THE EFFECTS OF TIME PRESSURE AND INTERRUPTIONS ON TEAM EXTERNAL ACQUISITION OF WORK ROUTINES

by

Mary E. Zellmer-Bruhn

A dissertation submitted in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

(Business)

at the

UNIVERSITY OF WISCONSIN — MADISON

1999

DEDICATION

I dedicate this dissertation to my husband, Peter Bruhn, who through all of the peaks and valleys of the project kept me on an even keel. His humor, kindness and selflessness lifted me on many late nights and in difficult moments.

I also dedicate this dissertation to my parents, Erich and Helen Zellmer, who taught me to persist, to find opportunity in every problem, and to stretch to reach my goals.

ACKNOWLEDGEMENTS

This project has been a terrific learning experience. I would like to thank Ramon J. Aldag for his supervision, for his warm and helpful support, and his dry wit at just the right moment. I would also like to thank Cristina B. Gibson and Mary J. Waller for immeasurable support over the past years. Our work together provided inspiration for this project and ideas for several more to come. I am also grateful to Randall B. Dunham and David Gustafson for their service on my committee.

For methodological advice, I would like to thank Craig Olson and Donald Schwab. They both came through in several pinches with helpful guidance and advice.

Thanks also to Robert Giambatista and Ingo Holzinger for helpful advice and support throughout the process. Visits to their offices during the dark days of the project helped me move forward. Peter Bruhn, Ingo Holzinger, Myleen Leary, Linda Brothers, Harald Fischer, and Mike DeVaughn all deserve thanks for their help creating survey packets.

Countless other individuals at the University of Wisconsin School of Business played a role in the completion of this document, but a few deserve special notice. Casey Jordan helped make sure all the i's were dotted and t's crossed when it came to paperwork and navigating the system. Nancy Thompto played a crucial role in making sure survey packets made it through the mail and back to me. Thanks also the UW Survey Research Center and Andrea Nelson for all their work in tracking surveys and developing databases.

Finally, I would like to acknowledge the funding provided by the NSF Grant #SBR 96-31748. My research benefited substantially from the funding provided for the Multinational Implementation of Teams Project, which allowed me to piggyback the data collection for my dissertation onto the data collection for that study.

TABLE OF CONTENTS

TABLE OF CONTENTS CONTINUED

ABSTRACT

THE EFFECTS OF TIME PRESSURE AND INTERRUPTIONS ON TEAM EXTERNAL ACQUISITION OF WORK ROUTINES

Teams perform many tasks using routines. Routines have been shown to persist even in the face of environmental changes negating their effectiveness. However, we know very little about when, why and how teams acquire new routines, or how contextual factors affect teams' acquisition of routines from outside their boundaries. Practitioners and theorists assume that such acquisition is important for team performance maintenance and improvement. Addressing these issues in my dissertation, I ask the question: Do time pressure and interruptions -- two team contextual factors -- affect team external acquisition of work routines? I focus on external acquisition of routines and address gaps in the routines, knowledge management, and team boundary-spanning literatures with this research question.

I develop hypotheses concerning time pressure and interruptions as antecedents to team acquisition of routines. Specifically, I hypothesize that time pressure will reduce the likelihood that teams engage in external acquisition of routines, and that interruptions increase the likelihood that teams engage in external acquisition of routines. In addition, I posit that anticipation may moderate the relationship between interruptions and external acquisition of routines. A field study method is used, and I sample teams from pharmaceutical and medical products organizations. Routines were operationalized as team-level work practices, and information concerning them was collected from team

leaders. Team members provided information on time pressure, information, and control variables. Hypotheses were tested using Probit regression.

Results concerning time pressure were equivocal. No negative relationships were found, and some evidence was found for a positive relationship between time pressure and external adoption of routines. The hypotheses concerning interruptions were supported. Teams experiencing more interruptions were more likely to both search outside their boundaries for new routines and to adopt routines from external sources. No support was found for a moderating effect of anticipation.

These results have implications for team routines theory, organizational learning theory and team boundary-spanning theory. Most specifically, they suggest the importance of including variables concerning triggers to activities within teams in these theories. Also, this study extends the team routines literature and the team boundary-spanning literature by providing an empirical study of ongoing work teams embedded in organizations.

CHAPTER ONE

INTRODUCTION & BACKGROUND

1.0 INTRODUCTION

For a host of reasons including increasing globalization and advances in technology, organizations today face increasingly dynamic environments. In part as a response to these environmental changes, many organizations have adopted streamlined hierarchies that increase the use of teams in daily operations. Indeed, the use of teams has increased dramatically in organizations over the past twenty years (Guzzo, 1982; Morhman, Cohen & Mohrman, 1995; Osterman, 1995; Thompson, Peterson & Brodt, 1996; Wageman, 1995). As a result, teams perform many organizational tasks and functions. In doing so, they commonly use routines and standard operating procedures. Often these persist even in the face of environmental changes negating their effectiveness. At the same time, teams operating in these environments are often under tremendous time pressure, and typically face changing demands which may include interruptions to their tasks, goals, or plans.

Furthermore, in many organizations it is common to have multiple teams in dispersed geographical locations performing the same or highly similar tasks. It is quite likely that innovative routines are developed in these dispersed teams. These routines are a form of procedural knowledge in that they concern *how* to do things. The recognition that knowledge is commonly created in sub-units of large organizations, and that this knowledge may be beneficial to other units has fueled increasing interest in knowledge

transfer by both researchers and practitioners. Despite this increased interest, very little is known about when, why and how teams acquire new routines, or how contextual factors affect teams' acquisition of routines from outside their boundaries. Practitioners and theorists assume that such acquisition is important for performance maintenance and improvement. Addressing these issues in my dissertation, I ask the question: Do time pressure and interruptions -- two commonly occurring team contextual factors -- affect team external acquisition of work routines? I focus on *external* acquisition of routines and address gaps in the routines, knowledge management, and team boundary-spanning literatures. This research extends current research on group routines, knowledge transfer and team boundary-spanning activities.

The structure of this manuscript is as follows. In the remainder of Chapter One, I provide a brief overview of conceptual definitions and the gaps I address in the literature. I then present my hypotheses in Chapter Two. Chapter Three details the design and methods of the study. Chapter Four describes the analysis plan, with results of the analyses presented in Chapter Five. Finally, I address the theoretical and practical contributions of my findings, as well as limitations, and suggest directions for future research in Chapter Six.

1.1 DEFINITIONS AND LITERATURE REVIEW

Three theoretical domains contribute to the motivation of my research question. These streams are (1) research on routines; (2) research on organizational learning and knowledge management; and (3) research on the external activities of teams. Considerable

attention has been given to routines in organizational behavior theory. The routines literature provides important background information for the conceptual definition of my dependent variable, as well as direct evidence concerning development and changes in team-level routines. As noted earlier, routines are a form of procedural knowledge. The organizational learning and knowledge management areas directly concern the development and transfer of knowledge within and between organizations. This literature provides information concerning forms of knowledge and processes of acquisition. Finally the team boundary spanning literature is included because it provides information concerning the importance of boundary spanning activities in teams and the types of boundary spanning activities teams might engage in. Each of these literatures is addressed in the following sections, beginning with routines.

1.1.1 Routines

The view that behavior in organizations is often guided by routines is widespread at both the individual and organizational level of analysis. Indeed, some authors argue that *most* activities in organizations follow routines and cognitive scripts (e.g. Louis & Sutton, 1991; Weiss & Ilgen, 1985). A growing body of literature also suggests that groups[1] quickly develop routines and that these routines are persistent (e.g. Dougherty, 1992; Gersick, 1988, 1989; Gersick & Hackman, 1990; Hackman & Morris, 1976; Kelly & McGrath, 1985). Persistence also deepens over time. For example, the longer a decision

[1] Following Ancona (1990) the term group here is used interchangeably with team. In using the term team, I make reference to individuals who see themselves as a group, are seen by others in the organization as a group and work interdependently to achieve tasks designated by the organization (Ancona, 1990; Ancona, 1987; Hackman & Morris, 1975).

making group is together, the less the group experiments with new ways to do things (Ancona, 1989).

Routines prove functional for groups by reducing uncertainty, and save time by eliminating the need to deliberate over appropriate action – thereby improving efficiency (e.g. Alison, 1971; Cyert & March, 1963). Routines also contribute to members' comfort within a group (Gersick & Hackman, 1990). Without routines, organizations would not be efficient structures for collective action (March & Simon, 1958; Stinchcombe, 1990).

However, routines may also have dysfunctional consequences. They may reduce the likelihood of innovation, and they may result in performance decrements if applied in situations that have changed (Gersick & Hackman, 1990). A routine may be functional for a time, but if a performance circumstance changes its continued use may result in undesirable outcomes (e.g. Langer, 1989). Furthermore, in the same way decision-makers have been demonstrated to "satisfice" (March & Simon, 1958) – which causes teams to settle for the first acceptable solution as opposed to the optimal solution, and "to use existing repertoires of performance programs whenever possible rather than developing novel responses" (Scott, 1992: 104) -- initially developed routines may be satisfactory but not optimal. If this is the case, maintaining a routine even under stable conditions may limit a team's performance. Additional evidence for the potentially negative consequences of routine action is found in executive team research. For example, over time habit, standard operating procedures and institutionalization drive out vigilant problem solving in many top management teams (Louis & Sutton, 1989; Virany, Tushman & Romanelli,

1992). Therefore, since routines can have both positive and negative consequences, they have been described as a "double-edged sword" (Cohen & Bacdayan, 1994).

While there is agreement that teams quickly establish persistent routines and that it may be important for teams to change their established routines, there is little research examining what causes groups to deviate from existing routines and acquire new routines. Gersick's work (Gersick, 1988; 1989; Gersick & Hackman, 1990) is a notable exception. Gersick and Hackman (1990, pp. 83-92) theorize that the following events may trigger teams to change their routines: (1) encountering novelty; (2) experiencing failure; reaching a milestone; (3) receiving an intervention; (4) coping with a structural change; (5) redesign of the task; or (6) changes in authority. Gersick (1988, 1989) provided empirical evidence that routines established at the start of task performance guided behavior until a team experienced a major transition prompted by the midpoint of their allotted time. An externally set deadline triggered changes in routinized behavior. When teams realized that half their time had expired, it triggered a flurry of activity, a rethinking of work processes, and significant changes in the way work proceeded until the deadline. The midpoint transition apparently opened a window of opportunity for active cognitive processing concerning the arrangement of work activities. Other than Gersick's work, there is no empirical evidence directly concerning triggers to change in team routines. Furthermore, Gersick's studies concerned changes to routines developed *inside* the team's boundaries, not the external acquisition of routines.

My research addresses a gap in empirical evidence concerning changes in team-level routines by specifically examining how two contextual variables, time pressure and

interruptions, may affect team acquisition of new routines. Before turning to additional background literature, it is important to clarify the central construct in my research: routines. Therefore, I will provide a brief discussion of this construct in the following paragraphs.

Routines and related constructs[2] are pervasive in the organizational behavior and organizational theory literatures (Ashforth & Fried, 1988; Betsch, Fiedler, & Brinkman, 1998; Feldman, 1989; Gersick & Hackman, 1990; Levitt & March, 1988; March & Simon, 1958; Miner, 1991, 1996; Nelson & Winter, 1982; Pentland & Reuter, 1994; Simon, 1947; Weick, 1992, 1993; Weiss & Ilgen, 1985; Winter, 1996). Table One lists definitions for routines from these theorists. Several characteristics occur across definitions, and these can be summarized as: (1) routines involve behaviors, and they concern processes and "action" in organizations; (2) routines are sets of behaviors and must involve more than a single behavior; (3) routines involve collective action and coordination, linking either multiple actors or multiple behaviors within a single actor or across several actors; and (4) routines occur more than once in response to a given stimulus situation. Pentland and Reuter (1994: 492) shed further light on what is meant by a routine: "One might substitute the less value laden term 'process' for the ambiguous term 'routine'." Furthermore, many definitions do not suggest that a routine must be invoked *every* time the stimulus condition is present, rather most argue that a routine must be enacted frequently and regularly. Again, Pentland and Reuter (1994: 492) illuminate this idea: "Processes [routines] can be more or less automatic, embody more or less variety,

search and so on." Still others suggest that "establishing a routine in memory requires neither performance of the behavior nor that the associated situation has ever been actually encountered (Betsch, Fielder & Brinkmann, 1998: 863). Betsch et al. provide the example that if you notice your neighbor's house burning, the idea to call the fire department might immediately pop into your mind – a routine of action – even if it is the first time you have ever encountered the situation. In such a case, the routine has been acquired by communication or observation, not direct experience.

In addition to a definition of routines, Nelson and Winter (1982: 14-16) also provide several examples of what is meant by routines. These examples are useful to further illustrate what is meant by the concept of routine. Nelson and Winter suggest that routines range from well-specified technical processes for producing things, through procedures for hiring and firing, or ordering new inventory, to policies for research and development. Based on these inquiries, my working definition of routine is: *Routines are patterns of coordinated behaviors that are repeatable, enduring and often regularly occurring.*

In summary, routines are pervasive in organizational behavior. While routines are ubiquitous phenomena in organizations, comparatively little empirical research has been conducted on team-level routines. This is problematic given the dramatic increase in the use of teams in organizations over the past two decades. We do have evidence that teams quickly develop routines and once developed, these routines persist. Yet, very little is known about when or why teams change their routines. Understanding facilitators and

---

[2] e.g. Standard Operating Procedures (Cyert & March, 1963); Operating Characteristics (Nelson & Winter,

impediments to changes in routines is important because the persistence of routines may have dysfunctional consequences for groups and the organizations they serve. I address this gap by examining how two contextual variables affect teams' external acquisition of routines. In the next section I detail areas of the organizational learning and knowledge management literature addressed in my research. I also draw on these literatures for additional construct definitions and clarification of the acquisition process.

1.1.2 Organizational Learning and Knowledge Transfer

A recently growing emphasis within the organizational learning and knowledge management literatures is the conscious identification and transfer of organizational knowledge. One type of knowledge commonly addressed is routines. This focus is concurrent with the emergence of the view of the firm as knowledge-based, and the parallel idea that competitive advantage is built around knowledge and competencies (e.g. Conner, 1991; Conner & Prahalad, 1996; Kogut & Zander, 1992, 1996). Proponents of the knowledge-based view of the firm argue that by identifying and transferring critical or innovative knowledge *within* the organization, firms avoid redundancies in which multiple units start from the ground up solving the same problems (Nonaka & Takeuchi, 1995). These activities also enhance firms' appropriation of rents from internally generated knowledge capital (Szulanski, 1996). Numerous inefficiencies may be avoided if critical knowledge is identified within the organization, codified, and transferred to points where it can be utilized. A poignant example of such inefficiency was provided by a team member in an interview I conducted while exploring my dissertation topic:

1982); Scripts (Gioia & Manz, 1985); Habits; Skills.

> "The other day at lunch, I was talking to this guy -- we just happened to be sitting at the same table at lunch – and [name] was there, who heads up [product] and [product] and so they were talking and he said – they were talking about a particular study they were doing – and he said, 'Oh! Gosh, we should coordinate that because I'm doing the same study!' We found out that we had three different teams on *this floor* doing the same study. So we paid for it three separate times. We've learned it three different times. And so just, so that just opened up the discussion of, you know, what we need are interdepartmental, ah, there needs to be somebody who takes charge of 'Hey, you know what? [Product] is doing this; and [product] is in the same market so then they need to share. Remember to share their information with [product].' But we missed, you know we were talking about how many opportunities we missed, just like that."

Ruggles (1998) reported the results of a survey of 431 organizations and found that only thirteen percent of the executives responding thought they were doing well at transferring knowledge from one part of the organization to other parts. The interview excerpt and survey findings illustrate that practitioners as well as researchers have become increasingly attentive to the importance of knowledge transfer. The importance of knowledge transfer has also been emphasized in the organizational learning literature (e.g. Epple, Argote, & Devadas, 1991). Indeed, Hedlund (1994) and Hedlund and Nonaka (1993) identify the transfer of knowledge as a crucial part of organizational learning.

There are multiple aspects to what is referred to as "knowledge management." This term is ill-defined, and as one author notes is a term which has been used by practitioners to "describe everything from organizational learning efforts to database management tools" (Ruggles, 1998: 80). Despite this variety in use, knowledge management in the organizational theory literature typically consists of knowledge generation and knowledge transfer. While knowledge generation is considered a critical element of organizational success (e.g. Nonaka & Takeuchi, 1995), I limit my focus here to knowledge acquisition. As I identified in the previous section, the specific type of knowledge I am examining

takes the form of routines. The organizational learning literature uses the term "procedural knowledge" to identify knowledge about methods of work or "how things are done" (Cohen & Bacdayan, 1994; Huber, 1991). Procedural knowledge involves skills and routines, in contrast to declarative knowledge that concerns facts and events (Moorman & Miner, 1998). Given this distinction, I consider routines to be a type of procedural knowledge and as such will draw upon reasoning and empirical evidence presented in the organizational learning literature to develop the hypotheses in the next chapter. I also assume that teams are *sources* of new procedural knowledge *within* organizations.

The organizational learning literature broadly suggests that knowledge (here routines/procedural knowledge) may be developed inside an organization or sub-unit, or they may be imported from external sources (e.g. Bierly & Chakrabarti, 1996; Huber, 1992). Huber (1992) identifies several specific mechanisms for knowledge acquisition: (1) congenital learning; (2) experiential learning; (3) vicarious learning; (4) grafting; and (5) searching. These mechanisms can be classified as internal or external. Internal knowledge acquisition involves generation of knowledge inside an organizational unit; external knowledge acquisition involves generation outside the unit. Congenital learning, experiential learning and grafting are internal sources of routines, while vicarious learning and searching are external sources of routines. Congenital learning evolves from members present at the foundation. Experiential learning emerges from current members learning by doing. and grafting involves the addition of an organization or member who has knowledge the focal unit desires. Alternatively, search and vicarious learning are mechanisms for importing external procedural knowledge. Search involves an intentional

process designed to locate new knowledge. Vicarious learning involves copying knowledge from an external source. In other words, a team learns vicariously if it learns a new routine from the behavior and consequences experienced by another team, rather than from its own performance attempts (Gioia & Manz, 1985). In this study I focus only on these last two means of knowledge acquisition: external search and vicarious learning (adoption from external sources), therefore my emphasis is on the *external* acquisition of routines.

Given that knowledge acquisition is a feature of knowledge transfer, it is important to further clarify the knowledge transfer process. Szulanski (1996:3) defines transfer as "a dyadic exchange of knowledge already in use between a source and a recipient sub-unit." In other words, transfer involves both the "supply" of knowledge and the "demand" for knowledge. However, Szulanski's definition does not account for the role of third parties in transfer. Supply comes from the unit where the knowledge has been generated. Supply is the source of the transferred knowledge. While Szulanski identifies the other dyadic party as the recipient, the impetus for the transfer may come from other sources (and indeed in his research it appears to). For example, demand may come from a third party, such as management, who identify a source of knowledge and determine that it *prescriptively* ought to be transferred to other parts of the organization. While not explicitly discussed in many existing studies, this implicitly appears to be the most commonly studied type of transfer event. Alternatively, transfer could be initiated from within a given organizational unit, in my research this unit is the team. This type of transfer event would involve a "demand" driven transfer. Teams initiating the transfer are

involved in boundary-spanning activities – which I consider in more detail in the final section of this chapter. Given these conceptual clarifications, I now turn to the specific gaps I address within the organizational learning and knowledge transfer literatures.

I focus only on the *external* acquisition of routines because I want to address knowledge *transfer* and team boundary-spanning. By external, I mean from outside the team. This may or may not be outside the organization. This is in contrast to internal development which involves knowledge creation within the team's boundary. Focusing on the internal development of new team routines would not address knowledge transfer unless the team shared its new routines with other teams. Indeed, sharing is an important part of knowledge transfer, and the antecedents to teams sharing their routines are worthy of study. However, studying both the "supply-side" of team routines and the "demand-side" of team routines is beyond the scope of this project.

While a consensus seems to be growing that knowledge transfer is important, our empirical understanding of these processes is weak (Huber, 1991; Miner & Mezias, 1996). Existing research has tended to be macro in focus, examining the movement of innovations and routines from organization to organization (e.g. Doz, 1996); and top-down, examining routines identified at high levels and "broadcast" down to sub-units.

Comparatively less attention has been paid to intra-firm transfer of knowledge, although notable exceptions exist. For example, Epple, Argote , and Devadas (1991) studied organizational learning in the transfer of knowledge within a plant in one organization. They found that knowledge transfer improved plant productivity. However, the routines they examined were clearly identified at high levels of the organization and

broadcast across plants, therefore this research gives little insight into internally initiated transfers of routines from other intra-firm sources.

Szulanski's (1996) research on "stickiness" of best practice transfer also addresses intra-firm transfer. However, he did not examine antecedents to the initiation of transfer. Rather, he examined intra-firm transfers of best practices and the relative importance of various factors to the "stickiness" or difficulty of transfer. He found that characteristics of the source, recipient, practice itself, and the context all had important effects on difficulty of transfer. He also found that in his sample, the relative importance of knowledge-related factors (e. g. absorptive capacity and causal ambiguity of the practice) were greater than what he termed the motivation of either the source or the recipient. The routines Szulanski examined were very macro in nature, for example, the transfer of a "routine" identified as the entire production function from one automotive assembly plant to another within one firm. While these findings are important to our understanding of the transfer of routines, they still do little to help us understand why sub-units, and more specifically teams, will engage in external acquisition of routines. The knowledge transfer literature has also generally ignored lower level exchanges such as team-level transfer.

Team-level learning and knowledge-transfer has been addressed *inside* teams in the literature on transactive memory. This research examines how team members store knowledge collectively and how they partition their knowledge *within* team boundaries (see for example Moreland, Argote and Krishnan (1998)). Here again, as with the

majority of research on teams, the emphasis is inside team boundaries and not between teams.

As I noted before, the use of teams has increased dramatically in organizations, and in large, globally dispersed organizations it is common to have many teams performing the same function in multiple locations. It is quite likely that innovative procedural knowledge is developed in these dispersed locations. These routines are the building blocks of organizational knowledge, but remain untapped if not identified, transferred and therefore leveraged across the larger organization. Knowledge transfer between teams may critically affect both organizational learning (Nonaka, 1994) and team performance. Therefore, the omission of team-specific research in the knowledge transfer literature is problematic. Not only will research on this topic assist team developers, but it also will enhance our understanding of *organizational* learning and knowledge transfer. Therefore, the first gap I address in the knowledge management and organizational learning literature is the examination of transfer at a key operational level – the team. In addition to extending research to a different level of analysis, my research also brings two previously unaddressed variables to bear on the transfer phenomenon – time pressure and interruptions. The knowledge transfer literature will be enhanced by blending issues identified in the organizational learning literature with the routines literature.

In addition to gaps addressed in the group routines literature and the knowledge management and organizational learning literatures, my research also extends team boundary spanning research.

1.1.3 Team Boundary Spanning

In addition to extending research on changes in routines and knowledge transfer, my focus on *external* acquisition of routines extends the team boundary spanning literature. Study of boundary spanning activities has a long history within organizational behavior and organizational theory (e.g. Leifer & Huber, 1977; Pfeffer & Salancik, 1978). The importance of boundary spanning activities is typically undisputed, and empirical evidence exists for relationships between boundary spanning activities and important organizational outcomes. Boundary spanning activities have also been explicitly linked to knowledge acquisition and organizational learning (e.g. Galaskiewicz & Wasserman, 1989; Tushman & Scanlan, 1981). Even so, the majority of boundary spanning research has been conducted at the individual level of analysis, typically examining the role of boundary spanning individuals. Furthermore, most of this research has examined outcomes of boundary spanning behavior (e.g. Dollinger, 1984; Katz & Tushman, 1979), rather than triggers to specific occurrence of boundary spanning behavior.

