000 | | | | | |
| 3 | Grp. Stewardship | Customer Service | c' | 0.416 | 0.102 | 0.000 | partial | 30% | 2.340 * | 0.459 | 0.018 |
| | Proactive | | b | 0.256 | 0.106 | 0.018 | | | | | |

Notes: $^{ns}P > 0.05$ $^{**}p \leq 0.01$

$^{*}P \leq 0.05$ $^{***}p \leq 0.001$

Tests Use Work Group Member Perceptions (108 groups, weighted by number of responses)

## C.6 WABA EQUATION FOR HYPOTHESIS 7

**Table C.15 Components of the WABA Equation for Relationships between Group Stewardship and Outcomes for Conditions with Low and High Need for Analysis**

| Level | Condi-tion | Construct | (1) ( $n_{BX}$ | | (2) x $n_{BY}$ | | (3) x $r_{BXY}$ ) | | + | (4) ( $n_{WX}$ | | (5) x $n_{WY}$ | | (6) x $r_{WXY}$) | | = | (7) $r_{TXY}$ | | (8) Z-test | | (9) Inference | (10) Between | (11) Within |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Low | External Perspective | 0.495 | *** | 0.495 | *** | 0.837 | *** | + | 0.869 | ns | 0.869 | ns | 0.679 | *** | = | 0.7174 | *** | 2.551 | ** | wholes | 0.205 | 0.512 |
| Group | Low | Experiment | 0.495 | *** | 0.513 | *** | 0.567 | *** | + | 0.869 | ns | 0.859 | ns | 0.510 | *** | = | 0.5241 | *** | 0.543 | ns | equivocal | 0.144 | 0.380 |
| Group | Low | Internal Collaboration | 0.495 | *** | 0.513 | *** | 0.714 | *** | + | 0.869 | ns | 0.859 | ns | 0.535 | *** | = | 0.581 | *** | 1.982 | * | wholes | 0.181 | 0.399 |
| Group | Low | Proactive Behaviors | 0.495 | *** | 0.518 | *** | 0.790 | *** | + | 0.869 | ns | 0.855 | ns | 0.699 | *** | = | 0.722 | *** | 1.363 | ns | equivocal | 0.203 | 0.520 |
| Plant | Low | External Perspective | 0.560 | * | 0.433 | ns | 0.929 | *** | + | 0.828 | ns | 0.901 | ns | 0.819 | *** | = | 0.837 | *** | 1.054 | ns | equivocal | 0.225 | 0.612 |
| Plant | Low | Experiment | 0.560 | * | 0.431 | ns | 0.298 | ns | + | 0.828 | ns | 0.902 | ns | 0.663 | *** | = | 0.567 | *** | -1.038 | ns | equivocal | 0.072 | 0.495 |
| Plant | Low | Internal Collaboration | 0.560 | * | 0.477 | ns | 0.546 | ns | + | 0.828 | ns | 0.879 | ns | 0.780 | *** | = | 0.7142 | *** | -0.919 | ns | equivocal | 0.146 | 0.568 |
| Plant | Low | Proactive Behaviors | 0.560 | * | 0.331 | ns | 0.619 | ns | + | 0.828 | ns | 0.944 | ns | 0.864 | *** | = | 0.790 | *** | -1.238 | ns | equivocal | 0.115 | 0.675 |
| Group | High | External Perspective | 0.516 | *** | 0.468 | ** | 0.682 | *** | + | 0.856 | ns | 0.884 | ns | 0.665 | *** | = | 0.668 | *** | 0.211 | ns | equivocal | 0.165 | 0.503 |
| Group | High | Experiment | 0.516 | *** | 0.505 | *** | 0.513 | *** | + | 0.856 | ns | 0.863 | ns | 0.499 | *** | = | 0.503 | *** | 0.123 | ns | equivocal | 0.134 | 0.369 |
| Group | High | Internal Collaboration | 0.516 | *** | 0.591 | *** | 0.802 | *** | + | 0.856 | ns | 0.807 | ns | 0.545 | *** | = | 0.621 | *** | 3.264 | *** | wholes | 0.245 | 0.376 |
| Group | High | Proactive Behaviors | 0.516 | *** | 0.530 | *** | 0.876 | *** | + | 0.856 | ns | 0.848 | ns | 0.751 | *** | = | 0.785 | *** | 2.535 | ** | wholes | 0.240 | 0.546 |
| Plant | High | External Perspective | 0.525 | ns | 0.571 | * | 0.916 | *** | + | 0.851 | ns | 0.821 | ns | 0.583 | *** | = | 0.682 | *** | 2.050 | * | equivocal | 0.275 | 0.408 |
| Plant | High | Experiment | 0.525 | ns | 0.538 | * | 0.356 | ns | + | 0.851 | ns | 0.843 | ns | 0.575 | *** | = | 0.513 | *** | -0.647 | ns | equivocal | 0.101 | 0.412 |
| Plant | High | Internal Collaboration | 0.525 | ns | 0.619 | ** | 0.893 | ** | + | 0.851 | ns | 0.786 | ns | 0.766 | *** | = | 0.802 | *** | 0.973 | ns | equivocal | 0.290 | 0.512 |
| Plant | High | Proactive Behaviors | 0.525 | ns | 0.585 | * | 0.923 | *** | + | 0.851 | ns | 0.811 | ns | 0.859 | *** | = | 0.876 | *** | 0.730 | ns | equivocal | 0.283 | 0.593 |