Comparatively little research has examined the boundary spanning activities of teams. As noted earlier, until recently the dominant focus in team-level research was on the *internal* interactions among team members and their effects on performance. Empirical examination of the interaction between teams and their contexts was largely ignored (Ilgen, 1999; Mohrman, Cohen & Mohrman, 1995; Sundstrom, DeMeuse, & Futrell, 1990).[3] Responding to this imbalance, Ancona spearheaded research on external activities of teams (Ancona, 1990; Ancona & Caldwell, 1992) and demonstrated the importance of an external emphasis in research on teams. For example, she reported case evidence from five teams that external activities are better predictors of team performance than internal group

[3] There are exceptions, but Ancona & Caldwell (1992) point out that most existing studies do not focus on groups as the object of theoretical interest.

processes if a team faces external dependencies (which is highly likely). Ancona and Caldwell (1992) then conducted a large scale quantitative study which examined the external activities of 45 new product teams. They found that teams develop distinct strategies toward their environments, with some teams consistently engaging in more external activity and others remaining isolated. Teams with higher levels of external activity performed better, while isolated teams had a high probability of failure. The work of Ancona and colleagues represents a significant step forward in our understanding of the behavior and performance of teams embedded in organizations. However, the teams studied by Ancona and Caldwell (1992) were limited term project teams. Thus, we do not have empirical evidence concerning the external activities of ongoing work teams.

In addition to limited evidence concerning ongoing work teams, there is little empirical research examining the antecedents to external activity in general or external acquisition of routines in particular. We still know little about how and when teams change their interaction with the external environment and what effects these changes may have on routines. Thus, examining potential antecedents to external procedural knowledge acquisition in ongoing organizational teams is an important extension of the work on external activities of teams.

1.2 CHAPTER SUMMARY

In summary, the use of teams to accomplish organizational tasks has increased dramatically (Ilgen, 1999). It is typical in large, geographically dispersed organizations to have multiple teams of the same type performing similar tasks in many locations. Teams may be important factors in organizational learning and knowledge transfer, yet we know very little about cross-team transfer of knowledge. We do know that teams quickly develop routines and these routines persist. Also, as detailed in this chapter, routines can

be considered a form of procedural knowledge. I focus on one part of the transfer process – external acquisition of routines. I specifically ask how time pressure and interruptions – two commonly occurring contextual factors for teams -- influence a team's external acquisition of work routines. In doing so, this research will extend current theory on group-level routines, organizational learning and knowledge transfer, and team boundary-spanning activities. The proposed relationships between time pressure and external acquisition of routines, and between interruptions and external acquisition of routines are outlined in the next chapter.

CHAPTER TWO
HYPOTHESES

2.0 INTRODUCTION

The hypotheses developed in this chapter detail proposed relationships between two antecedent variables and team external acquisition of routines. Following research on organizational learning (Huber, 1992), external acquisition is considered a two part process: (1) external search for routines; (2) adoption of routines from external sources. The antecedents to team external acquisition of work routines examined here are time pressure and interruptions. Figure One presents a model representing the variables and relationships outlined in the hypotheses.

2.1 TIME PRESSURE & EXTERNAL ACQUISITION OF ROUTINES

Recently, a growing number of researchers have called for greater attention to time and time-related variables as explicit predictors of behaviors and outcomes in organizational behavior research (Ancona & Chong, 1996; Bluedorn & Denhardt, 1988; McGrath, 1986; McGrath & Kelly, 1986), as well as with specific respect to teams (Tindale & Anderson, 1998). The explicit influence of time pressure on team knowledge acquisition or team boundary spanning has not been addressed in the literature.

As noted in my introduction, many teams work in dynamic environments with changing deadlines and workload. Furthermore, time pressure is likely to vary across teams in different organizations. For example, in highly dynamic, extremely competitive environments such as the computer industry or the pharmaceutical industry, project

timelines and therefore perceived time pressure may be very different than for teams in relatively stable, unchanging industries such as the furniture industry. Moreover, even *within* a specific context there are likely to be cycles of workload with waxing and waning time pressure. Thus, time pressure is likely to vary across teams and across time (Ancona & Chong, 1996; McGrath & Kelly, 1986).

While time pressure is likely to be a common, but varying, contextual factor for many teams, it has not been examined as a factor in any of the three literature areas identified in Chapter One. Ancona and Chong (1996) note that with only a few exceptions (e.g. McGrath & Kelly, 1986; Gersick, 1988; 1989), time and timing have rarely been *explicitly* addressed in organizational behavior research. Exceptions include research on decision making and on personality (e.g. Type A behavior pattern). Additional attention to time in a wider range of organizational research is needed, particularly since time pressure influences what McGrath (1991) characterized as a "generic problem" in organizations – the allocation of temporal resources. Time spent engaged in external acquisition of routines is likely to result in reduced time for task performance. As time becomes scarce, the cost of external search for routines increases. Indeed, Ancona (1990) found that interactive external activity "takes up a lot of time" and had resultant negative effects on some internal team processes such as cohesion and team building (p. 359). While Ancona's research *suggests* that engaging in external activities does reduce temporal resources available for other activities, no direct evidence exists concerning the effects of time pressure on the external activities of teams. McGrath (1991) theorizes that time pressure will lead groups to focus only on what he calls the "direct path" of the production

function. This focus may result in reduced attention to strategic planning or learning activities.

While there is no empirical research directly concerning time pressure and team-level external search for routines, there is related research at the individual level which informs us concerning the potential form of the relationship between time pressure and team external knowledge acquisition. Group decision theorists have argued for the applicability of individual level findings in formulating group-level research (e.g. Davis, 1992; Davis & Stasson, 1988; Parks & Cowlin, 1995). In a review of work on individual level routines, Weiss and Ilgen (1985) note that high levels of non-routine response are costly in terms of both time and effort. Routinized behavior allows individuals to conserve cognitive resources and increase response speed. These results suggest that teams may be more likely to *maintain* their routines during periods of high time pressure and therefore be less likely to acquire new work routines. Additional evidence from individual-level research demonstrated that under time pressure, *individuals* reduce external information search. For example, Hulland and Kleinmutz (1994) conducted a lab experiment on individual choice behavior with time pressure as a treatment condition. They found that external search effort was significantly lower in individuals in the time pressure condition compared to individuals with abundant time. Both total search effort and proportion of external to total search effort were significantly lower under time pressure. If similar mechanisms are at work in groups, higher time pressure may result in less external search for new work routines.

Additional support for a negative relationship between time pressure and external search is provided in threat-rigidity theory and decision making research. Threat rigidity suggests that under stress information is barely processed, and decisions reflect a response that is dominant or well-learned rather than one that has been thoughtfully and newly derived (e.g. Staw, Sandelands, & Dutton, 1981). This finding has been demonstrated across multiple levels of organizational analysis. As a result, social systems, including teams, have a tendency to close down rather than open up under stress. Indeed, empirical evidence concerning group decision making under threat indicates that increased stress results in restriction of information processing (Gladstein and Riley, 1985). Janis and Mann (1977) also suggest that stress leads to reduced vigilance, and extreme stress invokes defensive avoidance and restricted search. Since time pressure likely produces stress (Parks & Cowlin, 1995, Janis & Mann, 1977; McGrath & Kelly, 1986), it may produce similar results. Additional decision making research at the individual level of analysis supports this idea. Under time pressure individuals use less scrutiny in their decisions (Edland & Svenson, 1993; cf. Betsch, et al., 1998), are more likely to employ simple decision strategies (Ben Zur & Breznitz, 1981), and may rely on their habituated dominant response strategy (Beach & Mitchell, 1978).

Given the previous research at the individual level on effects of time pressure on external information, and individual and group level work in decision making under threat, I posit the following hypothesis:

H1a: ***In a given time period, teams reporting higher perceived time pressure will be less likely to engage in external search for routines.***

Time pressure is also likely to affect adoption of routines from external sources. Time pressure may reduce the probability that routines are adopted. This may occur for a number of reasons. First, because less *search* for routines is taking place under time pressure, teams are less likely to find or be aware of work routines existing outside their boundaries, and therefore be less likely to adopt new routines. Second, because of the same generic time allocation problems mentioned above, teams experiencing high time pressure will devote less time to reconfiguring the way they work. This may even occur if search occurred because as noted before for individuals, time pressure leads to reduced information processing. A recent study on individual decision making provides empirical support for the negative effect of time pressure on the acquisition of new routines. Betsch et al. (1998) examined the effects of time pressure on routine maintenance in an experimental study of individual routine maintenance in decision making. Subjects participated in a computer simulation game in which they had to make choices concerning trucking loads of melons to market. Over a series of trials, a set of routines was learned. Then conditions were varied with new trials. Some subjects were placed under time pressure, and the participants in the time pressure condition showed a stronger tendency to maintain their previously learned routines than subjects in the no time-pressure condition. In fact, under the time pressure condition, participants almost perfectly maintained their previously learned routines even though the circumstances had changed and the adequacy of the prior routine was uncertain to participants.

Given this evidence, time pressure will likely serve to reinforce existing routines, therefore the following hypothesis is proposed:

H1b: *In a given time period, teams reporting higher time pressure will be less likely to adopt routines from external sources.*

In summary, the hypotheses presented in this section suggest that the commonly occurring and varying contextual variable of time pressure may have an important influence on the external acquisition of new work routines by teams. The second contextual variable I examine is interruptions. I explore the potential relationship between interruptive events and external acquisition of routines in the next section.

2.2 INTERRUPTIONS & EXTERNAL ACQUISITION OF ROUTINES

While little empirical evidence exists for triggers to acquisition of new work routines, several authors have posited that interruptions may be necessary to invoke a "switch" from automatic performance of routines to the conscious information processing involved in acquisition of new routines (e.g. Gersick & Hackman, 1990; Langer, 1989; Louis & Sutton, 1991). While this view suggests positive effects of interruptions, interruptions have often carried a negative connotation in organizational behavior research. For example, the self-management and social learning literatures (e.g. Bandura, 1977; Manz 1986; Adcock, 1971; Kleiner, 1992; Lucco, 1994) identify interruptions as environmental contingencies to control through specific targeting and monitoring policies (e.g. Andrasik & Heimberg, 1982). Interruptions have also been identified as a significant factor in job stress (Kirmeyer, 1988). Recently, interruptions have also been linked to coordination problems, work overload and high time pressure in software development teams (Perlow, 1999). Finally, ergonomics research suggests that task interruptions may lead to increased processing time and error rates (e.g. Cellier & Eyrolle, 1992).

Despite these negative views of interruptions, there is an emerging positive view of interruptions. Interruptions may prompt attention shifts leading to change and innovation (Gersick, 1991; Meyer, 1982; Okhuysen & Eisenhardt, 1997; Tyre & Orlikowski, 1995; Tyre, Perlow, Staudenmeyer & Wasson, 1996). Tyre, Perlow, Staudenmeyer and Wasson (1996, *cf.* Okhuysen and Eisenhardt, 1997: 9) argue that interruptive events may "make time" for change by providing actual or perceived "time outs" from normal activity, thereby focusing activity, and triggering change. Such interruptions may be important determinants of change in routines. Descriptions of routine behavior range from "mindlessness" (Langer, 1979, 1989) to "automatic cognitive processing" to "habits of mind" (Louis & Sutton, 1991) to "habitual behavior" (Gersick & Hackman, 1990). Team-level search for external information concerning routines and subsequent adoption of routines constitute a movement from "mindless" routine behavior to "mindful" search and change. The aforementioned authors suggest that the only way to get individuals or groups to break out of habits of mind is to interrupt them, thereby triggering active cognitive processing.

Technological adaptation research provides empirical evidence that interruptions trigger changes in routines. Weick (1990) reports that interruptions in the regular use of technology may increase arousal, change the focus of user attention and provide windows of opportunity for change. Tyre and Orlikowski (1994) provided similar evidence from three empirical studies of technological adaptation. They found that the period immediately following the installation of a technology was a period of high activity of adaptation and acquisition of routines. However, people quickly developed routines.

Changes in routines did not occur again until a "trigger" occurred. These results occurred at both the individual and group levels. Tyre and Orlikowski suggest that "windows of opportunity" for change occur only immediately after installation of a new technology and after certain "trigger" events occur. Both can be considered interruptions. Installation of a new technology interrupts routine work and prompts a period of active search for information and adaptation of routines. After a period of initial adaptation, routine behavior develops. In almost every case they studied, later spurts of adaptation were only associated with novel, disruptive events.

Technological adaptation research provides evidence that interruptions spur change, however, the examples reported above only examine the effects of interruptions on *internally* developed changes in routines. There are few team-level studies which provide direct evidence that interruptions provide an impetus for *external* knowledge acquisition. Gersick's (1988, 1989) work on midpoint transitions is an exception. She reported that groups which enact a midpoint transition (i.e., interrupt themselves) triggered by attention to an approaching deadline were more likely to seek outside information during the transition and to use different strategies and operating processes after the interruption. These findings suggest that interruptions may have important effects on team routines and boundary spanning behaviors. However, Gersick's studies employed limited-term groups, performing a single task, operating under clear deadlines. These findings do little to illuminate the effects of interruptions on ongoing work teams facing multiple and complex task environments. Nor do they address the specific effect of interruptive events on external acquisition of routines.

In the organizational learning literature, Virany and her colleagues (Virany et al., 1992) also found evidence that interruptive events may prompt organization learning. They suggest that the interruption caused by executive succession is an important mechanism for triggering organizational learning. They found that changes in top management teams led to alteration of standard operating procedures and decision-making processes. They did not distinguish between internal and external sources of these procedures.

Additional evidence explicitly concerning the role of interruptive events on *external* knowledge acquisition is provided by studies of individual feedback seeking. Ashford (1986) reported that individuals actively seek outside information in the form of feedback when faced with new, uncertain or troublesome settings. Her research did not examine why a setting might appear new, uncertain or troublesome, rather she simply asked if the individual perceived his/her task environment to have these characteristics. It is possible that environmental events may occur which are novel, making a situation appear new or non-routine. As a result, such events may lead to a greater probability of active cognitive processing in the form of information search.

The Betsch et al. (1998) study of individual deviation from routines also examined the effect of novelty in the decision stimuli on individual routine maintenance in a simulated trucking problem. They found that when subjects encountered an unexpected novelty in the display, they were more likely to deviate from their previously learned routine pattern than in the condition in which no changes were made. This study provides empirical evidence at the individual level of analysis for the positive effect of interruptions

on acquisition of new routines. The evidence concerning the effects of interruptions leads to the following hypotheses:

H2a: *In a given time period, teams experiencing more interruptive events will be more likely to engage in external search for routines.*

H2b: *In a given time period, teams experiencing more interruptive events will be more likely to adopt routines from external sources.*

While H2a and H2b state that essentially *any* interruption is likely to increase the probability that external knowledge acquisition occurs, it is not clear if all interruptions will have equal effects. One characteristic of interruptions which may affect external knowledge acquisition is novelty (Gersick & Hackman, 1990; Langer, 1989; Louis & Sutton, 1991). A characteristic of interruptions which may affect novelty is anticipatability. Wickens (1996) suggests that anticipation may be an determinant of the impact of interruptions and that unanticipated interruptions are more disruptive than anticipated interruptions. For example, a nuclear power plant control crew may be informed that there is a pre-scheduled period when their reactor will be off-line for repairs. These repairs interrupt regular task performance, but because they are planned may not provide enough disruption to trigger active attention to routines. Alternatively, there may be an emergency need to take the reactor off-line. This would be an unanticipated interruption in task performance and may act as a trigger to active attention to routines. If interruptions are anticipated, they may lose their impact as triggers to cognitive switches. In other words, when interruptions are unanticipated, they will be more likely to trigger active cognitive processing resulting in the acquisition of new routines, but if anticipated,

they may lose this impact. The following hypotheses are posited concerning the effects of unanticipated interruptions:

H2c: *In a given time period, anticipation moderates the effect of interruptions in that when anticipation of interruptions is high, interruptions will be less likely to prompt external search for routines and when anticipation is low, interruptions will be more likely to prompt external search for routines.*

H2d: *In a given time period, anticipation moderates the effect of interruptions in that when anticipation of interruptions is high, interruptions will be less likely to prompt adoption of routines from external sources, and when anticipation is low, interruptions will be more likely to prompt adoption of routines from external sources.*

2.3 CHAPTER SUMMARY

In the preceding sections, specific, testable hypotheses were presented concerning the relationships between time pressure and external acquisition of routines, and between interruptions and external acquisition of routines. In Chapter Three, I present the study design and measures developed to test these hypotheses.

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 INTRODUCTION

The hypotheses proposed in Chapter Two (see Table Three for a summary) were driven by the goal of describing the roles of time pressure and interruptions as antecedents to team external acquisition of routines. The discussion in this chapter focuses on the research design I implemented to test these hypotheses. To add robustness to my research, there were two phases to the study. I began with qualitative interviews to identify and better understand the research setting, and to aid in development of measurement instruments. The interview phase was followed by a survey of multiple teams. I describe the development of measures and the procedures used to collect the data.

3.1 EMPIRICAL SETTING

My research question and hypotheses guided the choice of the empirical setting. The unit of analysis is the team. The setting broadly consisted of (1) ongoing teams; (2) embedded in organizational contexts where knowledge transfer is attempted and supported. The hypotheses posed in Chapter Two involved the potential roles of two contextual antecedents to external routine acquisition and as such, context is important. Furthermore, prior studies of team-level external activity have typically examined teams with definite end-points to their activities (e.g. Ancona, 1990; Ancona & Caldwell, 1992; Gersick, 1988, 1989). In an effort to extend this literature, my research focused on *ongoing*

organizational teams. Therefore, the methods chosen to test the hypotheses needed to allow observation of ongoing teams embedded in realistic contexts.

To maximize the realism of the context, I used a field study methodology to examine the proposed antecedents to external acquisition of work practices. McGrath (1984:33) notes that field studies maximize realism. Studying the proposed antecedents in the field offered an empirical setting in which participants are engaged in the tasks at hand, in which task performance is consequential to the team's members, and in which the impact of time pressure and interruptions are realistic.

While field studies maximize realism, they also increase difficulties in control (McGrath, 1984). The choice of setting can help mitigate control issues. The empirical setting for my study was ongoing work teams in large, multinational, pharmaceutical/medical products organizations. Choosing the sample from a single industry improved control by eliminating potential differences in knowledge transfer activity due to industry. Within this single industry, the study setting consisted of firms that expressed an interest in, and efforts toward knowledge transfer. The appropriateness of inclusion was determined through interviews with team members in a subset of five organizations (details of the interview study are provided in the following paragraphs). These interviews were conducted as part of the first phase of my research.

My dissertation data collection was connected to a larger, ongoing study of teams. That study examines the implementation of teams in multi-national organizations and is primarily concerned with issues of team leadership and cultural factors. My research was not theoretically connected to that study; however, my data collection was

included in data collection efforts for that study. There are five organizations in the larger study. Table two summarizes the sample of the interview study. A total of ninety-eight people representing forty-six teams were interviewed. I asked general questions related to team-level transfer of knowledge. I asked these questions to better understand the context, to discern whether any or all of these five organizations may be acceptable contexts from which to draw my sample of teams, and to aid in measurement development. Given my research question, organizational settings of particular interest were those in which teams emphasized knowledge transfer activities. This was to ensure that the team members and leaders would be familiar with the language I used on my survey, and also to enhance the likelihood of variance on my dependent variables across teams. In firms that do not attempt to transfer knowledge across teams, the study of external acquisition of routines may be impeded by lack of attempts as a baseline frequency.

Examples of the interview questions are provided in Appendix A. The questions asked both about sharing and adopting routines. For the purpose of my dissertation research, I only used results concerning the acquisition of practices. A total of ninety-eight individuals were interviewed. These individuals represented forty-six teams across five firms. Between one and eight individuals were interviewed from each team. All interviews were audio-taped and transcribed by a professional transcriptionist.

I used a word processing program to search the interview texts for a set of key words relating to knowledge transfer.[4] These words were highlighted in color in the database to facilitate easy identification of passages relating to the terms. After this step

[4] Knowledge, sharing, transfer, search, routine(s), practice(s), process(es), learning, adopt.

was complete, I scanned the interview texts to locate each highlighted term. I read the passages around each term to determine where a segment about the term began and ended. After determining the beginning and ending of a given segment, I copied and pasted each into another document. This document contained only text segments about knowledge transfer. One hundred forty-seven pages of interview excerpts relating to knowledge transfer were obtained using this method.

I read these excerpts to determine what language the team members used when describing knowledge transfer in general, and acquisition of routines in particular. I was particularly interested in gaining information to guide the development of measures, but was also interested in determining whether all five of the organizations in the larger research study would be appropriate empirical settings. As mentioned earlier, it was important to limit the sample to teams in organizational contexts where knowledge transfer is identified as important, and where it would be likely that language concerning knowledge transfer would be understood by team members. From the interview excerpts I determined that three of the firms placed greater emphasis on knowledge transfer efforts. In light of these results, I concentrated my data collection efforts within three firms. This reduction in the number of firms from which teams were sampled also provided additional control by reducing the variance in activity that might be due to company-level factors. Company was also controlled in statistical analyses with dummy variables, and including fewer firms reduced the number of control variables necessary in these analyses. These control variables as well as others are described in greater detail later in this chapter.

In sum, the empirical setting for my research consisted of ongoing teams in three pharmaceutical /medical products firms. Based on interview results, all three firms expressed interest and efforts in transferring knowledge, and team members within these organizations used and understood language relating to knowledge transfer efforts. The teams considered for inclusion were all identified by the organizations as teams in that they all have shared responsibilities and resources, have interdependent tasks to varying degrees, and are known as teams. Team types range from marketing teams, to customer service teams, to sales and service teams, however the great majority of the teams are sales and service teams. I now turn to a description of the specific research design I employed to collect data.

3.2 RESEARCH DESIGN

I used a field study design to collect data. I administered two surveys to collect data from both team members and team leaders. Team leaders completed the first survey. The leaders served as key informants for the dependent variables. Leaders had a coordination role within the teams in the sample and therefore have an appropriate vantage point from which to assess team-level knowledge acquisition. Team members completed the second survey. The member survey contained the independent variables, the control variables, and team demographic information. I collected information on the independent variables and the dependent variables from different sources to minimize common method variance through methodological separation (Campion, Papper & Medsker, 1996). Same source bias is a form of subject demand effects. Respondents may try to reason the relationship between the questions they are being asked and answer "accordingly." Same

source bias may also result because respondents may be consistent in how "agreeable" or "disagreeable" they are in their answers. In such cases, there will be variance on the dependent and independent variables, but we will see a strong trend relationship that is not true variance (Schwab, 1999). Separating the source of independent variables and dependent variables reduces the influence of these problems.

As mentioned earlier, the teams in my sample were a subset of teams sampled for a larger research study of teams. The data collection was connected to the survey administration for that study. In each company, key organizational contacts developed during the interview stage of the study assisted in identifying a sample of teams within their organizational units. They provided names of teams and membership information for survey "pack" creation. Each team "pack" contained surveys for each member and a survey for the leader. Each individual survey contained a cover letter explaining the research, instructions for completing and returning the survey, and also stressed confidentiality for individual participants. Each survey had an identification code to track individual and team response rates, and to provide anonymity for individual respondents.

Surveys were administered through a combination of on-site administration and mail administration. For mailed surveys, a prepaid mailing envelope to return the completed surveys was included in the survey pack. In most cases, I traveled to the organization and administered the surveys. On-site administration is advantageous to higher response rates; however, budget constraints limited the number of trips. Therefore, if teams were not available during the site visit, or if teams were dispersed geographically, the surveys were administered by mail. When mail administration was used, survey packs

were assembled for each team and sent out to the primary contact for the team (usually the team's leader). This person distributed the surveys to the members of his/her team, and individuals returned their surveys directly to me.

Every possible effort was taken to assure the highest possible response rate. As noted earlier, cover letters and instructions emphasized anonymity for individual respondents. In addition, two follow-up contacts were made to non-respondents. Typically, follow-up contact was conducted via fax. A letter was faxed to the member or leader encouraging him or her to complete and return his/her survey. The letter also asked him/her to contact me if a new copy of the survey was needed. Additional copies were mailed out in response to these requests.

In addition to efforts to maximize response rates, every effort was made to keep the quality of the responses high. Most important to this effort was ensuring that respondents all employed the same referent when completing the survey (Rousseau, 1985). To reinforce the common referent, the name of the team was printed prominently at the top of each survey to ensure that all respondents used the same team referent in answering the questions. The specific month in question was also printed at the top of the survey and within specific question groups. This ensured that all the team members limited their answers to the same defined time period.

To summarize, the procedure I employed for data collection involved surveying team leaders and members. Dependent variable information was collected from team leaders, and independent variables and controls were collected from team members. Surveys were typically administered on-site, but mailed administration was also used.

Surveys contained information about the team to be rated, and identified the specific time period for respondents to consider. This information was provided to ensure that all raters used a common referent. The next section describes the measures employed in the surveys.

3.3 MEASURES OF DEPENDENT VARIABLES

There are no existing measures for search for team level work routines or external adoption of work routines. Furthermore, little empirical precedent existed to develop these measures. Therefore I used a variety of steps to develop measures. More specifically, I used a literature review and the results of the interview study to develop items. I then conducted a small number of additional interviews to further refine items. These steps are described in the following paragraphs.

There were a number of issues I considered in the development of dependent variable measures. First, I wanted to identify and use language to describe routines that would accurately represent the construct but also be meaningful to the team members surveyed. As noted earlier, Pentland and Reuter (1994) consider the term "process" to be interchangeable with routine. The term "practices" has also been identified as a manifestation of procedural knowledge in prior research (Szulanski, 1996, 1997: 15). Pentland and Reuter (1994) provide examples of what they mean by a routine. They considered the customer service function in an organization and described several routines to accomplish customer service. For example, they suggested that the series of behaviors for answering the phone constituted a routine. Similarly, authorizing a credit card was another routine. Each of these routines was made up of several "moves" or unitary actions

of the organizational member, such as greeting the customer and transferring the call. In the interview excerpts, these series of behaviors typically were described as "practices" by team members in my sample. Therefore, practice is the operational term I chose to measure the construct routine.

In addition to identifying the operational term practice to represent routines in the dependent variable measures, it was also important that respondents distinguished between individual level and team level routines. Therefore, I conducted additional interviews to further refine the wording of the actual items on the dependent variable survey. To accomplish this, I conducted interviews with eight team leaders and one team developer to further aid in the development of the dependent measures. Each interview lasted approximately 20-30 minutes. I audio-taped the interviews and transcribed them. The questions asked in these interviews are provided in Appendix B. I read the transcripts to examine the language used for practices and to identify examples of practices. The interviews provided rich contextual detail which permitted me to ground the language of the survey items in the language of the phenomena as understood by team members.

In the second set of interviews, I asked questions to determine whether team members distinguished individual versus team practices. Individual routines affect only individuals and not the behaviors of a significant subgroup of the team, or the behaviors of the team as a whole. For example, I conducted an interview with a team developer who is in charge of enhancing her organization's transfer of practices. She was able to provide an example of an individual-level routine and a team-level routine. For the individual-level

routine, she described a productivity-enhancing practice for individual Service Engineers (SEs):

> After a SE completes his/her work in the field, he/she must go through a kind of debriefing of the situation and then send it in to the organization electronically. Apparently, many SEs complain that this takes too much of their "home" or "personal" time. Upon examination, it was discovered that many SE's would wait until they had packed up and driven home until they would debrief. When questioned why they did not do them on site, they argued that they had to "up-link" in order to send them in, and that the only feasible place to do that was at home. Some SE's had developed a routine debriefing on-site and saving the file. Then when they got home, they merely had to connect up, up-load the file and get off-line – in just a matter of a few minutes. This alternative practice was identified as a practice and there have been some attempts to communicate it to the entire SE workforce. It is not known at this time how many SEs have adopted the practice.

Alternatively, she described a team level routine. This routine concerned the team practice for getting purchase orders in from customers.

> In most teams this had been the responsibility of the SEs. However, they were often late and there was often a lot of follow-up work that needed to be done. There was too much diffusion of responsibility. One team changed the entire process, and made one person at the service center in charge of this process. Consequently, the entire team's process was changed. This new process was identified by the [region] as a best practice and promoted to other teams in the region.

The interviews suggested that respondents can distinguish between individual and team level routines. More specifically, the first example demonstrates a routine that is accomplished by only one individual. The change could be made without other members in the team altering their behavior or needing to participate in a set of actions.

Alternatively, the second example describes a new routine that modifies how the entire team conducts an important sequence of activities, and it affects a team-level function.

Based upon the interview results and previous research, I concluded that team-level work practices are a type of routine executed by multiple actors (team members) and are available to conscious scrutiny by team members.[5] Practices are patterns or sequences of behaviors enacted to accomplish specific tasks. Practices are likely to become more mechanical or automatic over time as the team repeats execution of the practice. Interviews provided examples of individual-level practices and team-level practices. I use two examples provided by an interviewee on the survey to enhance the clarity of the construct to respondents (see Appendix C for the survey instrument).

In the process of examining the initial interview excerpts, it became clear that teams in the sample organizations also referred to a some of their practices as "best practices." These practices had been identified by a third party as a kind of "ideal" routine. No clear definition exists in the organizational behavior literature for best practice, but best practices are generally associated with practices which are already in use and provide superior performance (Szulanski, 1995, 1996). While I did not differentiate qualitative differences in practices, nor did I hypothesize about best practices, I included an item distinguishing "best" practices from general or generic work practices. Including this item

---

[5]When I say "consciously available" I do not mean all the time. In other words, because I consider practices to be a type of routine, I do believe that they will typically be enacted without discussion or deliberation. However, by consciously available, I mean that if *asked* to reflect on the "way" they do a certain task, a team would be able to identify the basic steps and features of the practice. This view differs from some of the more extreme views of routinized action which suggest that these patterns of behavior are completely tacit and unavailable to identification by the actors.

allows exploration of potential differences in acquisition activities between "generic" and "best" practices.

To summarize, I collected dependent variable information from the team leaders. This treats the team leader as a key informant/expert rater. Based on previous research and an interview study, I use the term "practice" to operationalize the construct routine. I identified examples of team level practices from interview excerpts to use on the survey instrument to help respondents understand the type of knowledge the questions refer to. I created items for dependent variables concerning external search, and adoption from external sources. Each variable and corresponding measure is described in greater detail in the following paragraphs.

External Search for Practices. External search for practices was operationalized with two items. The first item was a general question asking whether the team searched outside its boundaries in the specified month for *any* new team practice. The second item asked whether the team searched outside its boundaries in the specified month for team *best* practices. Both questions were answered with either yes or no (Coded: 1=yes, 0=no). These items appeared on both the team leader and team member surveys. The items are provided in Appendix C.

Adoption of Practices from External Sources. Adoption of practices from external sources was also operationalized with two items. Here again, the first item was a general question asking whether the team adopted *any* team practices from outside its boundaries in the specified month. The second item asked whether the team had adopted any *best* practices from outside its boundaries in the specified month. Both questions were

answered yes or no (Coded: 1=yes, 0=no). These items appeared on both the team leader and team member surveys. The items are provided in Appendix C.

Four variables were created from these four items. These four variables are: (1) External Search for Practices (S1); (2) External Best Practice Search (S2); (3) Adoption of Practices (A1); (4) Adoption of Best Practices (A2). In addition, I created two summary variables which capture whether either type of search or adoption was reported: (1) Any Search (S1 or S2) coded "1" if *either* S1 or S2 were "1" and (2) Any Adoption from external sources (A1 or A2) coded "1" if *either* A1 or A2 were "1." Inclusion of separate search and adoption variables for general practices and "best" practices allows exploratory examination of potential differences in the relationships between key variables and general new practices versus best practices. While not specifically hypothesized, it will be interesting to see if the teams in my sample report different frequencies (i.e. distinguish between general practices and best practices), and whether there are different relationships between the independent variables and the types of practices.

3.4 INDEPENDENT VARIABLES

I identified three independent variables in my hypotheses: (1) time pressure; (2) interruptions; (3) anticipation of interruptions. Measurement of each of these variables is discussed in the following paragraphs.

3.4.1 Time Pressure

The independent variable for time pressure is a scale taken from the NASA-TLX (Task Load Index) (Hart & Staveland, 1988). I specifically chose seven items

concerning time pressure and pace of work from this survey. Team time pressure was measured on team members only. Time pressure items are measured on a scale of one to seven with higher values indicating greater time pressure. Individual scale scores were created by taking the mean across the seven items. Team scores were created by averaging individual team member scores. These items are provided in Appendix C.

3.4.2 Interruptions & Anticipation

The second independent variable, interruptions, consists of a series of potentially interruptive events. Interruptions are measured with fourteen questions concerning the occurrence of various interruptive events. These items were developed using a combination of literature review and interview results. I drew primarily on four articles to identify potential interruptive events. These articles were (1) Gersick and Hackman (1990); (2) Louis and Sutton (1989); (2) Langer (1989); and (4) Tyre and Orlikowski (1994). Gersick and Hackman (1990) identify a set of conceptual triggers to changes in group routines which include: (1) encountering novelty; (2) experiencing failure; (3) reaching a milestone; (4) receiving an intervention; (5) coping with a structural change; (6) redesign of the task; or (7) change in authority. Louis and Sutton (1989) and Langer (1989) provide similar lists of potential triggers to mindfulness or active cognitive processing. The first three studies only theorized about potential interruptions that may influence changes in routines. In contrast, Tyre and Orlikowski (1994) report an empirical study of triggers to technological adaptation. They identified several triggers in two different organizations that led to "windows of opportunity" for change. Table Four summarizes these triggers. This list provides a concrete set of examples of interruptive

events, and I include it to provide examples of what one empirical study identified as actual triggers to internal changes in routines. Further examples of interruptive events come from organizational learning theory the idea of problemistic search. This theory suggests that unexpected failure to attain goals or a change in goals can result in uncertainty which may trigger reconsideration of routines (March & Simon; Weiss & Ilgen, 1985).

After assembling a list of possible interruptions identified in the literature, I reviewed the interview excerpts to see whether similar interruptions were identified by interviewees, and also to identify examples. Wherever possible, I combined event types to reduce the number of items in my survey. Also, I wrote items using general language so the survey questions would be applicable across different types of teams. This process led to a list of fifteen interruptive events. I asked whether each event occurred in the specified time period (1 = yes, 0 = no).

Each interruption question was followed with a question asking to what degree the event was anticipated. Respondents only answered the follow-up question if they answered "yes" to the occurrence of the event. Follow-up questions were answered on a five-point Likert-type scale. Anticipation items were anchored by 1 = "not at all" and 5 = "completely/extremely." Interruption and anticipation items are provided in Appendix C.

3.5 CONTROL VARIABLES

3.5.1 Interdependence.

There is recent evidence suggesting that interdependence will influence collective cognition or "team mental models" (Gibson, 1996). If this is true, then higher levels of

interdependence may increase the probability that a team will search for team-level practices. In other words, teams that have more highly interdependent outcomes will focus more on team-level processes than teams with lower levels of interdependence. Furthermore, if teams are dependent on others to accomplish their outcomes, they may engage more frequently in boundary spanning activities. I used Wageman's (1995) measure of outcome interdependence to measure team interdependence. Team members responded on 7-point scales anchored by 1 = "very inaccurate" to 7 = " very accurate." Scale scores were created by averaging each respondent's answers across items. Team scores were computed by averaging the individual scores.

3.5.2 Decision Making Discretion.

Gersick and Hackman (1990) theorized that one reason little evidence exists concerning natural breakpoints leading groups to spontaneously attend to or assess their performance routines may be a lack of discretion to make changes in performance strategy. Thus, decision making discretion or authority over making changes in work processes may influence external knowledge acquisition activity. As a result, a measure of decision-making discretion was included. Decision making discretion was measured with eight items derived from previous research on teams (Cohen, Ledford & Spreitzer, 1996; Cordery, Mueller, & Smith, 1991). These items asked team members how much input they have on a variety of decisions ranging from planning and scheduling work to task assignments within the team. Team members responded on 7-point scales anchored by 1 = "no input" to 7 = " complete input." Scale scores were created by averaging each

respondent's answers across items. Team scores were computed by averaging the individual scores.

3.5.3 Length of Time as a Team.

Experience on a task may be part of the causal mechanism to develop routines, and also may prompt mindlessness (Langer, 1989), therefore it will also be included as a control. Others suggest that length of time together as a team may inhibit necessary external initiatives and activities (e.g. Janis, 1982; Katz, 1982). Also, length of time as a team may be a proxy for absorptive capacity (Cohen & Levinthal, 1989, 1990) which is considered a function of prior knowledge and experience. Recipients lacking absorptive capacity are less likely to recognize the value of new knowledge, assimilate that knowledge or apply it successfully (Szulanski, 1996). Length of time as a team was measured with a single item asking "How long has this team been in existence?" Answers were converted to months to create a common metric. Team scores were computed by averaging the individual team members' responses.

3.5.4 Organization.

The organizations in the sample may vary on the extent to which they promote or value the transfer of routines. Furthermore, organizations may vary in the mechanisms in place (e.g. codification systems) to enhance the likelihood that routines are transferred among units within the organization. Therefore, dummy variables for organization were included as controls.

3.5.5 Team Size

Team size may affect the degree to which there is a common "mindset" or mental model within the team. Larger teams may have difficulty viewing themselves as a team. Also, larger teams may have subgroups with sub-routines. These differences may lead to differences in team-level search behaviors. Therefore, a variable was included in the sample to control for team size. Archival information concerning the number of members on each team was used for the team size variable.

Table Five summarizes all the variables, measures and their sources.

3.6 SUMMARY

In this chapter I described the empirical setting for my research. This decision was driven by my research question and hypotheses, and consisted of ongoing teams in three pharmaceutical/medical products organizations. These three firms were pre-screened for inclusion during the first phase of my research project. I conducted interviews with team members from five major multinational pharmaceutical/medical products firms (these firms were participating in another, larger study of teams). Using the results of these interviews, I determined that three of the firms were most appropriate to draw my sample of teams from because they are actively involved with teams, and emphasize knowledge transfer. Interviewees from these firms demonstrated that team members are familiar with the language of knowledge transfer, and that transfer activity occurs – ensuring variance on the dependent variables. Data was collected using two surveys and two sources. Team leaders provided the dependent variables and team members provided the independent and control variables. Finally, I described the development of the key variables and identified control variables included in the analyses. I describe my analysis plan in the next chapter.

CHAPTER FOUR
ANALYSIS PLAN

4.0 INTRODUCTION

In Chapter Three I discussed the research setting and design I used to collect data. Ongoing teams in three large, multinational organizations were sampled for my research. Data were collected from team leaders and team members using surveys. In Chapter Four, I detail the analysis plan including the measurement, analyses, data aggregation, and hypothesis tests. The chapter begins with a discussion of the preliminary analyses, followed by a description of the substantive tests.

4.1 PRELIMINARY ANALYSES

4.1.1 Descriptive Statistics

Descriptive statistics concerning the realized sample, including total sample size and response rates, were computed and are reported in Chapter Five. Summary statistics including means, standard deviations, and where appropriate, frequencies, were computed and are reported in Chapter Five for all constructs measured and used in the analyses. Descriptive statistics were calculated to describe the achieved sample as well as to examine distributions and ranges of variables.

4.1.2 Measurement Tests

Schwab (1980) identifies several criteria for empirically evaluating psychometric properties and construct validity of measures. These include measures of reliability and convergence, and factor analysis. Following these guidelines, statistics were produced and

analyzed for all constructs developed here. Where scales were used to measure variables, internal consistency reliability was computed (alpha). Alpha is a measure of internal consistency, and is a conservative test which sets the upper limit on reliability of a measure (Nunnally, 1978). High levels of alpha suggest that the items in a scale hold a large amount of variance in common. Reliability is important in measures because improving the reliability of measures reduces the error variance. Reducing error variance improves the ability to detect systematic variance, since unreliable measures attenuate statistical relationships.

Additional analysis of measures was conducted using correlation results and factor analysis. As noted earlier, data on the dependent variables were also collected from team members. The correlation between team members' responses on the dependent variables and the leaders' ratings was used as a measure of congruence/convergence of the ratings. A significant correlation would provide additional justification for the use of an expert rater for the dependent variable. Finally, where appropriate, scales were subjected to factor analysis to assess the degree to which the items within a given scale constitute single dimensions as conceptualized.

4.1.3 Data Aggregation

As mentioned earlier, the unit of analysis in this study is the team. The independent variables were measured at the individual level, and needed to be aggregated to form team values. In Chapters One and Two, a theoretical basis for team-level relationships was developed, and individuals are simply used as raters of the team-level variables. However, if composite variables are created by combining individual level,

between-groups differences and within-group agreement should be apparent (Ancona & Caldwell, 1992:655; George, 1990: 110; Goodman et al., 1990). It is suggested that data with strong group-level properties (e.g., more of a variable's total variance due to group-level properties) suggest strong underlying group processes (Bliese & Halverson, 1998; Dansereau, Alutto & Yammarino, 1984). Therefore, before using grouped data in substantive analyses, I performed analyses to assess these properties.

These tests fell into roughly two categories: (1) tests that assessed the degree of agreement within a single group and (2) tests that assessed between-group variance. No consensus exists as to which tests are most appropriate, however, it is suggested that researchers use multiple indicators (Klein, Dansereau, & Hall, 1994). Therefore, for all aggregated scaled variables, I conducted three analyses to test the degree to which composite variables were distinct from one team to the next: (1) within-group inter-rater agreement with r_{WG} (James, Demaree, & Wolf, 1984; 1993); (2) between groups mean differences with ANOVA; and (3) intra-class correlation (Glick, 1985).

First, a measure of within-group inter-rater agreement was used to assess the degree of agreement within groups. Inter-rater agreement is typically defined as a proportion, which in the case of team members (as a set of raters) is the proportion of systematic variance in a set of judgments in relation to the total variance of the judgments (James, et al., 1984:86). I used the coefficient "r" outlined by James, Demaree and Wolf (1984) to assess within-team agreement on non-dichotomous scale variables. This technique estimates the consistency of ratings of a common target, within a given group. Values of .70 or above are considered indicative of adequate within group agreement

(George, 1990). Typically, authors report a mean value for their sample for each variable considered. The specific formula to calculate "r" for single item scales is:

$$r_{WG(1)} = 1 - (s_{xj}^2/\sigma^2_{EU})$$

For multiple items the formula is:

$$r_{WG(J)} = J[1 - (\text{sbar}_{xj}^2 /\sigma^2_{EU})] / J[1 - (\text{sbar}_{xj}^2 / \sigma^2_{EU})] + (\text{sbar}_{xj}^2 / \sigma^2_{EU})$$

Where:

$r_{WG(J)}$ = within-group inter-rater reliability for judges' mean scores on J items.

sbar_{xj}^2 is the mean of the observed variances on the J items

J = number of items in the scale

σ^2_{EU} is the expected variance based on a uniform distribution calculated with the formula:

$\sigma^2_{EU} = (A^2 - 1)/12$

A = the number of responses possible (i.e. A for a scale of 1 – 7 would be = 7)

It has been noted that the James et al. statistic does not work for dichotomous variables (response scales with only two response options) (George, 1990). As noted in the previous chapter, the measures of interruptions used single items asking whether an interruption of a given type occurred in the specified time period. Therefore, within-team inter-rater agreement cannot be ascertained for interruptions using the James et al. procedure. A literature search did not uncover a solution, and to my knowledge no such statistic currently exists (confirmed through personal communication with George and James). In her 1990 *Journal of Applied Psychology* article, George simply did not report a

measure of within team agreement for the dichotomous variables in her study. While this may be the case, it is inappropriate to simply ignore these variables in the assessment of within-team inter-rater agreement. Therefore, I computed a simple within-team ratio of agreement for each interruption item. In Chapter Five I report a mean value for each item as well as a mean across all the interruption items. This provides a baseline score for within-team agreement concerning the occurrence of these events.

In addition to demonstrating within team agreement, it is also important to demonstrate between-team variance on aggregated measures. Between-team variance is conventionally demonstrated by comparing mean values on the variables across teams using ANOVA (analysis of variance). If results of the ANOVA indicate that there is significantly greater between-team variance than within-group variance it is an indication that the composite scores "reliably represent and distinguish teams" (Ancona & Caldwell, 1992: 656). At a minimum, evidence for between-team differences is demonstrated when the F-value comparing team means on a given variable exceeds 1.00 (Hays, 1981). Further evidence for between-team differences is given by a statistically significant F-ratio. One-way ANOVAs were performed for the variables and results are reported in Chapter Five.

For the final aggregation test I used an Intra-class Correlation Coefficient (ICC). As conceptualized by Shrout and Fleiss (1979), this form of the ICC is an index of mean rater reliability, and is a Spearman-Brown formula (Glick, 1985). This is a scale (aggregated measure) reliability. This method is used to demonstrate group-level tendencies of variables. The formula for ICC(1,*k*) is as follows:

$$ICC(1,k) = (BMS - WMS)/BMS$$

Where:

BMS = mean squares between teams

WMS = mean squares within teams

ICC(1,k) is interpreted as the lower bound estimate of the mean rater reliability of an aggregated score (Glick, 1985; Shrout & Fleiss, 1979). Glick (1985) argues that any such index of reliability should exceed .60 to justify use of an aggregated perceptual measure. Results are reported in Chapter Five.

4.2 SUBSTANTIVE ANALYSES

4.2.1 Correlations

Correlation coefficients were used to examine the bivariate relationships between hypothesized variables. Statistical significance of directional relationships was tested with a one-tailed t-test of the correlation coefficient. Statistical significance of all other relationships was tested with a two-tailed test of the coefficients.

Correlation results were also examined for all independent variables to identify whether independent variables are inter-correlated, and if so, subsequently make judgments concerning threats of multi-collinearity (Cohen & Cohen, 1975). Greater collinearity among the IV's decreases the size of F, t and R-squared statistics. Greater collinearity therefore decreases the predictability of models and attenuates statistical significance of relationships.

4.2.2 Hypotheses Tests

As noted in Chapter Four, my dependent variables (external search for new routines and adoption of new routines from external sources) were dichotomous. Given these dichotomous dependent variables, Probit/Logit regression (Aldrich & Nelson, 1984) is appropriate to estimate the influence of hypothesized variables on the probability that the dependent variable equals one. OLS (ordinary least squares) regression is not appropriate for dichotomous dependent variables because several of the assumptions of OLS are violated. First, dichotomous dependent variables are restricted to be positive and to range between zero and one. OLS regression assumes that the dependent variable is continuous and ranging from negative infinity to positive infinity. At the same time, OLS regression puts no restrictions on the values of the independent variables. This creates a problem because OLS will produce estimates not constrained to zero and one. Secondly, OLS regression assumes that the dependent variable is a linear function of the independent variables. Yet Aldrich and Nelson (1984:26) argue that "a priori there is every reason to suspect that the expectation of a qualitative variable as a function of X must be non-linear in X." Applying OLS when the linearity assumption does not hold creates serious problems in interpreting regression results. While OLS will tend to indicate the correct sign of the effect of X on Y, none of the distributional assumptions hold, so statistical tests of significance will not hold (Aldrich & Nelson, 1984).