Notes: ns $P > 0.05$ ** $p \leq 0.01$ Column (10) = (1) x (2) x (3)

* $P \leq 0.05$ *** $p \leq 0.001$ Column (11) = (4) x (5) x (6)

Note: Condition column refers to the need for analysis for groups to do their work.

# VITA

## Richard L. Groesbeck

Grado Department of Industrial and Systems Engineering
250 Durham Hall (0118)
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061
Phone: 540-231-2006
Fax: 540-231-3322
email: rgroesbe@vt.edu

Home address:
1009 Mourning Dove Drive
Blacksburg, VA 24060
Phone: (540) 953-1950

**PROFESSIONAL EXPERIENCE**

1997 to 2001 **Virginia Tech**

Blacksburg, Virginia
Research Associate & Sr. Graduate Research Assistant August, 1997 - present
Worked with Enterprise Engineering Research Lab research partners on projects such as organizational change, team implementation, team learning, and development of measurement systems. Worked independently or collaboratively with others to conduct research, write research papers, and present research at several conferences.

1993 to 1997 **The Heinz Company, Ore-Ida Affiliate**

Fort Atkinson, Wisconsin
Division Technology Manager, from acquisition July, 1993 to Aug, 1997.
Find, develop and implement use of improved equipment and process techniques for production and R&D. Work independently utilizing plant sponsors and teams to assure customer ownership. Initiated use of quality improvement tools within plants. Utilized benchmarking to identify and share best practices.

1980 to 1993 **The Clorox Company, Household & Food Service Products**

Fort Atkinson, Wisconsin
Division Technology Manager, Nov, 1990 to June, 1993. See above.
Plant Manager, April, 1986 to Nov, 1990.
Guided plant growth from 100 to 300 people, from two to 5 production lines. Initiated ad hoc teams, employee involvement and SPC. Productivity increased 50 to 85% across product lines.
Plant Superintendent, Sept 1984 to March 1986.

Chicago, Illinois
Supervisor and Unit Supervisor, Dec, 1980 to Aug, 1984.
Process engineering, production and shift supervision, personnel, quality and improvements management in bleach plant.

Cleveland, Ohio
Process Engineer, Aug, 1980 to Nov, 1980

1975 to 1980 **United States Steel**
Lorain, Ohio
Engineer, April, 1975 to Aug, 1980.
Management Trainee, Field Engineer and Design Engineer in plant engineering department.

## EDUCATION

BSCE, Brigham Young University, April, 1975, Magna Cum Laude
Major: Civil Engineering

*MBA, Case Western Reserve University, Dec, 1979, with Honors*
Major: Business Management

*University of Massachusetts-Amherst, 24 credit hrs 1994-98, 3.9 GPA*
Major: Industrial Engineering

Ph.D. Candidate, Virginia Polytechnic Institute and State University, 3.9 GPA.
Expected graduation December 2001. Major: Industrial and Systems Engineering.