Probit/Logit solves this problem by transforming the probability function, and uses a maximum likelihood function to create the estimates. The difference between Probit and

Logit lies in the particular underlying distribution used to make the transformation. Long (1997: 83) argues that "the choice between Logit and Probit models is largely one of convenience...since the substantive results are generally indistinguishable." For my analyses, I use Probit, particularly because a few of the analytical extensions I use are more readily performed using Probit modeling in Stata.[6]

Testing hypotheses using Probit regression is straightforward. Variables were entered in the same way as in hierarchical regression. That is, first a model was run with only the control variables. Then, in a second model, the variables for the main effects were entered. Finally, a third model was run with the interaction term. Discerning whether the impact of a given independent variable on the dependent variable is statistically significant is the same in Probit regression as in OLS regression. This is simply done with a t-test of the coefficient and by the direction of the coefficient. As a result, support or disconfirmation of my hypotheses will be done by examining the coefficients from the Probit regression output, subjecting directional hypotheses to a one-tailed t-test. Further tests of the hypotheses involved assessing the goodness of fit of the model with the explanatory variables compared to the model with only the control variables. Goodness of fit is tested in Probit regression by comparing the change in the log-likelihood ratio from model to model using a Chi-square test.

---

[6] Stata is the statistical software package used to run the analyses. Stata is a registered trademark of the Stata Corporation, College Station, Texas.

4.3 SUMMARY

In this chapter I outlined the analyses I used to prepare the data and to test the hypotheses. Basic quantitative descriptions of the realized sample and specific variables are provided in the next chapter. Tests of the psychometric properties of the variables were also conducted. Individual level responses were aggregated to form team values, and tests for the appropriateness of aggregation were conducted. Finally, Probit regression was employed in hypothesis testing. Support or disconfirmation of the hypotheses was determined through a combination of the direction and statistical significance of the variables' coefficients and the fit of the overall model as compared to the explanatory power of the controls. In the next chapter, I present the results of these analyses.

CHAPTER FIVE
RESULTS

5.0 INTRODUCTION

In Chapter Four, I outlined my analysis plans for aggregating data and testing hypotheses. These analyses included quantitative descriptions of the data, tests for appropriateness of aggregation, zero-order correlation, and finally substantive tests using Probit regression. In this Chapter, I report the results of those analyses, and where appropriate, provide discussion concerning the interpretation of these results. Further interpretation and full discussion of the results of the hypothesis tests are provided in Chapter Six.

5.1 DESCRIPTIVE STATISTICS & MEASUREMENT

5.1.1 Sample

As noted in Chapter Three, I surveyed teams from three different firms, and this data collection was connected to a larger study of teams. I administered surveys to 12 teams in company one, 11 teams in company two, and 135 teams in company three. This resulted in a total administration to 158 teams. Teams ranged in size from three to twenty-one members.

The first response rates reported here are team response rates. The rate is the percent of teams from which I received at least one survey. The response rate was 92% from company one (11 of 12 teams), 100% from company two (11 of 11 teams), and 54%

from company three (73 of 135). The overall team response rate was 60% (95 of 158). This represented 458 individuals for an individual response rate of approximately twenty-nine percent.

There is no consensus in the literature concerning within-team response rate and inclusion in substantive analyses. In recent group-level research, a range of cut-off levels has been published. For example, Janz, Colquitt & Noe (1997) used a response rate cut-off of a minimum of "three" members from a team returning surveys, regardless of team size. Teams averaged ten members in their sample, so this criterion for inclusion was approximately 30% within team response rate. Alternatively, Ancona & Caldwell (1992) only included teams if 75% of the members responded. This suggests an acceptable range, therefore I examined substantive relationships with three different cut-off criteria. These criteria are (1) teams with at least two responses received, (2) teams with at least 30% within-team response rate, and (3) teams with at least 50% within-team response rate. The overall response rate reported above referred to the percentage of teams surveyed from which I received *at least one* survey. To meet the first cut-off teams had to have at least two respondents. Of the original responses, three teams had only one respondent. I removed these three teams from the database. This resulted in a total sample size of 92 teams with at least two responses (58% team response rate). 58 teams met the second criterion of at least 30% within-team response rate (37% response rate), and 36 teams met the most stringent criterion of at least 50% within-team response rate (23% response rate). I created a variable named "Total Response Rate" which indicates the overall within-team response rate for each team. Creating and including this variable allowed me to select

cases and run analyses on differing levels of conservatism and test for mean differences across response rates. Results are reported for the full sample, for all teams with at least 30% of members responding and for all teams with at least 50% of members responding.

The cut-off levels mentioned in the preceeding paragraph are for member response. As noted earlier, the dependent variable was collected from team leaders. In some cases where I received at least two or more member surveys, the leader did not respond. As a result, the number of available teams for the regression analyses is less than the number for overall team response rates. The sample size for teams with at least two members *and* the leader was forty-four. The sample size for teams with at least thirty percent of members *and* the team leader was thirty-three. The sample size for teams with at least fifty percent of members *and* the team leader was twenty-two. Because the number of teams in the overall sample and the number of teams available for the regression runs differs substantially, I will report all descriptive statistics and preliminary analyses for both the full sample (even teams with leader non-response) and the teams with leaders.

5.1.2 Measures

Dependent Variables. Information on the dependent variables was collected from team leaders. This treated the team leader as a key informant/expert rater. I also included the same dependent variable items on the member surveys. Collecting dependent variable information from the members as well as the leader allowed me assess construct validity of the dependent variable by examining the degree to which the leader responses converged with the member responses. Four items concerning search for practices and adoption of practices were included on the leader and member surveys. Correlation coefficients

between leader responses and member responses on all four dependent variable measures were positive and statistically significant. The correlation coefficients between leader scores and member scores were $r = .51$ ($p < .000$) for S1, $r = .50$ ($p < .001$) for S2, $r = .76$ ($p < .000$) for A1, and $r = .68$ ($p < .000$) for A2. These results provide evidence of convergence between member and leader ratings of external acquisition activity. In addition, I created two summary variables which capture whether either type of search or adoption was reported: (1) Any external search (coded "1" if *either* S1 or S2 were "1"), and (2) Any adoption from external sources (coded "1" if *either* A1 or A2 were "1").

The separate search and adoption variables allowed me to examine whether there are different relationships between key variables and new general practices versus best practices. The summary variables allowed me to run single equations for "any search" or "any adoption." The dependent variables consisted of single items with binary response, therefore, it was not possible or necessary to conduct factor analyses or internal consistency reliability estimates (alpha) on these variables.

Descriptive statistics for the dependent variables are reported in Tables 11 - 16. When ones and zeroes are used to score binary items, as is the case for my dependent variables, the mean of the item is equal to the proportion of teams with a score of one on the item (Pedhazur & Schmelkin, 1991: 98). For the first dependent variable, external search for practices, the mean value was .38, .43 and .41 in the full database, 30% within team response rate cut-off, and 50% within team response rate cut-off respectively. This can be interpreted to mean that 38% to 43% of teams reported external search (depending upon the database considered). To examine whether there were statistically significant

differences in the mean frequencies of occurrence of the dependent variable across the within-team response rates, I ran one-way ANOVAs with each dependent variable as the dependent variable in the ANOVA and total within team response rate as the independent variable. None of the F-values were statistically significant, indicating that the differences in the mean values of the dependent variables are not statistically significant across the three databases considered. Therefore for the remainder of my descriptions in this paragraph, I used the mean values from the largest database (all teams with at least two responses). To summarize these findings for external search, approximately 38% of teams reported external search for general practices and approximately 48% of teams reported external search for best practices. Approximately 33% reported adoption of practices from external sources and 28% reported adoption of best practices from external sources.

Independent Variables. Three independent variables were included in my analyses: (1) time pressure; (2) interruptions; and (3) anticipation of experienced interruptions. Measurement of each of these variables is discussed in the following paragraphs.

Time Pressure. Team time pressure was measured on team members only. The time pressure scale had an internal consistency score of .93(alpha) and was virtually identical in teams with leaders responding (.92) (Table 6). The seven time pressure items were also subjected to a principle components factor analysis. Results indicated that the seven items load on one factor. Individual scale scores were created taking the mean across the seven items. Team scores were then created by averaging individual team member scores. Descriptive statistics are reported in Tables 11-16.

As I did for the dependent variables, I also ran a one-way ANOVA using time pressure as the dependent variable and total within-team response rate as the independent variable. Means showed no statistically significant differences across internal response rates. Therefore, again for efficiency, I describe the summary statistics for time pressure using the full database. Results for all three databases are reported in Tables 11 through 16. Time pressure had a mean of 5.14 on a scale of 1 to 7, with a standard deviation of .84. These numbers were very similar for teams with leaders with a mean of 5.29 and a standard deviation of .66 (Table 12). This indicates that the average team in my sample reported moderate to slightly high levels of time pressure in the examined time period.

Interruptions. The second independent variable, interruptions, consisted of a set of potentially interruptive events. While there may be qualitative differences in interruptions, I did not posit specific hypotheses for the different types of interruptions. Instead, I operationalized interruptions as the number of these events experienced in the specified time period. The interruptions items had an internal consistency score of .66 (alpha) and was identical in teams with leaders responding (Table 6). I summed the number of interruptions reported by each team member and then created a team score by averaging the individual scores. Descriptive statistics for all the samples examined are reported in Tables 11 - 16.

One-way ANOVA results indicated that the mean values on interruptions were not significantly different across within-team response levels. The mean number of interruptions reported was approximately 2.76 with a standard deviation of 1.76 (Table 11). These numbers were very similar for teams with leaders with a mean of 2.98 and a

standard deviation of 1.71 (Table 12). The minimum number of interruptions reported was zero, with a maximum number of eleven in the one-month period examined. These results indicate that the interruptive events examined here commonly occurred, and that they varied considerably across teams.

Anticipation. The final independent variable was a measure of how anticipated the experienced interruptions were. For any "yes" answer for an interruption, the team members also answered an additional question asking to what degree they had anticipated the interruption. Individual scores were created by taking the mean of the items. Team scores were created using the mean of individual team members' scores. Descriptive statistics are reported in Tables 11 - 16.

The results of the ANOVA comparing mean levels of anticipation across internal response rates indicated that there were no significant differences in the mean scores across within-team response rates. The mean value in the largest database (all teams with at least two respondents) was 3.33. The descriptive statistics were virtually identical for teams with leaders with a mean of 3.43 and a standard deviation of .62 (Table 12). The values ranged from one, when experienced interruptions were not well anticipated, to five, when interruptions experienced by the team were completely anticipated. This range is narrower in the teams with leaders, ranging from 2.08 to 4.67.

Control Variables. Descriptive statistics for the control variables are also reported in Tables 11 through 16. Factor analysis results indicated that all eight decision making autonomy items loaded onto one factor. Alpha for decision making was .87 in both the full sample of all teams and the teams with leader responses (see Table 6). Mean values for

decision making autonomy ranged from 4.52 to 4.63. Scale scores were created taking the average of the items, and team scores were creating by averaging the individual scale scores. The five outcome interdependence items also loaded cleanly onto one factor. Alpha for the outcome interdependence scale was .77 for all teams and .72 using respondents from teams with leader responses (see Table 6). Mean values for outcome interdependence ranged from 4.49 to 4.72 across the databases. Scale scores and team scores were created the same way decision making scores were obtained. Length of time the team has existed was calculated as months. The mean length of time the teams existed was 7.55 months with a standard deviation of 8.64. The minimum tenure was half a month, and the maximum tenure was seventy months. The mean size of the teams was approximately ten members with a standard deviation of three. The smallest team in the sample had three members and the largest team had twenty-one members.

5.2 DATA AGGREGATION

As noted in Chapter Four, I conducted three different tests of appropriateness of aggregation: (1) r_{WG} within-group agreement; (2) One-way ANOVA; and (3) intra-class correlation. The results of these tests are detailed in the following paragraphs.

5.2.1 Within-Group Inter-Rater Agreement

Using the procedure detailed by James, Demaree and Wolf (1984; 1993) I calculated the inter-rater agreement for all continuous-type interval scales. A cut-off level of .70 is given by James et al., (1984) and others (George, 1990) to indicate adequate within-team agreement. Typically, researchers report an average value of r_{WG} across

groups on each variable. These average values are reported in Table 7 for all teams and in Table 8 for teams with leader responses. No values were calculated for the dependent variables since the dependent variables were collected from a single rater -- the leader. Within team agreement for time pressure ranged from .87 to .90 across the three sample cut-off levels. Average values were slightly lower in the teams with leader responses, ranging from .80 to .86. Since the James et al. procedure does not work for dichotomous variables, for the independent variable interruptions I calculated the percentage of members agreeing within each team. The average percentage of agreement for the interruption items ranged from .83 to .82 across the three sample cut-off levels (Table 7). These average values were identical for the subset of teams with leader responses (Table 8). The third independent variable, anticipation, had an average within-team inter-rater agreement ranging from .79 in the largest sample to .40 in the smallest sample (Table 7). These values were considerably lower in the subset of teams with leader responses, ranging from .39 to .20 (Table 8).

Outcome interdependence and decision making autonomy were the only control variables measured using multiple items with response scales. Therefore, I also calculated within-team agreement scores for these variables. Average within team agreement ranged from .73 to .80 for outcome interdependence and from .57 to .58 for decision making autonomy. These results were similar in the subset of teams with leaders (Table 8). These results indicate that all the independent and control variables except anticipation meet the prescribed level for within team agreement in the largest sample, and all but decision making and anticipation in the two smaller samples.

5.2.2 ANOVA

The second test for team-level attributes was a one-way ANOVA to test for between-group differences in the means of the variables. As noted in Chapter Four, an F-ratio of 1.00 or greater is considered demonstration of between teams differences (Hays, 1981). This finding is further strengthened if the F-test is statistically significant. ANOVA results are presented in Tables 9 and 10. F-values were greater than one and statistically significant for all three independent variables and the control variables (in both teams with and without leader responses), indicating significant mean differences between groups. F-values for anticipation failed to reach statistical significance in the subset of teams with leaders.

5.2.3 Intra-Class Correlation

The final data aggregation test was the ICC (Intra-class correlation). Glick (1985) suggests a cut-off of .60 to indicate within-group agreement and between-groups differences. Results of the ICC analyses are reported in Tables 9 and 10. While the two previous measures of appropriateness of aggregation (within-team inter-rater agreement and ANOVA) generally supported the appropriateness of aggregation, the ICC results are mixed. ICC scores for interruptions ranged from .33 in the full database to .50 in the database with at least 50% within team response rates. Time pressure scores were similarly mixed, although generally higher, ranging from .49 to .55 (approaching the prescribed cut-off level). ICC scores on anticipation ranged from .78 to .85. In the subset of teams with

leader responses, these values decrease across the board and all of the ICC scores drop below the .60 cut-off level (Table 10).

If these results are taken together for all teams in the sample, aggregation of interruptions is supported by two out of the three indicators, aggregation of time pressure is supported by two of the three indicators, aggregation of anticipation is supported by two of the three indicators. Taken together, these results provide support for aggregating individual level responses to the independent variables to group-level constructs. Given these results, I proceed using the group-level variables in all further analyses reported in the following paragraphs. Results for anticipation in the leader subset are below cut-off levels, suggesting within-team unreliability in this variable. This may attenuate relationships and will be considered when evaluating results.

5.3 CORRELATION RESULTS

Correlation coefficients for all variables are reported in Tables 17 - 22. Tables 17 - 19 report the correlation coefficients for all teams meeting the various within team response rates. Tables 20 - 22 report these values for the subset of teams with leaders responding. Note that the correlations between the independent variables and dependent variables and between the control variables and the dependent variables will remain the same between the subset of teams and the entire sample of teams because these are pairwise correlations and those teams without leader response would be dropped from the analyses using the dependent variables because the data would be missing.

I conducted the same correlation analyses for all three databases to examine the sensitivity of the coefficients and statistical significance to sample size. First, in Table 17 (and Table 20 for the corresponding analyses with the subset of teams with leader responses), I ran the analyses with the entire sample, which includes all teams with at least two responses. In Table 18 (and Table 21), I report these results using only teams with 30% or more within-team response rate, and in Table 14 (and Table 22) results using the most conservative cut-off -- only teams with 50% or more within-team response rate. I shaded the cells with statistically significant coefficients to make it easy to visually examine the patterns of statistical significance across the databases. The pattern is nearly identical across the three Tables. The main change is that fewer of the relationships are statistically significant going from the largest sample (35 statistically significant coefficients) to the smallest sample (27 statistically significant coefficients). The reduction in the number of significant relationships in the smallest sample makes sense given that there is likely to be less power and there is less variance in the independent variables in the smaller sample, making it more difficult to detect statistical significance of the coefficients. Overall, the zero-order correlations with the dependent variables were very similar across the three different databases.

I first used correlation results to examine the bivariate relationships identified in the hypotheses. I address each of these relationships in turn, then use the correlation results to examine collinearity among the independent variables.

Hypothesis 1a suggested that teams experiencing higher time pressure are less likely to engage in external search for practices. In all but one bivariate case, the direction

of the correlation between time pressure and the external search variables was positive -- opposite the direction hypothesized. None of the coefficients between time pressure and external search were statistically significant.

Hypothesis 1b suggested that teams experiencing higher time pressure are less likely to adopt practices from external sources. In all three databases, all relationships between time pressure and the adoption variables were positive, and using the full sample, these correlation coefficients were also statistically significant: (1) Time Pressure and External Adoption of Practices ($r = .27$, $p < .076$, $n = 43$); (2) Time Pressure and External Best Practice Adoption ($r = .32$, $p < .038$, $n = 43$); and (3) Time Pressure and Any External Adoption ($r = .26$, $p < .094$, $n = 43$). All of these tests were two-tailed.

Hypothesis 2a suggested that teams experiencing more interruptions are more likely to engage in external search for practices. Across all three databases, the correlation coefficients between interruptions and the search variables were in the hypothesized direction – positive. However, none of the coefficients were statistically significant.

Hypothesis 2b suggested that teams experiencing more interruptions are more likely to adopt practices from external sources. In all three databases, the correlation coefficients between Interruptions and the three measures of External Adoption were positive and significant (using a one-tailed test). These values are as follows for each of the databases respectively: (1) Interruptions and External Adoption of Practices A1 ($r = .33$, $p < .016$, $n = 43$; $r = .34$, $p < .027$, $n = 33$; $r = .37$, $p < .004$, $n = 22$); (2) Interruptions and External Adoption of Best Practices A2 ($r = .43$, $p < .002$, $n = 43$; $r = .48$, $p < .003$, $n = 33$; $r = .56$, $p < .004$, $n = 22$); and (3) Interruptions and Any External

Practice Adoption A1 or A2 ($r = .31$, $p , .024$, $n = 43$; $r = .31$, $p < .041$, $n = 33$; $r = .34$, $p < .064$, $n = 20$).

The final hypotheses, H2c and H2d, concerned the impact of the anticipation as a moderator of the relationship between interruptions and external acquisition of practices. Testing these hypotheses requires the use of an interaction term in regression equations, however, the correlation coefficients between anticipation and the dependent variables were not statistically significant.

Bivariate correlation coefficients can also be used to examine the threat of multi-collinearity in multiple regression. Multi-collinearity refers to correlation among independent variables. Interruptions and time pressure are not inter-correlated. The interruptions variable had only one statistically significant correlation with a control variable (Interruptions and Outcome Interdependence). Anticipation is correlated with outcome interdependence, team size, and company one. Decision making autonomy is correlated with most of the control variables as well as time pressure. These results indicate that there is some degree of collinearity between the control variables and between the control variables and predictor variables. The results for the subset of teams with leader responses are very similar, and in general, the teams that will be used in the regressions have a few more statistically significant correlations among the independent variables and control variables (approximately one to four more depending upon the sample size) as reported in Tables 20 - 22.

The most important problem presented by multi-collinearity is that multi-collinearity reduces the dependent variable variance explained relative to what would be

the case if the independent variables had the same simple relationships with the dependent variable, but little or less collinearity. As the correlation between any independent variable and other independent variables in a regression equation increases, the standard error of the partial coefficient increases, reducing statistical power. If variables have a theoretical reason for being in the model, they should remain in the model even if they are correlated (Schwab, 1999). The main interpretation is that if variables are highly collinear, results would be improved with a larger sample, because the increase in standard errors of the partial coefficients associated with the collinear independent variables reduces statistical power (Schwab, 1999).

In summary, the zero-order correlation results suggested support for Hypothesis 2b and also demonstrate that there is some degree of multi-collinearity among the independent variables and the control variables. The multi-collinearity is not severe, however it does exist and therefore should be considered when interpreting the results of the multiple regressions reported in the next section

5. 4 REGRESSION RESULTS

As noted earlier, because the dependent variables are dichotomous, a regression technique that accounts for the restricted left-hand side (0 or 1) must be used. I used Probit regression models (Aldrich & Nelson, 1984) to test the hypotheses. Probit regression uses a maximum likelihood estimation and predicts the occurrence of an event (assigned a value of one). Hypothesis tests are conducted primarily by examining the direction and significance of the regression coefficients (identical to the interpretation used in OLS regression). An additional test can be conducted to examine the joint effect of additional

predictor variables above and beyond the control variables (similar to a hierarchical OLS regression). This test is conducted by examining the change in log likelihood between the control model and the full model. This "goodness of fit" is tested using a statistic calculated by taking –2 times the change in log likelihood. This statistic is approximately chi-square distributed with two degrees of freedom.

The remainder of this section is organized as follows. I describe the Probit regression results for each of the six dependent variables in turn. Within each variable description, I discuss results for all three databases, with emphasis placed on whether the results were consistent across the sample sizes. In all cases, the regressions were run with four models. First, the control variables were entered. Then in the second model, the two main independent variables were entered (Time Pressure and Interruptions). In the third model anticipation was added, and finally in the fourth model the interaction term (Anticipation X Interruptions) was added. Results of these models are described in the following sections.

5.4.1 Regression Results for External Search (H1a, H2a, H2c)

DV = Any External Search (S1 or S2). Regression results for this dependent variable are reported in Tables 23, 24, and 25. In the first step, the control variables were entered. The coefficients for two controls, Company 1 and Team Size, were statistically significant in the full sample. Company 1 remained significant in the middle database (Table 24).

In the second step, time pressure and interruptions were entered. The coefficient for time pressure was positive and not statistically significant in the two larger databases

(Tables 23 & 24). The coefficient for time pressure is negative (in the hypothesized direction) in the smallest database (Table 23), but not statistically significant. The coefficient for interruptions was positive in all three databases and was statistically significant (one-tailed test) in the two more conservative databases (>=30% within team response rate and >=50% within team response rate) with coefficients and p-values of .459 ($p < .08$) and 1.05 ($p < .067$) respectively. These results support H2a but do not support H1a.

Further evidence concerning the independent variables can be obtained by examining the goodness of fit of the model after the independent variables have been entered. As mentioned earlier, this is done by testing the statistical significance of the change in log likelihood between the two models. The change in log likelihood between the control variable model and the predictor model was statistically significant in the most conservative database ($p < .10$), but not significant in the other two models.

The final step was to address the interaction between interruptions and anticipation. To do this, first I added anticipation as a main effect, then in the final step, I added the interaction term. This coefficient was positive (opposite the hypothesized direction) and was not statistically significant. The change in log likelihood also was not significant. These results do not support H2c.

DV = External Practice Search (S1). Regression results for this dependent variable are reported in Tables 26, 27, and 28. In the first step, the control variables were entered. None of the control variable coefficients were statistically significant.

In the second step, time pressure and interruptions were entered. The coefficient for time pressure was not statistically significant across all three databases, however, in the two more conservative databases, the coefficient was negative as hypothesized. The coefficient for interruptions was positive and statistically significant (one-tailed test) in all three databases (Full Sample, >=30% Within Team Response Rate, and >=50% Within Team Response Rate, respectively), with coefficients and p-values of b = .239, $p < .09$; b = .421, $p < .078$; and b = 1.11, $p < .037$. These results support H2a but do not support H1a. Further evidence concerning the independent variables can be obtained by examining the goodness of fit of the model after the independent variables have been entered. The change in log likelihood between the control variable model and the predictor model was statistically significant in the most conservative database ($p < .05$), but not significant in the other two models. These results support H2a but do not support H1a.

Again, the final step was to address the interaction between interruptions and anticipation. To do this, first I added anticipation as a main effect, then in the final step, added the interaction term. The coefficient was positive in the two larger databases, opposite the hypothesized direction (Table 26 & 27), and negative in the most conservative database (Table 28), but not statistically significant. The change in log likelihood also was not significant. H2c was not supported.

DV = External Best Practice Search (S2). Regression results for this dependent variable are reported in Tables 29, 30 and 31. Again, in the first step control variables were entered. The coefficients for two controls, Company 1 and Team Size, were

statistically significant in the full sample. Company 1 remained at least marginally significant across all three databases.

In the second step, time pressure and interruptions were entered. The coefficient for time pressure was not statistically significant across all three databases, however, in the most conservative database, the coefficient was negative as hypothesized but not statistically significant. The coefficient for interruptions was positive and statistically significant (one-tailed test) in the two more conservative databases (Full Sample, >=30% Within Team Response Rate, and >=50% Within Team Response Rate, respectively), with the following coefficients and p-values b = .459 ($p < .08$), and b = 1.05 ($p < .067$). These results support H2a but do not support H1a. The change in log likelihood between the control variable model and the predictor model was statistically significant in the most conservative database.

The final step was to address the interaction term. The coefficient was positive and not significant in all three databases. The change in log likelihood also was not significant. These results also do not support H2c.

5.4.2 Regression Results for External Adoption (H1b, H2b, H2d)

DV = Any External Practice Adoption (A1 or A2). Regression results for this dependent variable are reported in Tables 32, 33, and 34. Control variables were entered in the first step. Across all three databases, none of the control variables were statistically significant.

Time Pressure and Interruptions were entered into the next step to test the main effects of these two independent variables. Time pressure had a positive coefficient across all three databases (opposite that predicted in H1b), and was significant in the full sample ($b = .934$, $p < .07$, two-tailed). The coefficient for Interruptions was positive and statistically significant in all three databases (Full Sample, >=30% Within Team Response Rate, and >=50% Within Team Response Rate, respectively), $b = .376$, $p < .024$; $b = .453$, $p < .073$; and $b = .591$; $p < .042$. These results support H2a but do not support H1a. As noted in the results for the search variables, further evidence concerning the independent variables can be obtained by examining the goodness of fit of the model after the independent variables have been entered. The change in log likelihood between the control variable model and the predictor model was statistically significant in full database ($p < .05$, Table 32) and in the middle database ($p < .10$, Table 33), but not significant in the smallest sample.

The interaction term was addressed in the final steps. This coefficient was positive across all three databases, and was marginally significant in the largest database ($b = .75$, $p < .10$, Table 32). However, the change in log likelihood was not significant in any of the models. These results do not support H2d.

DV = External Practice Adoption (A1). Regression results for this dependent variable are reported in Tables 35, 36, and 37. Control variables were entered in the first step. Outcome Interdependence was significant in the full database, but not statistically significant in the two more conservative databases. Across all three databases, none of the remaining control variables were statistically significant.

Time Pressure and Interruptions were entered into the next step to test the main effects of these two independent variables. Time pressure had a positive coefficient across all three databases (opposite that predicted in H1b), and was statistically significant in the full sample ($b = 1.23$, $p < .042$). The coefficient for Interruptions was positive and statistically significant in all three databases (Full Sample, >=30% Within Team Response Rate, and >=50% Within Team Response Rate, respectively), $b = .392$, $p < .022$; $b = 1.39$, $p < .083$; and $b = 1.63$; $p < .052$. These results support H2a but do not support H1a. The change in log likelihood between the control variable model and the predictor model was statistically significant in all three databases lending further support to H2a.

The final step was to address the interaction between anticipation and interruptions. The coefficient for the interaction term was positive and not significant in any of the models, nor was the change in log likelihood. H2d was not supported.

DV = External Best Practice Adoption (A2). Regression results for the final dependent variable are reported in Tables 38, 39, and 40. Control variables were entered in the first step. Across all three databases, none of the control variables were statistically significant.

Time Pressure and Interruptions were entered into the next step to test the main effects of these two independent variables on external best practice adoption. Time pressure has a positive coefficient in the two larger databases (opposite that predicted in H1b), and was statistically significant in the full sample ($b = 1.01$ $p < .074$). In the most conservative database (Table 40), the Time Pressure Coefficient is negative (in the hypothesized direction), however, it is not significant, even with a one-tailed test. The

coefficient for Interruptions was positive and statistically significant in all three databases (Full Sample, >=30% Within Team Response Rate, and >=50% Within Team Response Rate, respectively), $b = 2.58$, $p < .005$; $b = 1.10$, $p < .017$; and $b = 1.78$; $p < .038$. These results support H2a but do not support H1a. Furthermore, the change in log likelihood between the control variable model and the predictor model was statistically significant in all three databases lending further support to H2a.

The final step was to examine the interaction. The coefficient was positive in the two larger models and was statistically significant in the largest sample ($b = 1.89$, $p < .10$, Table 38). The change in log likelihood was also statistically significant in the full sample. Models three and four are not reported for the smallest database on this dependent variable because Stata failed to estimate a maximum likelihood model. This failure was indicated by output containing extremely large standard errors for most variables and missing values for others. This indicates that there is multi-collinearity among the independent variables and low variance on the dependent variables, which with this small sample ($n = 20$), Stata is unable to disentangle the effects of this set of variables on the dependent variable. Given the results from the two larger databases, H2d was not supported.

5.5 ADDITIONAL ANALYSES

While I focused explicitly on team external acquisition of routines, it may be that teams also engage in internal development of routines. I noted in Chapter One, that the organizational learning literature suggests that new knowledge can be either created internally or acquired from external sources. In my sample, a significant number of teams reported engaging in external search and adoption of routines. However, these findings

may be insignificant if many more teams report internal acquisition of routines. Also, it may be interesting to examine the way in which the variables I identified in my hypotheses relate to internal routine development activities. Given these issues, I conducted some additional analyses to examine these questions. I included a set of questions asked to team members concerning the *effort* they expended in the specified month for knowledge acquisition and development activities. Among these questions, I asked one question concerning effort expended on the internal development of routines (See Appendix C). This question, unlike my dependent variables, was answered on a 5-point likert-type scale where 1 = no effort, 2 = a very low amount, 3 = a little, 4 = a moderate amount, 5 = a very high amount. The mean score for the subset of teams with leader responses on this item was 2.70 with a standard deviation of .78. Translated back to the response scale, this means that the average team reported between "a very low amount" and "a little" effort expended on internal development or modification of routines. While it is difficult to directly compare these values to the dichotomous responses for the leader reported external acquisition items, it is clear from these values that teams are *not* reporting high levels of internal knowledge devlepment activities in the corresponding time period as the external acquisition activities were reported. Further understanding of these activities is provided by the frequencies of occurrence. 11% of teams reported no activity in internal development or modification of routines, 36% of teams reported "a very low amount" of effort, 38% of teams reported "a little" effort, 13.83% reported "a moderate amount" of effort, and only 1% reported "a very high amount of effort."

In addition to the descriptive statistics reported in the previous paragraph, I ran a set of correlation analyses to examine the relationships between internal creation and modification of routines, to the dependent and independent variables in my study. Across the three databases, the relationship between internal development of routines and the six external acquisition dependent variables was not statistically significant. This suggests that teams may discriminately engage in the two types of activities. Across all three databases, the correlation coefficients between interruptions and the internal development variable were positive, and in the two larger databases, these coefficients were statistically signficant. These results suggest that interruptions also have a positive effect on effort expended in internal development of routines as well as external acquisition. Finally, across all three databases, the correlation coefficients between internal development of routines and time pressure were negative, but only one reached statistical significance.

The results of these additional analyses suggest that the teams do engage in internal development of routines. 89% reported some activity -- not an insignificant number -- however, of these, the majority reported very little effort applied to the internal development of routines. As noted above, since this item was not measured in the same way that external acquisition was, it is difficult to directly compare. Even so, the two key independent variables, time pressure and interruptions, have similar relationships with internal development as they did with external acquisition.

5.6 SUMMARY

In this chapter I described the results of the analyses. The overall team response rate was sixty percent. I conducted analyses with three different cut-off criteria for within team response rates: (1) teams with at least two responses (resulted in a 58% team response rate), (2) teams with at least thirty percent within-team response rate (resulted in a 37% team response rate), and (3) teams with at least fifty percent within-team response rate (resulted in a 23% team response rate).

All variables were examined for psychometric properties. All scale variables demonstrated adequate internal consistency reliability. All scale variables also loaded cleanly onto single factors representing the underlying constructs. ANOVA results did not demonstrate any mean differences in the independent variables across sample cut-off levels, lending credibility to the use of more lenient cut-off levels in subsequent analyses. Three tests of the appropriateness of aggregating individual level responses to team level variables were conducted. While results were mixed for some variables, all independent and control variables met at least two out of three criteria for aggregation, and I used the aggregated variables in all subsequent analyses.

Hypothesis tests were conducted using Probit regression. Four different models were run on three different databases for each of the six dependent variables. I summarize these analyses and their implications for my hypotheses in the following paragraphs.

Hypotheses 1a and 1b concern the effect of time pressure on teams' external acquisition of routines. Hypothesis 1a suggested that time pressure would have a negative effect on external search for routines. Results across the databases and the dependent variables were mixed. In five of the nine models the coefficient was positive and not statistically significant. However, in four of the nine models, the coefficient was negative, as predicted, but not statistically significant (see Tables 25, 28 & 30). These results are equivocal and do not support H1a.

Hypothesis 1b suggested that time pressure would also have a negative effect on adoption of routines from external sources. Results across the three databases and three dependent variables were opposite the predicted relationship. In eight of the nine models, the coefficient for time pressure was positive. Furthermore, this coefficient was statistically significant (two-tailed test) in three of these models (see Tables 32, 35 & 38). These results do not support H1b.

Hypotheses 2a and 2b concern the effect of interruptions on teams' external acquisition of routines. H2a suggested that teams experiencing more interruptions are more likely to engage in external search for routines. Results across the three databases and three dependent variables for external search were all in the predicted direction, positive. Furthermore seven of nine of these coefficients were statistically significant (Tables 24, 25, 26, 27, 28, 30 & 31). These results support H2a.

Hypothesis 2b suggests that teams experiencing more interruptions are more likely to adopt new routines from external sources. Results across all three databases and all three dependent variables for adoption from external sources were in the predicted

direction, positive. Furthermore, all nine of these coefficients were statistically significant (see Tables 32-40). These results support H2b.

The final set of hypotheses, H2c and H2d concern the effect of anticipation on the relationship between interruptions and external acquisition of routines. H2c concerns this relationship with external search and suggests that when interruptions are anticipated, they will not increase the likelihood that teams engage in external search. Across eight of the nine models the coefficient was positive and not significant. These results did not support H2c. H2d suggests that when interruptions are anticipated, they will not increase the likelihood that teams adopt new routines from external sources. Across the eight databases, the coefficient for the interaction term was positive. The coefficient was also statistically significant in two of the models (see Tables 32 and 38). These results did not support H2d.

In sum, of the six hypotheses posed in Chapter Two, only the two hypotheses concerning the effect of Interruptions on teams' external acquisition of work routines were supported. The remaining hypotheses, H1a, H1b, H2c and H2d were not supported. In the next Chapter I will discuss these findings at greater length, providing additional interpretation. I will also address the impact of these findings on current literature as well as future research. Finally, I will discuss the limitations of this study.

End note

James et al. (1984) suggest that it may be appropriate to de-emphasize the ICC results. Specifically, they argue against using ICC because if judges in a single team agree on most

responses to items, there may be a severe restriction of range in the data. Such agreement is necessary to achieve high levels of the ICC. ICC is insensitive to *degrees* of agreement, rather relying on absolute levels of agreement. ICC treats agreement as an all-or-nothing phenomenon with no room for partial or incomplete agreement. They provide the example of an ICC on a scale where one team member answers "4" and another answers "5." James et al. demonstrate that this circumstance would be treated as *disagreement* by ICC, but that most people would feel that this represents at least "partial agreement" because it is a response *scale*. As a result, when team members answer items on a 7-point scale, ICC will not achieve high values if team members' answers vary across several response levels, but generally clustering around a similar value. This poses a difficult problem in determining what really is "enough" agreement among team members. If asked about their team's time pressure and all answer between 5 and 7 (the upper end of the scale), is this agreement or disagreement? Do they all need to answer the *same* to constitute a reliable score? This is a question open to further debate. Finally, it has also been noted that ICC(1,*k*) increases as the number of raters increases. My sample includes many teams with a small number of raters (i.e. less than five). This could be another reason why the ICC values are just below the .60 threshold suggested by Glick. James et al. (1984) conclude that greater emphasis should be placed on the realized within-group rater agreement, informed by the ICC results.

CHAPTER SIX
DISCUSSION & CONTRIBUTIONS

6.0 INTRODUCTION

In this last chapter I summarize and discuss the results of the study. I begin with a review of the hypotheses and the results of the hypothesis tests. Then I discuss implications of these results for the three theoretical domains identified in Chapter One. After this, I discuss limitations of the study. The chapter is concluded with suggestions for future research, and practical implications of the findings.

6.1 REVIEW OF RESULTS

The objective of my research was to examine the influence of two team contextual factors -- time pressure and interruptions -- on teams' acquisition of routines from external sources. This objective addressed three theoretical domains: (1) team routines, (2) organizational learning and knowledge transfer, and (3) team boundary spanning. I focused on routines as procedural knowledge and drew on literature concerning the emergence, maintenance and change of routine behaviors. I hypothesized three sets of relationships. First I hypothesized that higher levels of time pressure would reduce the likelihood that teams acquire routines from external sources. In the second set of hypotheses, I argued that interruptions would increase the likelihood that teams acquire routines from external sources. Finally, in the third set of hypotheses, I suggested that anticipation would moderate the effect of interruptions on external acquisition of routines.

In the following sections I summarize and comment on the results of the tests of each set in turn.

6.1.1 Time Pressure

I hypothesized in H1a and H1b that teams experiencing higher levels of time pressure would be less likely to either search for or adopt new routines from external sources. H1a was not supported. Across the three search dependent variables and the three databases, none of the coefficients for time pressure was significant, and in five of the nine equations, the coefficient was positive -- opposite the hypothesized direction.

In H1b I hypothesized that the relationship between time pressure and adoption of routines from external sources would also be negative. Across the nine equations for external adoption, the coefficient for time pressure was positive in eight of the equations. In three of these equations, the positive coefficient was also statistically significant in a two-tailed test (see Tables 32, 35, and 38). All three of these equations are in the largest database (at least two responses from a team). The failure for the positive coefficients to reach significance in the smaller databases may be due to low statistical power given the small sample sizes and eight predictors in the equations. The zero-order correlation coefficients between time pressure and the adoption variables were also positive and statistically significant.

These results indicate that time pressure is related to the adoption of routines from external sources, but that the relationship is opposite the hypothesized negative direction. The effect of time pressure on external search is unclear. No clear support for H1a was found.

6.1.2 Interruptions

I hypothesized in H2a and H2b that teams experiencing more interruptions will be more likely to either search for or adopt new routines from external sources. Generally, H2a was supported. In all nine equations the coefficient for the relationship between interruptions and external search was positive. Seven of these coefficients were also statistically significant. Three of the equations also had significant improvement in model fit over the control variables alone (see Tables 25, 28 and 31). It is worth nothing that the larger databases tended to exhibit greater unreliability in inter-rater agreement. This unreliability may have contributed to the failure for the change in log likelihood to reach significance in the larger databases, since unreliability inflates standard errors and attenuates relationships.

In H2b I hypothesized that interruptions would also have a positive effect on the likelihood of adoption from external sources. H2b was strongly supported. The coefficient for interruptions was positive and statistically significant across all nine models. The change in log likelihood as an indicator of model fit was statistically significant in eight of the nine models, and in the one model where it failed to reach significance, it was just off the required chi-squared level needed. See Tables 32 through 40 for these results.

Taken in combination, the results for H2a and H2b indicated that are importantly related to teams' external acquisition of routines. The more interruptions a team experiences in a given time period, the more likely that the team both searched outside its boundaries for new routines and adopted routines from those external sources.

6.1.3 Anticipation

In the final two hypotheses, H2c and H2d, I suggested that a characteristic of interruptions, anticipation, may be an important moderator of the effect of interruptions on external acquisition of routines. Specifically, I suggested that when interruptions are anticipated, they will lose novelty and will be less likely to lead to external search for routines (H2c) or adoption of routines from external sources (H2d). The coefficient for the interaction term was positive (opposite the predicted direction) in all but one of the equations. In two of the equations, the positive coefficient was also statistically significant (see Tables 32 & 38). These results did not support H2c or H2d. At least for this sample, it appears that interruptions are related to external search and adoption from external sources regardless of the level of anticipation.

6.2 THEORETICAL IMPLICATIONS

The results described in the previous section have implications for three theoretical domains: (1) team-level routines; (2) knowledge transfer; and (3) team boundary-spanning activities. First, this research provides one of only a handful of empirical studies concerning changes in team-level routines conducted to date. Previous research on routines has demonstrated that teams develop routines and routines are often maintained (Dougherty, 1992, Gersick, 1988, 1989; Gersick & Hackman, 1990: Hackman & Morris, 1976; Kelly & McGrath, 1985). Despite recognition that it may be crucial for teams to acquire new routines, our understanding of covariates to changes in routines remains weak.

The results of my study provide empirical evidence concerning two potential covariates to acquisition of routines. First, previous theory and research findings suggested that time pressure would have a negative effect on external acquisition activities (e.g. Goodman, 1996; Betsch et al, 1998), that under time pressure, it may be more likely that teams will maintain their routines. My results concerning the effect of time pressure on external search were equivocal. These findings suggest that time pressure may not negatively affect search in that teams may be just as likely to search for new routines during periods of high or low time pressure. Only one previous study explicitly examined the relationship between time pressure and routines (Betsch, et al., 1998). This study found that under time pressure *individuals* are more likely to maintain their routines. My results are contrary to research conducted at the individual level of analysis and suggest that perhaps the relationship between time pressure and external information search may be different at the group versus the individual level of analysis.

Also contrary to the previous research, my results provide some support for a positive effect of time pressure on external *adoption* of routines. These findings again run counter to previous theory which would suggest that under time-related stress, systems will tend to maintain well-learned behaviors and will be unlikely to attempt change. However, these findings may be consistent with another line of reasoning promoted by McGrath (1991) in which he argues that when time is scarce, less time will be devoted to planning and creating strategies for performance, and more time will be devoted to acting and performing. Put into the language of routines, it may be that when time is scarce, teams will not devote scarce temporal resources to internal development of new work routines,

but will instead go outside their boundaries and "grab" a satisfactory option. Taken together, these findings suggest that time pressure may indeed have an effect on teams' acquisition of routines. However, these results are mixed and need further testing, as will be discussed in the limitations and future research sections below.

My results concerning the effect of interruptions on external acquisition also extend the literature on team-level routines by providing an empirical test of the effects of interruptions on the acquisition of routines. Several authors have theorized the need for a disruption to provoke mindful attention to routines, and to subsequently trigger changes in routines, but no direct empirical evidence for teams existed prior to this study. My findings suggest that interruptions may be an important factor in predicting the likelihood that teams engage in external acquisition of routines. Interruptions may influence changes in routines. Specifically, in a given time period (here a month), teams experiencing more interruptions were more likely to acquire new routines from external sources. This finding suggests that external acquisition of routines is linked to interruptive events. This provides empirical support to theory about team-level routines.

Taken together, my findings concerning time pressure and interruptions suggest that examining the covariates to acquisition of routines is important. The results also respond to calls to make issues of time more explicit in a wider range of organizational behavior research. Finally, my results extend the routines literature by examining the relationship between interruptive events and changes in routines in *ongoing* teams embedded in an organizational context. The little empirical work existing prior to this study concerning teams and routines (e.g. Gersick, 1988, 1989) focused mainly on short-

term teams (e.g. task forces) or finite, one-time experimental teams. My results suggest that the relationship between theorized triggers to changes in routines extend to ongoing work teams.

In addition to contributions to the team routines literature, my research also extends the knowledge transfer literature by addressing antecedents to transfer and by specifically examining team-level transfer. Furthermore, my study provides an empirical test of knowledge transfer activities. Very few empirical studies currently exist in the organizational learning and knowledge management literature. My findings suggest that knowledge acquisition activities, here in the form of acquisition of work routines, are common at the team-level. Empirical demonstration of these actions at the team-level points out that this level of analysis is an important overlooked area in the knowledge transfer literature. Furthermore, the findings that time pressure and are related to knowledge transfer indicates that these are important constructs for the knowledge transfer literature to incorporate.

Finally, my research extends the team boundary spanning theory by identifying and testing two potential predictors of a specific boundary spanning activity – external acquisition of routines. Prior to this study, little conceptual or empirical attention had been given to the triggers to boundary spanning or timing of team boundary-spanning. Prior research focused on describing boundary spanning activities and demonstrating that they influence team performance. However, little attention was given to antecedents to these activities. This is a shortcoming in the theory because it is important to understand why activities occur in order to understand how interventions may be possible, or when

boundary spanning is effective or not as a response to triggers. Furthermore, as was the case in the team routines literature, very few empirical studies exist testing boundary spanning activities, and in the existing studies, the teams sampled have typically been short-term teams. This study extends boundary-spanning research to ongoing work teams. I found that boundary-spanning, here in the specific form of crossing team boundaries to acquire routines, is common in ongoing work teams. This suggests that boundary spanning theory and findings from the previous studies may have important implications for a wide variety of teams.

While this research makes a contribution to theory in three areas, the results must be interpreted with caution. As with any study, this project has its limitations. In the next section, I highlight the main limitations and then provide suggestions for future research that build off the findings and the limitations.

6. 3 LIMITATIONS

This research has many limitations. As noted in the previous section, this research is one of the first empirical studies of team-level routine acquisition. In many ways this is exploratory research and is limited by that fact. In this section I discuss the major limitations and make suggestions for future research based on them.

The results reported here are cross-sectional. Cross-sectional research does not allow causal relationships to be established. An empirical relationship was demonstrated, but future research must include longitudinal work to dissect the causal paths between these variables. Furthermore, there may be lagged effects of the variables included in this study. I asked respondents to provide information on the independent variables and the

dependent variables in a single month. It is plausible that the effects of time pressure or interruptions may manifest themselves in later time periods, or that the effects may be different in the concurrent time period from lagged time periods. Future work using longitudinal designs should test these possibilities.