## ACHIEVEMENTS AND CERTIFICATIONS

- Led cross-functional teams initiating use of computer integrated manufacturing, benchmarking, comprehensive measurement systems, and in-house equipment redesigns to save over $1 million/year for five years.
- Used management-hourly teams to design concepts, startup, and run production lines. Results: improved safety, pride, and costs up to 85%.
- Initiated use of cost of quality, statistical process control and design of experiments. Result: operations personnel ownership of their business areas.
- Received Senior Graduate Research Assistantship in Industrial and Systems Engineering as a first semester Ph.D. student September, 1997 at Virginia Polytechnic Institute & State University.
- Received Pratt and Cunningham Fellowships from Virginia Tech, Ellis Ott Scholarship from ASQ Statistics Division and Gilbreth Memorial Fellowship from the Institute of Industrial Engineers.
- GRE scores: quantitative 780 (95th percentile), verbal: 620 (87th percentile), and analytical: 720 (91 percentile).
- Certified Quality Engineer by ASQ.

## PROFESSIONAL AFFILIATIONS

Member Academy of Management

Member Institute of Industrial Engineers

Senior Member American Society for Quality

**COMMUNITY ACTIVITIES**

Church: leader of congregation lay functions 1986 to 1993 and 1997 to 1999. Oversee eleven congregations in southwest Virginia 1999 to present.

Boy Scouts of America: Cubmaster, Scoutmaster, and District volunteer. Received District Award of Merit as Outstanding District Volunteer.

United Way: Directed In-plant drive portion of city's campaign one year, directed in-plant drive several years.

**JOURNAL PAPERS**

1. Groesbeck, R.L. and Van Aken, E.M. (2001). Enabling team wellness: Monitoring and maintaining teams after start-up. *Team Performance Management: An International Journal*, Vol 7., No. 1/2, pp. 11-20.
2. Klein, S., Van Aken, E.M., and Groesbeck, R.L. (2001). Reducing unbillables by focusing on measurement. *Billing World and OSS Today*. Vol 7 (9), 68-70.
3. Van Aken, E.M., Groesbeck, R.L., and Coleman, G.D. (in press). "Organizational assessment process and tools: Application in an engineer-to-order company." *Engineering Management Journal.*

**CONFERENCE PAPERS**

1. Groesbeck, R.L. (2001). "Vision to action through measurement." Proceedings of the International Council on Systems Engineering Hampton Roads Area Seminar on Metrics. pp. 3.44 – 3.71.
2. Van Aken, E.M., Groesbeck, R.L., and Coleman, G.D. (2001). "Application of an integrated organizational assessment approach." *Proceedings of the 22nd American Society for Engineering Management,* pp. 296-304.
3. Groesbeck, Richard, L. (2000). "An empirical study integrating stewardship and learning into a model of work group effectiveness." *Research paper presented at Academy of Management Annual Meeting 2000*, Toronto, August 6, 2000.
4. Groesbeck, R. L. and Van Aken, E. M. (2000). "An evaluation of work group effectiveness: A data envelopment analysis approach," *Proceedings of the 21st American Society for Engineering Management National Conference,* pp. 146-151. Washington, DC.
5. Van Aken, E.M., Ellis, J.F., Groesbeck, R.L. Rentes, A.F., and McDonald, T. (1999) Lessons learned in launching and sustaining work teams. *Proceedings of the 1999 International Conference on Work Teams*, September 13-15, 1999, Dallas, TX.
6. Groesbeck, R.L. and Van Aken, E.M. (1999). Strategies and tools for developing high performance work systems. *Proceedings of the 1999 International Industrial Engineering Conference,* May 24-26, 1999, Phoenix, AZ, pp. 21-29.
7. Groesbeck, R.L., Van Aken, E.M., and Wilson, L.W. (1999). An action research approach to improving work team effectiveness. *Proceedings of the 1999 Industrial Engineering Research Conference*, May 24-25, 1999, Phoenix, AZ, paper 095.pdf in CD-ROM.