Another limitation of this study is the type of teams included and the industry context. Future research should examine the generalizability of the results reported here to groups in other settings with more or less time pressure or interruptions. Higher natural levels of time pressure among the teams I sampled may reduce the ability to predict knowledge acquisition activities due to restriction of range. Variation in time pressure across time periods may also be important. It may be that some types of teams have more widely varying cycles of time pressure, while others have comparatively little. With cross-sectional data, it is not possible to know whether the teams in my sample are of one type or the other. If they generally work under high levels of time pressure with little variance over the months, this could be an explanation for the lack of support for the time pressure hypotheses. In other words, if high time pressure is rather constant across the months for these teams, some other factor may drive maintenance or change in routines. Without longitudinal research, there is no way to test this. As a result, it would be ideal to examine these hypothesized relationships in a more diverse sample (e.g., take teams from two very different industry settings – one more characterized by high time of dynamism/time pressure and another by lower levels of dynamism/time pressure) using a longitudinal design. Ensuring adequate variance would reduce the likelihood of range

restriction among the study variables. Greater variance increases the effect sizes that can be observed, increasing the likelihood of detecting significant effects.

The type of teams in my sample are real teams in organizations. These teams may not match idealized views of typical small groups in the organizational behavior literature. Many of these teams are dispersed geographically and may not meet face-to-face on a frequent basis. Members of these teams may vary in the degree to which the members identify their unit as a single team. The organization sees the unit as a team and there are collective outputs that the team is responsible for, however, some members of some teams work on additional secondary teams as well as on their primary teams. This is common for real organizational teams (Sundstrom et al, 1990). As a result it could be the case that members work with sub-groups of teammates rather than with the entire team. This could lead to discrepancies in reporting activities within the team, possibly leading to low inter-rater agreement. Campion et al. (1996) discuss the issue of whether team members identify themselves as a team, and the implications this may have on team-level relationships. The literature has sidestepped this issue and has typically inferred that if team members do not uniformly see themselves as a team, they are not teams. This is an oversimplification – teams range much more along a continuum in organizations. In Campion et al's study, they used three measure of "single-team identity" and these measures showed substantial variation among the 60 teams in their study (all from the same organization). Yet the relationships between team characteristics and effectiveness were not moderated by "single team identity," thus they concluded that the relationships examined in their study were generalizable across team forms. Future research should

more carefully examine the composition and work patterning of the teams to understand the potential impact of such sub-grouping on key team-level constructs and relationships between them.

Industry context is another limitation of this study. The teams in my sample come from organizations in the pharmaceutical and medical products industries. These industries are knowledge-intensive and therefore results may differ in contexts where knowledge management and knowledge transfer do not have as high an industry priority. As noted in the previous paragraphs, future research should sample teams from different industry and organizational settings to examine the generalizability of these results.

In addition to the design and sample, this study is limited by new and unproven measures. Prior to this study, no measures of acquisition of routines existed. Similarly, no measures of interruptions or common interruptive events existed. The measures developed here are a first attempt to measure routine acquisition as reported by teams and also to measure various interruptions. Empirical relationships found between key variables support construct validity (Schwab, 1980), but construct validation must be considered a continuous process. These measures need to be tested in other environments and expanded and/or adjusted as new results become available (Schwab, 1980). Furthermore, dependent variable information was collected with single items only. This maks dependent variable detail, for example the content of the acquired routines.

Future research should also incorporate measures collected from multiple sources and multiple methods. This could include archival records from the organizations in which the teams work. For example, archival information could be used to measure or validate

team reports concerning interruptions resulting from membership changes. It would also be possible to follow-up survey results with interviews. For example, if a team indicated on the survey that it had searched external sources or had adopted routines from external sources, follow-up interviews could be conducted with those teams to obtain detail concerning the routine, its content, and its source. This kind of design would require a significant partnership between the researcher and the teams sampled, but would provide rich information concerning the nature of the externally acquired routines.

The small sample size and survey nonresponse also limit the interpretation of the findings. The small sample threatens valid inference due to low statistical power. Power is the likelihood of making an incorrect "no difference" conclusion (Type II error). The risk of this error increases when sample sizes are small and alpha is set low. As sample size increases, t-values, F-values and other significance statistics increase, other things constant. Furthermore, if non-respondents were different than respondents, this limits the findings. There is no way to test this possibility here, but it seems plausible that teams under high time pressure may be less likely to respond than teams under moderate to low time pressure, for example. If this is the case, the sample independent variables may have restricted range in comparison to the population. This is a common problem for field research, but the limitations resulting from it suggest that in future research, every effort should be made to increase response rates or at minimum to identify differences between respondents and non-respondents.

In addition to the future research identified as a result of current study limitations, there are other directions the findings of this study point to for future work. These possibilities are discussed in the next section.

6.4 FUTURE RESEARCH

Many additional areas exist for the future study of changes in team-level routines. Several of these were pointed out in the previous section and stem from limitations of this study. The results for time pressure were equivocal in the case of external search and were opposite the hypothesized relationship for adoption from external sources. These findings suggest that future research is needed to understand the nature of the relationship between time pressure and the acquisition of routines. The relationship between time pressure and external acquisition may be more complex than hypothesized here. As noted in the limitations section, one possibility is that the relationship between time pressure and external acquisition may have lagged effects. Future research using longitudinal designs would provide the ability to test this possibility. Another possibility is that time pressure may have nonlinear effects. Janis & Mann (1977) discuss the effects of stress on vigilant decision making. Indeed, I used their arguments to posit that time pressure and its corresponding stress would have a negative effect on external acquisition of routines. However, Weiss and Ilgen (1985) point out that Janis and Mann actually suggest a curvilinear relationship between stress and vigilance. Low levels of stress are characterized by little search. Moderate levels of stress are characterized by increased search, and then extreme stress leads to reduced search as part of defensive avoidance. This more complex potential relationship between time-related stress and external

acquisition may explain why the hypothesized relationships were not supported. Future research should examine the possibility of a non-linear relationship between time pressure and external acquisition of routines.

Future research should also examine qualitative differences in the interruptions examined here. This could include interviews with team members to determine how disruptive the various events were, what makes them more or less problematic, and so on. Some interruptions may be more common than others, and future research should also examine whether the frequency of occurrence or novelty of the interruptions result in differential relationships with knowledge acquisition or other boundary spanning activities.

In this study, I only hypothesized concerning external acquisition. Teams may also alter their routines internally by modifying current routines or completely generating new routines. In a set of additional analyses reported in Chapter Five, I found that a majority of teams reported some level of effort in developing routines internally, however, the majority of teams reported very little effort expended toward these activities. In a series of additional correlation analyses, I also found that the relationships between time pressure and interruptions and internal development were similar to the relationships between these independent variables and the external acquisition variables. Finally, correlation results indicated that in this sample, the relationships between internal development and the external acquisition variables were not statistically significant. These results suggest that internal development occurs, but is not necessarily related to levels of external acquisition. Future research should examine the differences between internal development and external acquisition. This research can more carefully examine the relationships between the

antecedents described here and internal versus external acquisition, as well as identifying other potential predictors. This research could determine whether antecedents differentially predict internal versus external acquisition. Finally, future research should examine the relationships between internal and external acquisition and team performance.

Furthermore, I did not hypothesize a relationship between external search and adoption from external sources. Correlation results indicate that they are positively related. Future research should examined the extent to which search leads to adoption, and alternatively, under what circumstances adoption occurs in the absence of a deliberate search.

Future research could also examine the influence time pressure and interruptions have on other boundary-spanning activities. This study examined only one type of boundary-spanning action – external acquisition of routines. There may be other reasons teams may engage in boundary-spanning and future research is needed to test whether these two variables are related to those activities in the same way as they are related to external acquisition of routines.

This study tested only two potential variables that may affect the timing of routine acquisition. There may be others. The two examined here are features of the context within which the teams are embedded. There may be additional contextual variables worth pursuing as well as other non-contextual variables. Future research is needed to identify and test other possible triggers to external knowledge acquisition.

Future research should also focus on the cognitive processes triggered by interruptions. Louis & Sutton (1991) and Langer (1989) suggest that the way in which

interruptions work is that they trigger more active cognitive processing. Betsch et al. (1998) found empirical support at the individual level for the necessity of deliberate thinking to trigger deviation from routine behavior. Finally, along similar lines, it would be interesting in future research to examine the effects when an interruption is anticipated but does not actually occur. Future research on group-level acquisition of routines should examine this causal path and attempt to uncover the cognitive processes at work as a result of the interruptions.

6.5 PRACTICAL APPLICATIONS

In addition to the theoretical contributions identified earlier, the results of this research may help managers identify moments 'ripe' for changes in team routines. Many organizations are experimenting with intranet and internet sites as "warehouses" for practices and other forms of knowledge (Goodman, 1997). Tremendous amounts of money are being spent to develop these sites, yet managers have expressed dissatisfaction at their lack of effectiveness. My findings that contextual variables may influence the timing of routine acquisition suggest that developers may need to consider the timing of presentation of such information. For example, if interruptions enhance the probability of adoption of new routines, team leaders may decide to create interruptions or "time outs" to enhance the likelihood that team members mindfully examine their routines. There may "critical periods of information receptivity" (Gersick 1989), and perhaps information about new routines will have no effect if made available at other times (Weiss & Ilgen, 1985). If so, managers may want to time presentation of information corresponding to interruptions to maximize the likelihood that the routines will be adopted.

6.6 CONCLUSION

In this study, I examined the relationship between two team contextual factors, interruptions and time pressure, and external acquisition of routines. My findings suggested that interruptions increased the likelihood that teams engaged in external acquisition of routines. However, contrary to prior research and contrary to my hypothesis, time pressure did not reduce the likelihood that teams engage in external acquisition of routines. These findings extend existing theory concerning team routines, organizational learning, and team boundary-spanning. The results demonstrate the importance of including variables related to the timing of organizational activities, and provide impetus for future research in several related areas.

REFERENCES

Adcock, W. O. 1971. Time, one more time. California Management Review, Winter, 71(14:2), 28.

Aldrich, J. H. & Nelson, F. D. 1984. Linear probability, logit and probit models, Beverly Hills, CA: SAGE.

Allison, P. D. 1984. Event History Analysis: Regression for longitudinal event data, Beverly Hills, CA: SAGE.

Ancona, D. G. 1990. Outward bound: Strategies for team survival in an organization. Academy of Management Journal, 33, 334-365.

Ancona , D. G. & Caldwell, D. F. 1992. Bridging the boundary: External activity and performance in organizational teams. Administrative Science Quarterly 37, 634-665.

Ancona, D. G. & Chong, C. L. 1996. Entrainment: Pace, cycle, and rhythm in organizational behavior. Research in Organizational Behavior, volume 18, 251-284.

Andrasik, F. & Heimberg, J. S. 1982. Self-management procedures, in Handbook of organizational behavior management, ed. L. W. Frederiksen. 219-247, New York: Wiley-Interscience.

Ashford, S. J. 1986. Feedback-seeking in individual adaptation: A resource perspective. Academy of Management Journal, 29: 3, 465-487.

Ashforth, B. & Fried, Y. 1988. The mindlessness of organizational behaviors. Human-Relations, Apr Vol. 41(4) 305-329.

Bandura, A. 1977. Social Learning Theory, Englewood Cliffs, NJ: Prentice-Hall.

Beach, L. R., & Mitchell, T. R. 1978. A contingency model for the selection of decision strategies. Academy of Management Review, 3, 439-449.

Ben Zur, H. & Breznitz, S. J. 1981. The effect of time pressure on risky choice behavior. Acta Psychologica, 47, 68-80.

Betsch, T., Fiedler, K. & Brinkmann, J. 1998. Behavioral routines in decision making: The effects of novelty in task presentation and time pressure on routine maintenance and deviation. European Journal of Social Psychology, 28, 861-878.

Bierly, P., & Chakrabarti, A. 1996. Generic knowledge strategies in the US pharmaceutical industry. Strategic Management Journal, Vol. 17, Winter Special Issue, 123-135.

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.

Bluedorn, A. C. & Denhardt, R. B. 1988. Time and organizations. Journal of Management, 14(2), 299-320.

Bulmar, M. G. 1979 Principles of Statistics. New York: Dover.

Campion, M. A., Papper, E. M. & Medsker, G. J. 1996. Relations between work team characteristics and effectiveness: A replication and extension. Personnel Psychology, Summer 49(2), 429- 44.

Cellier, J. & Eyrolle, H. 1992. Interface between switched tasks. Ergonomics, 35: 1, 25-36.

Cohen, J. & Cohen, P. 1975. Applied multiple regression/correlation analysis for the behavioral sciences, Hillsdale, NJ: Lawrence Erlbaum.

Cohen, W. M. & Bacdayan, 1994. Organizational routines are stored as procedural memory. Organization Science, 5: 4.

Cohen, S. G., Ledford, G. E., Jr., & Spreitzer, G. M. 1994. A predictive model of self-managing work team effectiveness. Human Relations. 49(5): 643-677.

Cohen, W. M., & Levinthal, D. A., 1990. Absorptive capacity: A new perspective on learning and innovation. Administrative Science Quarterly , 35, 128-152.

Conner, K. R. 1991. A historical comparison of resource-based theory and five schools of thought within industrial organization economics: Do we have a new theory of the firm? Journal of Management, 17, 121-154.

Conner, K. R. & Prahalad, C. K. 1996. A resource-based theory of the firm: Knowledge versus opportunism. Organization Science 7(5): 477-502.

Cook, T. & Campbell, D. T. 1979. Quasi-experimentation: Design and analysis issues for field settings. Boston: Houghton Mifflin. (may need in discussion section).

Cordery, J. L., Mueller, W. S., & Smith, L. M. 1991. Attitudinal and behavioral effects of autonomous group working: A longitudinal field study. Academy of Management Journal, 34(2): 464-476.

Cyert, R. M., & March, J. G. 1963. A behavioral theory of the firm. Englewood Cliffs, NJ: Prentice Hall.

Dansereau, F., Alutto, J. A. & Yammarino, F. J. 1984. Theory testing in organizational behavior: The varient approach, Englewood Cliffs, NJ: Prentice Hall.

Davis, J. H. 1992. Some compelling intuitions about group consensus decisions, theoretical and empirical research, and interpersonal aggregation phenomena: Selected examples, 1950-1980. Organizational behavior and human decision processes, 52, 3-38.

Davis, J. H. & Stasson, M. F. 1988. Small group performance: Past and present research trends. Advances in group processes, 5, 245-277.

Dollinger, M. J. 1984. Environmental boundary spanning and information processing effects on organizational performance. Academy of Management Journal, 27(2), 351-368.

Dougherty, D. 1992. Interpretive barriers to successful product innovation in large firms. Organization Science, 3 (May), 179-202.

Doz, Y. L. 1996. The evolution of cooperation in strategic alliances: Initial conditions or learning processes? Strategic Management Journal, 17 (Special Issue), 55-85.

Edland, A. & Svenson, O. 1993. Judgment and decision making under time pressure: Studies and findings. In O. Svenson & J. A. Maule, (Eds.), Time pressure and stress in human judgment and decision making (pp. 27-40). New York: Plenum Press.

Epple, D., Argote, L, & Devadas, R. 1991. Organizational learning curves: A method for investigating intraplant transfer of knowledge acquired through learning by doing. Organization Science, 2, 58-70.

Feldman, D. 1989. Careers in organizations: Recent trends and future directions. Special Issue: Yearly review of management. Journal of Management, Jun Vol. 15(2) 135-156.

Galaskiewicz, J. & Wasserman, S. 1989. Mimetic processes within an interorganizational field: An empirical test. Administrative Science Quarterly, Sep; Vol. 34(3): 454-479.

George, J. 1990. Personality, Affect, and Behavior in Groups. Journal of Applied Psychology, 75(2), 107-116.

Gersick, C. J. G. 1988. Time and transition in work teams: Toward a new model of group development. Academy of Management Journal, 31(1), 9-41.

Gersick, C. J. G. 1989. Marking time: Predictable transitions in task groups. Academy of Management Journal, 32(2), 274-309.

Gersick, C. J. G. 1991. Revolutionary change theories: A multilevel exploration of the punctuated equilibrium paradigm. Academy of Management Review, 16(1): 10-36.

Gersick, C. J. G., & Hackman, J. R. 1990. Habitual routines in task-performing groups. Organizational Behavior and Human Decision Processes. 47, 65-97.

Gibson, C. B. 1996. Collective cognition in action: The formation, operation, and transformation of group-efficacy beliefs in the workplace. Paper presented at the Annual Meeting of the Academy of Management, Cincinnati, OH, August 9-14.

Gioia, D. A., & Manz, C. C. 1985. Linking cognition and behavior: A script processing interpretation of vicarious learning. Academy of Management Review. 10(3): 527-539.

Gladstein, D. 1984. Groups in context: A model of task group effectiveness. Administrative Science Quarterly, 29, 499-518.

Glick, W. H. 1985. Conceptualizing and measuring organizational and psychological climate: Pitfalls in multilevel research. Academy of Management Review, 10: 601-616.

Goodman, P. S. 1997. Knowledge Transfer via Computer-Assisted Systems in International Corporations. Paper presented a the Carnegie Bosch Institute Conference on Knowledge in International Corporations, Rome, Italy. November 6-8.

Goodman, P. S., Ravlin, E. C., & Schminke, M. 1990. Understanding groups in organizations. In L. L. Cummings & B. M. Staw (Eds.), Leadership, participation, and group behavior: 323-385. Greenwich, CT: JAI Press.

Guzzo, R. A. 1982. Improving group decision making in organizations, Academic Press.

Guzzo, R.A., Yost, P. R., Campbell, Richard J., & Gregory P. Shea. 1993. Potency in groups: Articulating a construct. British Journal of Social Psychology, 32, 87-106.

Hackman, J. R., & Morris, C. G. 1976. Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. In L. Berkowitz (Ed.), Advances in experimental social psychology. New York: Academic Press.

Hart, S. G. & Staveland, L. E. 1988. Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. Pp. 139-183 in P.A. Hancock and N. Meshkati, eds., Human Mental Workload. Amsterdam: North-Holland.

Hays, W. L. 1981. Statistics. New York: Holt, Rinehart,& Winston.

Hedlund, G. 1994. A model of knowledge management and the N-form corporation. Strategic Management Journal, 15: 73-91.

Huber, G. 1991. Organizational Learning: The contributing processes and the literatures. Organization Science, Feb., 2(1): 88-115.

Huber, G. 1991. Organizational Learning: The contributing processes and the literatures., in M. D. Cohen, & L. S. Sproull (eds.) Organizational Learning, pp. 124-162, Thousand Oaks, CA: SAGE.

Hulland, J. S., & Kleinmutz, D. N. 1994. Factors influencing the use of internal summary evaluations versus external information in choice. Journal of Behavioral Decision Making, 7(2), 79-102.

Ilgen, D. R. 1999. Teams embedded in organizations. American Psychologist, 54(2), 129-139.

James, L. R., Demaree, R. G. & Wolf, G. 1984. Estimating within-group interrater reliability with and without response bias. Journal of Applied Psychology, 69, 85-98.

James, L. R., Demaree, R. G. & Wolf, G. 1993. rWG: An assessment of within group inter-rater agreement. Journal of Applied Psychology, 78: 306-339.

Janis, I. 1982. Groupthink (2^{nd} edition). Boston: Houghton Mifflin.

Janis, I. & Mann, L. 1977. Decision Making: A psychological analysis of conflict, choice and commitment, New York: Free Press.

Janz, B. D., Colquitt, J. A., & Noe, R. A. 1997. Knowledge worker team effectiveness: The role of autonomy, interdependence, team development, and contextual support variables. Personnel Psychology, 50(4), 877-904.

Katz, R. 1982. The effects of group longevity on project communication and performance. Administrative-Science-Quarterly. 27(1): 81-104.

Katz, R. & Tushman, M. 1979. Communication patterns, project performance, and task characteristics: An empirical evaluation and integration in an R&D setting. Organizational Behavior and Human Decision Processes, 23(2): 139-162.

Kelly, J. R. & McGrath, J. E. 1985. Effects of time limits and task types on task performance and interaction of four-person groups. Journal-of-Personality-and-Social-Psychology. 49(2): 395-407.

Kirmeyer, S. L. 1988. Coping with competing demands: Interruption and the Type A pattern. Journal of Applied Psychology, 73(4), 621-629.

Klein, K. J., Dansereau, F. & Hall, R. J. 1994. Levels issues in theory development, data collection, and analysis. Academy of Management Review, 19(2), 195-229.

Kleiner, B. H. 1992. The art of handling many things at once. Managerial Auditing Journal, 7:6, 24+.

Kogut, B. 1996. What firms do? Coordination, identity, and learning. Organization Science, 7(5): 502-519.

Kogut, B. & Zander, U. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. Organization Science 4, 383-397.

Langer, E. J. 1978. Rethinking the role of thought in social interactions, in J.H. Harvey, W. J. Ickes and R. F. Kidd (eds.), New Directions in Attribution Theory, Vol. 2, Hillsdale, NJ: Erlbaum.

Langer, E.J. 1989. Minding matters: The mindlessness/mindfulness theory of cognitive activity. In L. Berkowitz (ed.) Advances in experimental social psychology. Pp. 137-171, New York: Academic Press.

Leifer, R., & Huber, G. P. 1977. Relations among perceived environmental uncertainty, organization structure, and boundary spanning behavior. Administrative Science Quarterly, 22(2): 235-247.

Levinthal, D., & March, J. G. 1981. A model of adaptive organizational search. Journal of Economic Behavior and Organization, 2, 301-333.

Levitt, B. & March, J. G. 1988. Organizational Learning. Annual Review of Sociology, 14, 319-340.

Louis, M. R., & Sutton, R. I. 1991. Switching cognitive gears: From habits of mind to active thinking. Human Relations, 44(1) 55-76.

Lucco, F. J. 1994. Effective time management. The Appraisal Journal, 62: 4, pp. 580-587.

Manz, C. C. 1986. Self-leadership: Toward an expanded theory of self-influence processes in organizations. Academy of Management Review, 585-600.

March, J. G. & Simon, H. A. 1958. Organizations, New York: John Wiley.

McGrath, J. E. 1984. Groups. Interaction and Performance. Englewood Cliffs, NJ: Prentice Hall.

McGrath, J. E. 1991. Time, interaction and performance (TIP). A theory of groups. Small Group Research, 22(2), 147-174.

McGrath, J. E. & Kelly, J. R. 1986. Time and Human Interaction: Toward a Social Psychology of Time, New York: Guilford.

Menard, S. 1991. Longitudinal research, Beverly Hills, CA: SAGE.

Meyer, A. D. 1982. Adapting to environmental jolts. Administrative-Science-Quarterly;1982 Dec Vol. 27(4) 515-537.

Miner, A. S. 1991. Organizational evolution and the social ecology of jobs. American Sociological Review, 56, 772-785.

Miner, A. S., & Mezias, S. J. 1996. Ugly duckling no more: Pasts and futures of organizational learning research. Organization Science, 7(1): 88-100.

Mohrman, S. A. , Cohen, S. G., & Mohrman, A. M., Jr. 1995. Designing Team-Based Organizations: New Forms for Knowledge Work. San Francisco, CA: Jossey-Bass.

Moorman, C. & Miner, A. S. 1998. Organizational improvisation and organizational memory. Academy of Management Review 23(4): 698-723.

Moreland, R. L., Argote, L., & Krishnan, R. 1998. Training people to work in groups. In Tindale, R. S., Heath, L, Edwards, J., Posavac, E. J., Bryant, F. B., Suarez-Balcazar, Y., Henderson-King, E., & Meyers, J. (Eds.) Theory and Research on Small Groups: Social Psychological Applications to Social Issues, Vol. 4, pp 37-60.

Nelson, R. R., & Winter, S. G. 1982. An evolutionary theory of economic change. Cambridge, MA: Harvard University Press.

Nonaka, I. 1994. A dynamic theory of organizational knowledge creation. Organization Science, 5(1) 14-37.

Nonaka, I., & Takeuchi, H. 1995. The knowledge-creating company. New York: Oxford University Press.

Nunnally, J. C. 1978. Psychometric Theory (McGraw-Hill Series in Psychology). New York: McGraw-Hill Book Company.

Okhuysen, G. A., & Eisenhardt, K. M. 1996. Creating opportunities for change: How formal problem solving interventions work. Paper presented at the Academy of Management Conference, Cincinnati, OH.

Osterman, P. 1995. Work/family programs and the employment relationship. Administrative-Science-Quarterly, 40(4): 681-700.

Parks, C. D. & Cowlin, R. 1995. Group discussion as affected by number of alternatives and by a time limit. Organizational behavior and human decision processes, 62(3): 267-275.

Pedhazur, E. J., & Schmelkin, L. P. 1991. Measurement, Design, and Analysis. An Integrated Approach Hillsdale, NJ: Lawrence Erlbaum Associates.

Pentland, B.T. & Rueter, H.H. 1994. Organizational routines as grammars of action. Administrative Science Quarterly. 39(3): 484-510.

Perlow, L. 1999. The time famine: Toward a sociology of work time. Administrative Science Quarterly, 44, 57-81.

Pfeffer, J., and Salancik, G. R. 1978. The external control of organizations. New York, NY: Harper & Row.

Rousseau, D. M. 1985. Issues of level in organizational research: Multi-level and cross-level perspectives. In Cummings, L. L., Staw, B. M. (Eds.) Research in Organizational Behavior, 7, 1-37.

Ruggles, R. 1998. The state of the notion: Knowledge management in practice. California Management Review, Spring, 40(3), 80-89.

Shrout, P. E. & Fleiss, J. L. 1979. Intraclass correlations: Uses in assessing rater reliability. Psychological Bulletin, 86(2): 420-428.

Schwab, D. P. 1980. Construct validity in organizational behavior. In Staw, B. M. and Cummings, L. L.(Eds.) Research in organizational behavior, Vol. 2, Greenwich, CT: JAI Press, 3 – 43.

Schwab, D. P. 1999. Research methods for organizational studies. Mahwah, NJ: Lawrence Erlbaum Associates.

Scott, W. R. 1992. Organizations. Rational, natural and open systems. Third edition. Englewood Cliffs, NJ: Prentice Hall.

Simon, H. A. 1947. Administrative behavior: A study of decision making processes in administrative organization. New York, NY: Macmillan.

Staw, B. M., Sandelands, L. E., & Dutton, J. E. 1981. Threat-rigidity effects in organizational behavior: A multi-level analysis. Administrative Science Quarterly, 26: 501-524.

Sundstrom, E., De Meuse, K. P., & Futrell, K. 1990. Work Teams: Applications and Effectiveness. American Psychologist, 45:2, 120-133.

Szulanski, G. 1995. Appropriating rents from existing knowledge: Intra-firm transfer of best practice. Unpublished doctoral dissertation, INSEAD.

Szulanski, G. 1996. Exploring internal stickiness: Impediments to the transfer of best practices within the firm. Strategic Management Journal, 17 (Winter Special Issue), 27-43.

Thompson, L., Peterson, E. & Brodt, S. W. 1996. Team negotiation: An examination of integrative and distributive bargaining. Journal of personality and social psychology, 70(1), 66-78.

Tyre, M. J. & Orlikowski, W. J. 1994. Windows of opportunity: Temporal patterns of technological adaptation in organizations. Organization Science, 5(1), 98-118.

Tyre, M. J., Perlow, L., Staudenmayer, N., & Wasson, C. 1996. Time as a trigger for organizational change. Paper presented at the Annual Conference of the Academy of Management, Cincinnati, OH.

Tushman, M., & Scanlan, T. J. 1981. Boundary spanning individuals: Their role in information transfer and their antecedents. Academy of Management Journal, Jun; Vol. 24(2): 289-305.

Virany, B., Tushman, M. & Romanelli, E. 1992. Executive succession and organization outcomes in turbulent environments: An organization learning approach. Organization-Science, Feb Vol. 3(1) 72-91.

Wageman, R. 1995. Interdependence and group effectiveness. Administrative Science Quarterly, 40: 145-180.

Weick, K. E. 1990. Technology as Equivoque: Sensemaking in new technologies, in Technology and Organizations, Paul S. Goodman and Lee S. Sproull (eds.) pp. 1-44, San Francisco: Jossey-Bass.

Weick, K. E. 1992. The social psychology of organizing. Reading, MA: Addison-Wesley.

Weick, K. E. 1993. The collapse of sensemaking in organizations: The Mann Gulch disaster. Administrative-Science-Quarterly, Dec Vol. 38(4) 628-652.

Weiss, H. M. & Ilgen, D. R. 1985. Routinized behavior in organizations. Journal of Behavioral Economics, 57 – 67.

Winter, S. G. 1996. Organizing for Continuous Improvement. Evolutionary Theory Meets the Quality Revolution. In M. D. Cohen & L. S. Sproull (eds.) Organizational Learning. pp. 460 - 483, Thousand Oaks, CA: SAGE.

Wickens, C. D. 1993. Workload transition: Implications for individual and team performance. In B. Huey and C. D. Wickens (eds.) National Research Council. Washington, DC: National Academy Press.

TABLE 1

Definitions of Routines

Source	Definition
Ashforth and Fried (1988)	Conceptualized routine as an event schema or script.
Feldman (1989: 136)	Organizational routines are "complex sets of interlocking behaviors held in place through common agreement on the relevant roles and expectations."
Gersick and Hackman (1990: 69)	"A habitual routine exists when a group repeatedly exhibits a functionally similar pattern of behavior in a given stimulus situation without explicitly selecting it over alternative ways of behaving."
Levitt and March (1988)	The generic term "routines" includes forms, rules, procedures, conventions, strategies and technologies around which organizations are constructed and through which they operate. It also includes the structure of beliefs, frameworks, paradigms, codes, cultures and knowledge that buttress, elaborate, and contradict formal routines. Routines are independent of the individual actors who execute them and are capable of surviving considerable turnover in individuals... Routines are transmitted through socialization, education, imitation, professionalization, personnel movement, mergers and acquisitions. They are recorded in collective memory that is often coherent but is sometime jumbled, that often endures, but is sometimes lost.
March and Simon (1958: 142)	"We will regard a set of activities as routinized, then, to the degree that choice has been simplified by the development of a fixed response to defined stimuli. If choice has been eliminated, but a choice remains in the form of a clearly defined and systematic computing routine, we will say that the activities are routinized."
Miner (1991; 1996: 378)	"I define an organizational routine as coordinated, repetitive sets of organizational activities."
Nelson and Winter (1982: 14)	Routines are "a general term for all regular and predictable behavioral patterns in firms."

TABLE 1

CONTINUED

Source	Definition
Pentlund and Rueter (1994)	Organizational routines are "a set of functionally similar patterns." Routines are ... essentially complex patterns of social action. "One might substitute the less value laden term "process" for the ambiguous term routine." "Processes [routines] can be more or less automatic, embody more or less variety, search and so on."
Simon (1947)	Following Stern (1940) defined what he called "organizational habits" as routi nes developed in response to recurring questions which become accepted practice.
Weick (1992, p. 164)	Routines are "basic building blocks representing efficient tools designed to transform variable inputs into less variable outputs through a standardized sequence of operations."
Weick (1993)	Habituated action patterns.
Weiss & Ilgen (1985, pp. 58-59)	"Repetitive behavior in the absence of explicit consideration of alternative course of action accompanied by constrained exploration and attention directed toward restricted aspects of the environment."
Winter (1996)	"Nelson and I use the word routine as the generic term for a way of doing things. It is simultaneously the counterpart of a wide range of terms employed in everyday life and in various theoretical languages, including those of orthodox and behavioral economics; among these terms are decision rule, technique, skill, standard operating procedure, management practice, policy, strategy, information system, information structure, program, script and organizational form."

TABLE 2

Interview Study Sample

			France		Puerto Rico		Philippines		Totals	
1	7	2	0	0	3	2	3	1	13	5
2	10	4	5	1	0	0	3	2	18	7
3	16	8	1	1	9	2	5	5	31	16
4	7	2	4	4	9	3	8	1	28	10
5	0	0	4	4	0	0	4	4	8	8
Totals	40	16	14	10	21	7	23	13	98	46

TABLE 3

Hypotheses

Type	Hypothesis
Global: Time Pressure	H1a. In a given time period, teams reporting higher perceived time pressure will have a lower probability of external search for routines.
	H1b. In a given time period, teams reporting higher perceived time pressure will have a lower probability of adopting routines from external sources.
Global: Interruptions	H2a. In a given time period, teams experiencing interruptions will have a higher probability of external search for routines.
	H2b. In a given time period, teams experiencing interruptions will have a higher probability of adopting routines from external sources.
	H2c. In a given time period, anticipation moderates the effect of interruptions in that when anticipation of interruptions is high, interruptions will be less likely to prompt external search for routines, and when anticipation is low, interruptions will be more likely to prompt external search for routines.
	H2d. In a given time period, anticipation moderates the effect of interruptions in that when anticipation of interruptions is high, interruptions will be less likely to prompt adoption of routines from external sources, and when anticipation is low, interruptions will be more likely to prompt adoption of routines from external sources.

TABLE 4

Triggers Identified by Tyre & Orlikowski (1994)

Site One			Site Two		
Number of Instances	**% of Instances**	**Trigger Description**	**Number of Instances**	**% of Instances**	**Trigger Description**
14	40%	New machines or tools added	34	68%	New system release or changes to existing system
6	17%	New product requirements	22	43%	Saw opportunity to automate commonly used routines
6	17%	New management action(intervention by a new plant or senior manager)	21	41%	Existing system becomes too annoying or frustrating
3	9%	New factory procedures	20	39%	Exposure to other users' ideas
3	9%	New personnel or break in schedule creates slack resources	15	29%	Problems with existing systems
2	6%	Machine breakdown	11	22%	Thought of something new
1	3%	Existing management request action			

TABLE 5

Summary of Measures

VARIABLE	MEASURE	SOURCE(S)
Dependent Variables		
External Search	2 items asking yes or no. Specified time period.	Team Leader, Team Members
External Adoption	2 items asking yes or no. Specified time period.	Team Leader, Team Members
Independent Variables		
Interruptions	15 items about occurrence of events. If yes, asks if it was anticipated.	Team Members
Time Pressure	NASA TLX	Team Members
Control Variables		
Outcome Interdependence	5 item scale. (Wageman, 1995)	Team Members
Organization	Dummy coded.	Archival
Decision Making Discretion	8 item scale. (Based on surveys by Cohen et al., 1996; Gulowsen, 1972; and Coerdery, et al. 1991)	Team Members
Length of Time as a Team	Single item.	Team Members
Size of Team	Single item.	Archival

TABLE 6

Scale Reliability Scores (Full Sample)

VARIABLE	Alpha	# of Items	N
Decision Making	.87	8	458
Outcome Interdependence	.77	5	402
Time Pressure	.93	7	373
Interruptions	.66	13	329

Scale Reliability Scores (Only Individuals on Teams with Leader Responses)

VARIABLE	Alpha	# of Items	N
Decision Making	.87	8	259
Outcome Interdependence	.72	5	216
Time Pressure	.92	7	196
Interruptions	.66	13	197

TABLE 7

Average Within-Team Agreement Scores

Variable	Average r_{WG} (All teams) (n = 91)	Average r_{WG} (>= 30%) (n = 71)	Average r_{WG} >=50% (n = 42)
Time Pressure	.92	.87	.90
Outcome Interdependence	.73	.78	.80
Decision Making	.58	.52	.57
Anticipation	.79	.62	.40
Interruptions	.83*	.82*	.82*

*Mean of % agreement within each team across interruption items.

TABLE 8

Average Within-Team Agreement Scores

(Only Cases with Leader Surveys Received)

Variable	Average r_{WG} (All teams) (n = 53)	Average r_{WG} (>= 30%) (n = 39)	Average r_{WG} >=50% (n = 26)
Time Pressure	.86	.86	.80
Outcome Interdependence	.82	.81	.80
Decision Making	.72	.64	.35+
Anticipation	.39	.38	.20+
Interruptions	.83*	.82*	.82*

*Mean of % agreement within each team across interruption items.
+Extreme value in team 13 swings this. Without team 13 the decision making average is .75.

TABLE 9

Analysis of Variance & Intra-Class Correlation Results

	Full Sample		>= 30% Within Team Response Rate		>=50% Within Team Response Rate	
Variable	ANOVA	ICC(1,*k*)	ANOVA	ICC(1,*k*)	ANOVA	ICC(1,*k*)
Interruptions	F = 1.16** *df* 93,256	.33	F = 1.60** *df* 57,214	.38	F = 1.96** *df* 34,149	.50
Anticipation	F = 4.54*** *df* 93,174	.78	F = 5.95*** *df* 57,155	.83	F = 6.53*** *df* 34,111	.85
Time Pressure	F = 1.92*** *df* 93,246	.49	F = 2.20*** *df* 57,210	.55	F = 2.23*** *df* 35,145	.55
Decision Making	F = 1.35* *df* 93, 361	.26	F = 1.59** *df* 57,285	.37	F = 1.66* *df* 34,190	.40
Outcome Interdependence	F = 2.88*** *df* 93,303	.65	F = 2.12*** *df* 57,244	.53	F = 3.21*** *df* 34,165	.69

* p < .05
** p < .01
*** p < .001

TABLE 10

Analysis of Variance & Intra-Class Correlation Results

(Only Cases with Leader Surveys)

	Full Sample		>= 30% Within Team Response Rate		>=50% Within Team Response Rate	
Variable	ANOVA	ICC(1,*k*)	ANOVA	ICC(1,*k*)	ANOVA	ICC(1,*k*)
Interruptions	F=1.46* *df* 52,154	.32	F=1.48* *df* 39,143	.32	F=1.67* *df* 24,104	.40
Anticipation	F = .89 *df* 49,105	.11	F = .98 *d 38,98f*	.03	F=1.03 *df* 24,76	.03
Time Pressure	F=1.43* *df* 52,150	.30	F=1.51* *df* 39,139	.34	F=1.68* *df* 24,100	.41
Decision Making	F=1.42* *df* 53,212	.30	F=1.59* *df* 39,188	.37	F=1.86* *df* 24,128	.46
Outcome Interdependence	F =1.56** *df* 52,165	.44	F=1.65* *df* 39,153	.40	F=2.20** *df* 24, 105	.55

* p < .05
** p < .01
*** p < .001

TABLE 11

Descriptive Statistics

(Full Sample)

Type	Variable	Mean	Standard Deviation	Min	Max	N
DV	External Search	.38	.49	0.00	1.00	44
DV	External Best Practice Search	.48	.51	0.00	1.00	44
DV	Any External Search	.50	.51	0.00	1.00	44
DV	External Adoption of Practices	.33	.47	0.00	1.00	43
DV	External Adoption of Best Practices	.28	.45	0.00	1.00	43
DV	Any External Adoption	.35	.48	0.00	1.00	43
IV	Interruptions	2.76	1.76	0.00	11.00	92
IV	Time Pressure	5.14	.84	2.29	7.00	92
IV	Anticipation	3.33	.76	1.00	5.00	87
CV	Outcome Interdependence	4.49	.84	1.82	6.10	92
CV	Decision Making	4.54	.62	3.13	5.71	92
CV	Length of Time as Team	7.55	8.64	.50	70.00	89
CV	Size of Team	10.60	3.22	3.00	21.00	92

TABLE 12

Descriptive Statistics

(Full Sample, Teams with Leader Responses Only)

Type	Variable	Mean	Standard Deviation	Min	Max	N
DV	External Search	.38	.49	0.00	1.00	44
DV	External Best Practice Search	.48	.51	0.00	1.00	44
DV	Any External Search	.50	.51	0.00	1.00	44
DV	External Adoption of Practices	.33	.47	0.00	1.00	43
DV	External Adoption of Best Practices	.28	.45	0.00	1.00	43
DV	Any External Adoption	.35	.48	0.00	1.00	43
IV	Interruptions	2.98	1.71	0	8.00	52
IV	Time Pressure	5.29	.66	3.71	6.54	52
IV	Anticipation	3.43	.62	2.08	4.67	48
CV	Outcome Interdependence	4.63	.75	2.40	6.00	52
CV	Decision Making	4.68	.60	3.17	5.71	53
CV	Length of Time as Team	8.37	10.67	1	70	49
CV	Size of Team	10.17	3.66	3	21	53

TABLE 13

Descriptive Statistics

(30% Within-Team Response Rate)

Type	Variable	Mean	Standard Deviation	Min	Max	N
DV	External Search	.43	.50	0.00	1.00	33
DV	External Best Practice Search	.52	.51	0.00	1.00	33
DV	Any External Search	.55	.51	0.00	1.00	33
DV	External Adoption of Practices	.33	.48	0.00	1.00	33
DV	External Adoption of Best Practices	.27	.45	0.00	1.00	33
DV	Any External Adoption	.36	.49	0.00	1.00	33
IV	Interruptions	2.81	1.48	0.00	8.00	57
IV	Time Pressure	5.10	.70	3.03	6.48	57
IV	Anticipation	3.42	.63	2.00	4.67	56
CV	Outcome Interdependence	4.61	.62	3.30	5.64	57
CV	Decision Making	4.52	.59	3.17	5.67	57
CV	Length of Time as Team	7.85	10.06	1.00	70.00	55
CV	Size of Team	9.82	3.22	3.00	21.00	57

TABLE 14

Descriptive Statistics

(30% Within-Team Response Rate, Teams with Leader Response Only)

Type	Variable	Mean	Standard Deviation	Min	Max	N
DV	External Search	.43	.50	0.00	1.00	33
DV	External Best Practice Search	.52	.51	0.00	1.00	33
DV	Any External Search	.55	.51	0.00	1.00	33
DV	External Adoption of Practices	.33	.48	0.00	1.00	33
DV	External Adoption of Best Practices	.27	.45	0.00	1.00	33
DV	Any External Adoption	.36	.49	0.00	1.00	33
IV	Interruptions	2.93	1.56	0.00	8.00	39
IV	Time Pressure	5.20	.64	3.71	6.48	39
IV	Anticipation	3.49	.60	2.17	4.67	39
CV	Outcome Interdependence	4.66	.59	3.38	5.60	39
CV	Decision Making	4.63	.59	3.17	5.67	39
CV	Length of Time as Team	8.48	11.59	1.00	70.00	37
CV	Size of Team	9.56	3.80	3.00	21.00	39

TABLE 15

Descriptive Statistics

(50% Within-Team Response Rate)

Type	Variable	Mean	Standard Deviation	Min	Max	N
DV	External Search	.41	.50	0.00	1.00	22
DV	External Best Practice Search	.50	.51	0.00	1.00	22
DV	Any External Search	.55	.51	0.00	1.00	22
DV	External Adoption of Practices	.37	.49	0.00	1.00	22
DV	External Adoption of Best Practices	.27	.46	0.00	1.00	22
DV	Any External Adoption	.41	.50	0.00	1.00	22
IV	Interruptions	2.73	1.59	0.00	8.00	35
IV	Time Pressure	4.99	.67	3.03	6.19	35
IV	Anticipation	3.46	.61	2.17	4.67	35
CV	Outcome Interdependence	4.72	.67	3.30	5.64	35
CV	Decision Making	4.63	.56	3.65	5.67	35
CV	Length of Time as Team	9.51	12.52	1.00	70.00	35
CV	Size of Team	8.71	3.21	3.00	15.00	35

TABLE 16

Descriptive Statistics

(50% Within-Team Response Rate, Teams With Leader Responses Only)

Type	Variable	Mean	Standard Deviation	Min	Max	N
DV	External Search	.41	.50	0.00	1.00	22
DV	External Best Practice Search	.50	.51	0.00	1.00	22
DV	Any External Search	.55	.51	0.00	1.00	22
DV	External Adoption of Practices	.37	.49	0.00	1.00	22
DV	External Adoption of Best Practices	.27	.46	0.00	1.00	22
DV	Any External Adoption	.41	.50	0.00	1.00	22
IV	Interruptions	2.73	1.66	0.00	8.00	25
IV	Time Pressure	5.14	.60	3.71	6.19	25
IV	Anticipation	3.65	.60	2.17	4.67	24
CV	Outcome Interdependence	4.68	.65	3.38	5.60	25
CV	Decision Making	4.74	.58	3.65	5.67	25
CV	Length of Time as Team	10.29	14.21	1.00	70.00	23
CV	Size of Team	8.24	3.41	3.00	15.00	25

TABLE 17
Correlation Table (Full Sample)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Adopt	1.00														
2. Best Practice Adopt	.79 .000	1.00													
3. Any Adopt	[illegible]	[illegible]	1.00												
4. Search	[illegible]	[illegible]	[illegible]	1.00											
5. Best Practice Search	[illegible]	[illegible]	[illegible]	.74 .000	1.00										
6. Any Search	[illegible]	[illegible]	[illegible]	.79 .000	.96 .000	1.00									
7. Total # of Interruptions	[illegible]	[illegible]	[illegible]	.18 .118	.12 .215	.12 .216	1.00								
8. Time Pressure	[illegible]	[illegible]	[illegible]	.08 .593	.17 .280	.15 .341	.01 .922	1.00							
9. Company 1	.05 .748	-.03 .843	.03 .867	-.13 .393	[illegible]	-.24 .125	.14 .189	-.16 .124	1.00						
10. Company 2	.01 .966	-.10 .519	-.01 .934	.09 .549	.15 .329	.13 .391	.06 .564	-.28 .006	-.13 .203	1.00					
11. Outcome Interdependence	.30 .052	.19 .218	.26 .097	.04 .794	.02 .888	.07 .644	.43 .000	.03 .770	.24 .022	.16 .117	1.00				
12. Length of Time Team Exists	-.02 .925	-.04 .797	-.03 .865	-.23 .156	-.15 .337	-.15 .337	-.01 .909	.10 .351	.26 .013	-.13 .243	.07 .510	1.00			
13. Size	-.04 .808	.10 .541	-.04 .807	-.04 .781	.01 .934	-.07 .647	-.16 .132	.16 .137	.00 1.000	-.06 .579	-.23 .029	-.16 .128	1.00		
14. Decision Making	.15 .325	.04 .778	.17 .275	.05 .745	-.21 .163	-.14 .358	.04 .696	.22 .033	.21 .043	-.16 .135	.24 .021	.06 .592	-.16 .125	1.00	
15. Anticipation	.17 .300	-.03 .874	.10 .562	-.05 .767	-.01 .963	.04 .812	.003 .979	-.15 .180	.16 .138	.16 .141	.24 .027	.10 .375	.24 .027	.16 .139	1.00

N=92, N = 43 for Dependent Variables. Top numbers in cells are correlation coefficients. Bottom numbers are p-values.
t-tests for coefficients between interruptions (#7) and 1-6 are one-tailed, all others are two-tailed.
Shaded cells are coefficients that reach statistical significance at $p < .10$ or better.

TABLE 18
Correlation Table (30% Within Team Response Rate)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Adopt	1.00														
2. Best Practice Adopt	[illegible]	1.00													
3. Any Adopt	[illegible]	[illegible]	1.00												
4. Search	[illegible]	[illegible]	[illegible]	1.00											
5. Best Practice Search	[illegible]	[illegible]	[illegible]	.71 .000	1.00										
6. Any Search	[illegible]	[illegible]	[illegible]	.78 .000	[illegible]	1.00									
7. Total # of Interruptions	[illegible]	[illegible]	[illegible]	.09 .309	.06 .378	.06 .374	1.00								
8. Time Pressure	.27 .126	[illegible]	.26 .143	.07 .681	.24 .179	.22 .214	-.03 .835	1.00							
9. Company 1	.05 .782	-.03 .873	.01 .941	-.20 .266	[illegible]	[illegible]	.19 .146	-.17 .204	1.00						
10. Company 2	.00 1.00	-.11 .534	-.03 .870	.07 .689	.14 .428	.12 .525	.15 .270	[illegible]	[illegible]	1.00					
11. Outcome Interdepend.ence	[illegible]	.14 .440	.26 .148	-.05 .769	-.12 .504	-.04 .844	[illegible]	-.05 .697	[illegible]	.18 .166	1.00				
12. Length of Time Team Exists	-.01 .950	-.04 .816	-.03 .888	-.24 .202	-.12 .533	-.12 .533	-.03 .808	.14 .316	[illegible]	-.14 .300	[illegible]	1.00			
13. Size	-.14 .426	.00 .986	-.13 .467	.05 .790	.14 .447	.04 .838	-.14 .285	.11 .425	[illegible]	.01 .938	[illegible]	[illegible]	1.00		
14. Decision Making	.27 .135	.12 .525	[illegible]	.10 .590	-.28 .119	-.18 .326	.09 .503	[illegible]	[illegible]	[illegible]	.30 .022	.16 .238	[illegible]	1.00	
15. Anticipation	.20 .269	-.04 .835	.11 .564	-.06 .760	-.05 .785	.01 .974	.14 .296	.02 .910	.18 .180	.07 .615	.29 .029	.13 .354	[illegible]	.10 .450	1.00

N=58, N=33 for Dependent Variables. Top numbers in cells are correlation coefficients. Bottom numbers are p-values.
t-tests for coefficients between interruptions (#7) and 1-6 are one-tailed, all others are two-tailed.
Shaded cells are coefficients that reach statistical significance at $p < .10$ or better.

TABLE 19
Correlation Table (50% Within Team Response Rate)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Adopt	1.00														
2. Best Practice Adopt	.60 .003	1.00													
3. Any Adopt	.91 .000	.74 .000	1.00												
4. Search	.52 .012	.32 .146	.62 .002	1.00											
5. Best Practice Search	.38 .063	.41 .059	.46 .030	.65 .001	1.00										
6. Any Search	.51 .011	.35 .106	.57 .005	.76 .000	.91 .000	1.00									
7. Total # of Interruptions	.52 .004	.56 .004	.34 .064	.11 .308	.02 .473	.02 .463	1.00								
8. Time Pressure	.11 .624	.12 .581	.12 .606	.02 .917	.16 .480	.15 .517	-.15 .399	1.00							
9. Company 1	.02 .937	-.04 .865	-.05 .817	-.25 .273	-.57 .006	-.45 .036	.25 .150	-.05 .781	1.00						
10. Company 2	.13 .553	-.02 .915	.09 .700	.09 .700	.24 .291	.19 .388	.17 .325	-.25 .151	-.28 .094	1.00					
11. Outcome Interdependence	.29 .195	.03 .902	.19 .387	-.06 .788	-.27 .225	-.15 497	.25 .135	-.07 .702	-.35 .038	.23 .170	1.00				
12. Length of Time Team Exists	-.12 .617	-.15 .531	-.15 .528	-.25 .291	-.19 .430	-.19 .430	-.07 .711	.18 .313	.28 .107	-.17 .341	.20 .269	1.00			
13. Size	-.06 .810	.12 .601	.00 1.00	.13 .554	.32 .153	.19 .411	-.17 .332	.06 .742	-.77 .000	.11 .519	-.24 .172	-.28 .113	1.00		
14. Decision Making	.22 .317	.02 .946	.25 .257	.24 .288	-.32 .147	-.18 .423	.11 .522	.15 .375	.47 .004	-.25 .142	.23 .184	.15 .384	-.38 .024	1.00	
15. Anticipation	.22 .329	-.10 .648	.08 .740	-.10 .652	-.18 .421	-.11 .630	.02 .920	-.05 .775	.30 .076	.05 .753	.33 .056	.13 .483	-.37 .032	.24 .167	1.00

N=36, N= 22 for Dependent Variables. Top numbers in cells are correlation coefficients. Bottom numbers are p-values.
t-tests for coefficients between interruptions (#7) and 1-6 are one-tailed, all others are two-tailed.
Shaded cells are coefficients that reach statistical significance at $p < .10$ or better.

TABLE 20
Correlation Table (Full Sample, Teams with Leaders Only)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Adopt	1.00														
2. Best Practice Adopt	.79 .000	1.00													
3. Any Adopt	.93 .000	.85 .000	1.00												
4. Search	.39 .010	.27 .078	.45 .003	1.00											
5. Best Practice Search	.35 .023	.36 .019	.40 .009	.74 .000	1.00										
6. Any Search	.41 .006	.33 .033	.46 .002	.79 .000	.96 .000	1.00									
7. Total # of Interruptions	.03 .016	.45 .002	.31 .024	.18 .118	.12 .215	.12 .216	1.00								
8. Time Pressure	.27 .076	.32 .038	.26 .094	.08 .59	.17 .280	.15 .340	-.02 .905	1.00							
9. Company 1	.05 .748	-.03 .844	.03 .867	-.13 .393	-.33 .028	-.24 .124	.28 .045	-.32 .020	1.00						
10. Company 2	.01 .966	-.10 .520	-.01 .934	.09 .549	.15 .329	.13 .391	-.01 .979	-.28 .045	-.16 .248	1.00					
11. Outcome Interdependence	.30 .052	.19 .218	.26 .097	.04 .794	.02 .888	.07 .644	.51 .000	-.04 .792	.26 .062	.11 .439	1.00				
12. Length of Time Team Exists	-.02 .925	-.04 .797	-.03 .865	-.23 .156	-.15 .337	-.15 .337	-.11 .434	.05 .711	.32 .023	-.13 .392	.07 .616	1.00			
13. Size	-.04 .808	.10 .541	-.04 .807	-.04 .781	.01 .934	-.07 .647	-.18 .205	.29 .036	.67 .000	-.12 .411	-.19 .176	-.22 .126	1.00		
14. Decision Making	.15 .325	.04 .778	.17 .275	.05 .745	-.21 .163	-.14 .358	.16 .262	.04 .777	.26 .059	-.26 .065	.36 .010	.05 .725	-.26 .066	1.00	
15. Anticipation	.16 .300	-.03 .874	.09 .562	-.05 .767	-.01 .963	.04 .812	.067 .653	-.17 .252	.37 .009	.17 .244	.32 .025	.20 .189	.39 .005	.15 .299	1.00

N= 43. Top numbers in cells are correlation coefficients. Bottom numbers are p-values.
t-tests for coefficients between interruptions (#7) and 1-6 are one-tailed, all others are two-tailed.
Shaded cells are coefficients that reach statistical significance at $p < .10$ or better.

TABLE 21
Correlation Table (30% within-team response rate, Teams with Leaders Only)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Adopt	1.00														
2. Best Practice Adopt	.72 .000	1.00													
3. Any Adopt	.94 .000	.81 .000	1.00												
4. Search	.43 [illegible]	[illegible] [illegible]	.50 .003	1.00											
5. Best Practice Search	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	.71 .000	1.00										
6. Any Search	[illegible] [illegible]	[illegible] [illegible]	[illegible] [illegible]	.78 .000	.94 .000	1.00									
7. Total # of Interruptions	[illegible] [illegible]	[illegible] .003	[illegible] .041	.09 .617	.06 .756	.06 .748	1.00								
8. Time Pressure	.27 .126	[illegible] .075	.26 .143	.07 .681	.24 .179	.22 .214	-.06 .738	1.00							
9. Company 1	.05 .782	-.03 .873	.01 .941	-.20 .266	-.44 .010	-.36 .056	.39 .016	-.32 .047	1.00						
10. Company 2	.00 1.00	-.11 .534	-.03 .870	.07 .689	.14 .428	.12 .525	.01 .963	-.28 .084	-.23 .152	1.00					
11. Outcome Interdependence	.32 .066	.14 .440	.26 .148	-.05 .769	-.12 .504	-.04 .844	.55 .000	-.06 .722	.37 .021	.14 .384	1.00				
12. Length of Time Team Exists	-.01 .950	-.04 .816	-.03 .888	-.24 .202	-.12 .533	-.12 .533	-.10 .538	.11 .512	.35 .036	-.14 .411	.29 .080	1.00			
13. Size	-.14 .426	.00 .986	-.13 .467	.05 .790	.14 .447	.04 .838	-.24 .139	.19 .259	-.70 .000	-.06 .698	-.28 .086	-.31 .058	1.00		
14. Decision Making	.27 .135	.12 .525	.29 .102	.10 .590	-.28 .119	-.18 .326	.11 .493	.07 .656	.37 .020	-.27 .100	.33 .039	.18 .297	-.31 .054	1.00	
15. Anticipation	.20 .269	-.04 .835	.11 .564	-.06 .760	-.05 .785	.01 .974	.22 .190	-.01 .961	.40 .015	.16 .336	.40 .014	.22 .203	-.43 .008	.21 .216	1.00

N= 33. Top numbers in cells are correlation coefficients. Bottom numbers are p-values.
t-tests for coefficients between interruptions (#7) and 1-6 are one-tailed, all others are two-tailed.
Shaded cells are coefficients that reach statistical significance at $p < .10$ or better.

TABLE 22

Correlation Table (50% within-team response rate, Teams with Leaders Only)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16. Adopt	1.00														
17. Best Practice Adopt	.60 .005	1.00													
18. Any Adopt	.76 .000	.74 .000	1.00												
19. Search	.35 .106	.32 .146	.62 .002	1.00											
20. Best Practice Search	.51 .026	.41 .060	.56 .030	.65 .001	1.00										
21. Any Search	.61 .011	.35 .106	.57 .005	.76 .000	.91 .000	1.00									
22. Total # of Interruptions	.37 .044	.56 .004	.34 .064	.11 .308	.02 .473	.02 463	1.00								
23. Time Pressure	.11 .624	.12 .581	.12 .606	.02 .917	.16 .478	.15 .517	-.11 .610	1.00							
24. Company 1	.02 .937	-.04 .865	-.05 .817	-.25 .273	-.57 .006	-.45 .036	.44 .029	-.39 .056	1.00						
25. Company 2	.13 .553	-.02 .915	.09 .700	.09 .700	.24 .291	.19 .388	.03 .873	-20 .350	-.30 .146	1.00					
26. Outcome Interdependence	.29 .195	.03 .902	.19 .387	-.06 .788	-.27 .225	-.15 .497	.52 .008	-.11 .603	.41 .043	.17 .429	1.00				
27. Length of Time Team Exists	-.12 .617	-.15 .531	-.15 .528	-.25 .291	-.19 .430	-.19 .430	-.12 .587	.10 .664	.33 .124	-.14 .532	.31 .144	1.00			
28. Size	-.06 .810	.12 .601	.00 1.00	.13 .554	.31 .153	.19 .411	.35 .089	.27 .189	-.74 .000	-.03 .882	-.22 .291	-.34 .118	1.00		
29. Decision Making	.22 .317	.02 .946	.25 .257	.24 .288	-.32 .147	-.18 .423	.27 .198	-.14 .507	.47 .019	-.24 .254	.39 .055	.15 .494	-.40 .046	1.00	
30. Anticipation	.22 .329	-.10 .648	.08 .740	-.10 .652	-.18 .421	-.11 .629	.05 .836	-.10 .651	.40 .056	.10 .648	.30 .159	.20 .385	-.43 .037	.32 .124	1.00

N= 22. Top numbers in cells are correlation coefficients. Bottom numbers are p-values.
t-tests for coefficients between interruptions (#7) and 1-6 are one-tailed, all others are two-tailed.
Shaded cells are coefficients that reach statistical significance at p < .10 or better.

TABLE 23

Probit Regression Results: Any External Practice Search (S1, S2)

(Full Sample)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	-.76	-1.61(.11)	-.73	-1.52(.13)	-.75	-1.47(.14)	-.68	-1.26(.21)
Outcome Interdependence	.36	.97(.33)	.24	.59(.56)	.27	.54(.59)	.18	.32(.75)
Company 1	-2.23*	-2.13(.03)	-2.28*	-2.02(.04)	-2.11+	-1.92(.06)	-2.31*	-1.93(.05)
Company 2	-.56	-.75(.46)	-.34	-.42(.68)	-.43	-.52(.61)	-.46	-.55(.58)
Length of Time Team Exists	-.02	-.69(.49)	-.02	-.56(.57)	-.03	-.81(.42)	-.02	-.51(.61)
Team Size	-.22+	-1.89(.06)	-.21+	-1.90(.06)	-.20+	-1.75(.08)	-.20+	-1.74(.08)
Time Pressure			.25	.66(.51)	.35	.92(.36)	.37	.92(.36)
Interruptions			.11	.66(.26)	-.02	-.10(.92)	-1.62	-1.26(.21)
Anticipation					.23	.45(.65)	-1.11	-.94(.35)
A X I							.45	1.26(.21)
Model Chi Square		11.00+		11.94		11.19		12.92
Pseudo R2		.20		.21		.21		.25
Log Likelihood		-22.91		-22.44		-20.74		-19.88
Δ Log Likelihood				-.47		-2.00		-.86
Chi Square				.94		4.00		1.72
		n=41		n=41		n=38		n=38

(t-test for Interruptions (model 2) is 1-tailed, all others are two-tailed)

\+ $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 24

Probit Regression Results: Any External Practice Search (S1, S2)

(30% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	-.46	-.87(.38)	-.41	-.66(.51)	-.49	-.78(.43)	.37	.39(.70)
Outcome Interdependence	.31	.58(.56)	-.30	-.40(69)	-.52	-.66(.51)	-.72	-.83(.41)
Company 1	-2.49*	-2.16(.03)	-3.45+	-1.84(.07)	-3.28+	-1.84(.07)	-6.72+	-1.73(.08)
Company 2	-.62	-.77(.44)	-.23	-.23(.80)	-.29	-.30(.77)	-.96	-.80(.43)
Length of Time Team Exists	-.01	-.26(.80)	.03	.66(.51)	.03	.71(.48)	.05	.84(.40)
Team Size	-.19	-1.51(.13)	-.16	-1.45(.15)	-.15	-1.32(.19)	-.17	-1.39(.16)
Time Pressure			.15	.29(.78)	.06	.11(.92)	-.45	-.67(.25)
Interruptions			.46+	1.40(.08)	.44+	1.42(.08)	-5.55	-1.32(.19)
Anticipation					.37	.53(.60)	-3.66	-1.26(.21)
A X I							1.70	1.40(.16)
Model Chi Square		8.27		11.04		10.78		13.82
Pseudo R2		.19		.26		.26		.33
Log Likelihood		-17.21		-15.82		-15.33		-13.81
Δ Log Likelihood				-1.39		-.49		-1.52
Chi Square				2.78		.98		3.04
		n=31		n=31		n=30		n=30

(t-tests for Interruptions (model 2-3), Time Pressure (model 4) are 1-tailed, all others are two-tailed)

\+ $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 25

Probit Regression Results: Any External Practice Search (S1, S2)

(50% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	-.30	-.45(.65)	.38	.40(.69)	.43	.45(.65)	.71	.61(.54)
Outcome Interdependence	.25	.33(.74)	-.96	-.80(.43)	-1.70	-1.07(.28)	-2.19	-1.03(.31)
Company 1	-2.67	-1.62(.11)	-6.86	-1.51(.13)	-11.31	-1.41(.16)	-12.48	-1.49(.14)
Company 2	-.58	-.48(.63)	-.30	-.19(.85)	.16	.07(.94)	.61	.24(.81)
Length of Time Team Exists	-.02	-.46(.65)	.08	1.03(.31)	.16	1.16(.25)	.18	1.20(.23)
Team Size	-.20	-1.08(.28)	-.18	-.80(.42)	-.02	-.08(.94)	.07	.19(.85)
Time Pressure			-1.15	-1.13(.13)	-1.62	-1.22(.11)	-1.57	-1.22(.11)
Interruptions			1.05+	1.50(.07)	1.99+	1.36(.09)	-.84	-.13(.90)
Anticipation					2.11	1.02(.30)	.65	.16(.87)
A X I							.84	.43(.67)
Model Chi Square		6.85		11.53		12.77		12.96
Pseudo R2		.25		.42		.46		.47
Log Likelihood		-10.34		-8.00		-7.38		-7.28
Δ Log Likelihood				-2.34		-.62		-.10
Chi Square				4.68+		1.24		.20
		n=20		n=20		n=20		n=20

(t-tests for Interruptions (model 2 and 3) and Time Pressure are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 26

Probit Regression Results: External Practice Search (S1)

(Full Sample)

	H1a & H2a				H2c			
Variable	**b**	**t (p)**	**b**	**t (p)**	**b**	**t (p)**	**b**	**t (p)**
Decision Making	-.05	-.11(.91)	.11	.24(.81)	.21	.42(.68)	.27	.54(.59)
Outcome Interdependence	-.10	-.30(.76)	-.41	-.99(.32)	-.56	-1.07(.29)	-.62	-1.13(.26)
Company 1	-1.19	-1.25(.21)	-1.49	-1.28(20)	-1.05	-.89(.37)	-1.16	-.94(.35)
Company 2	-.11	-.16(.87)	.16	.21(.83)	.39	.48(.63)	.35	.43(.67)
Length of Time Team Exists	-.07	-1.58(.11)	-.08	-1.53(.13)	-.07	-1.41(.16)	-.06	-1.27(.20)
Team Size	-.10	-1.08(.28)	-.10	-1.02(.31)	-.08	-.89(.37)	-.09	-.92(.36)
Time Pressure			.20	.49(.63)	.28	.66(.51)	.26	.62(.54)
Interruptions			.24+	1.34(.09)	.16	.77(.22)	-.87	-.70(.49)
Anticipation					-.12	-.24(.81)	-.99	-.85(.40)
Λ X I							.28	.83(.41)
Model Chi Square		5.91		8.20		7.41		8.13
Pseudo R2		.11		.15		.15		.16
Log Likelihood		-23.97		-22.83		-21.31		-20.95
Δ Log Likelihood				-1.14		-1.52		-.36
Chi Square				2.28		3.04		.72
		n = 41		n = 41		n = 38		n = 38

(t-tests for Interruptions (model 2 and 3) are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 27

Probit Regression Results: External Practice Search (S1)

(30% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	.47	.91(.36)	.80	1.29(.20)	.73	1.16(.25)	1.82+	1.66(.10)
Outcome Interdependence	-.04	-.08(.94)	-.75	-1.02(.31)	-.89	-1.14(.25)	-1.24	-1.41(.16)
Company 1	-1.74	-1.52(.13)	-2.80+	-1.70(.09)	-2.50	-1.38(.17)	-6.07	-1.62(.11)
Company 2	-.16	-.21(.84)	.04	.04(.99)	.15	.15(.88)	-.85	-.67(.50)
Length of Time Team Exists	-.08	-1.37(.17)	-.05	-.85(.40)	-.04	-.63(.53)	-.05	-.75(.46)
Team Size	-.10	-.94(.35)	-.11	-1.02(.31)	-.10	-.92(.36)	-.15	-1.18(.24)
Time Pressure			-.16	-.30(.38)	-.19	-.35(.36)	-.78	-1.06(.14)
Interruptions			.42+	1.42(.08)	.41+	1.35(.09)	-5.42	-1.33(.19)
Anticipation					.01	.01(.99)	-3.92	-1.31(.19)
A X I							1.66	1.40(.16)
Model Chi Square		6.08		8.34		7.23		9.94
Pseudo R2		.14		.20		.18		.25
Log Likelihood		-18.04		-16.91		-16.57		-15.22
Λ Log Likelihood				-1.13		-.34		-1.35
Chi Square				2.26		.68		2.70
		n = 31		n = 31		n = 30		n = 30

(t-tests for Interruptions (model 2 and 3), Time Pressure are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 28

Probit Regression Results: External Practice Search (S1)

(50% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	1.27	1.50(.13)	2.87+	1.70(.09)	8.07	1.29(.20)	8.26	1.10(.23)
Outcome Interdependence	-.07	-.10(.92)	-1.84	-1.34(.18)	-5.60	-1.12(.26)	-6.03	-1.04(.30)
Company 1	-2.42	-1.25(.21)	-6.70	-1.48(.14)	-27.03	-1.16(.25)	-30.13	-1.12(.27)
Company 2	-.24	-.19(.85)	-.14	-.06(.95)	-6.14	-.89(.38)	-7.19	-.91(.36)
Length of Time Team Exists	-.08	-.96(.34)	-.003	-.04(.97)	-.07	-.57(.57)	-.04	-.29(.78)
Team Size	-.11	-.54(.59)	-.08	-.24(.81)	-.51	-.78(.44)	-.69	-.90(.37)
Time Pressure			-1.66	-1.16(.12)	-4.66	-1.07(.14)	-5.14	-1.03(.15)
Interruptions			1.12*	1.79(.04)	3.91	1.19(.12)	9.15	.95(.35)
Anticipation					6.87	.98(.33)	10.94	1.01(.31)
A X I							-1.28	-.63(.53)
Model Chi Square		6.90		13.01		15.01+		15.57
Pseudo R2		.26		.48		.56		.58
Log Likelihood		-10.01		-6.96		-5.95		-5.67
Δ Log Likelihood				-3.05		-1.01		-.28
Chi Square				6.10*		2.02		.56
		n = 20		n = 20		n = 20		n = 20

(t-tests for Interruptions (model 2 and 3) are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 29

Probit Regression Results: External Best Practice Search (S2)

(Full Sample)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	-.76	-1.61(.11)	-.73	-1.52(.13)	-.75	-1.47(.14)	-.98	-1.27(.21)
Outcome Interdependence	.36	.97(.33)	.24	.59(.56)	.27	.54(.59)	.17	.32(.75)
Company 1	-2.23*	-2.13(.03)	-2.28*	-2.02(.04)	-2.11+	-1.92(.06)	-2.31*	-1.93(.05)
Company 2	-.56	-.75(.46)	-.34	-.42(.68)	-.43	-.52(.61)	-.46	-.55(.58)
Length of Time Team Exists	-.02	-.69(.49)	-.02	-.56(.57)	-.03	-.81(.42)	-.02	-.51(.61)
Team Size	-.22+	-1.89(.06)	-.21+	-1.90(.06)	-.20+	-1.74(.08)	-.20+	-1.74(.08)
Time Pressure			.25	.66(.51)	.35	.92(.36)	.37	.92(.36)
Interruptions			.11	.66(.26)	-.02	-.10(.92)	-1.62	-1.26(.21)
Anticipation					.23	.45(.65)	-1.12	-.94(.35)
A X I							.45	1.26(.21)
Model Chi Square		11.00+		11.94		11.19		12.92
Pseudo R2		.19		.21		.21		.25
Log Likelihood		-22.91		-22.44		-20.74		-19.88
Δ Log Likelihood				-.47		-1.70		-.86
Chi Square				.94		3.40		1.72
		n = 41		n = 41		n = 38		n = 38

(t-test for Interruptions (model 2) is 1-tailed, all others are two-tailed)

\+ $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 30

Probit Regression Results: External Best Practice Search (S2)

(30% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	-.46	-.87(.38)	-.41	-.66(.51)	-.49	-.78(.43)	.37	.39(.70)
Outcome Interdependence	.31	.58(.56)	-.30	-.40(.69)	-.52	-.67(.51)	-.72	-.83(.41)
Company 1	-2.49*	-2.16(.03)	-3.45+	-1.84(.07)	-3.28+	-1.84(.07)	-6.72+	-1.73(.08)
Company 2	-.62	-.77(.44)	-.23	-.25(.80)	-.29	-.30(.77)	-.96	-.80(.43)
Length of Time Team Exists	-.01	-.26(.80)	.03	.66(.51)	.03	.71(.48)	.05	.84(.40)
Team Size	-.19	-1.51(.13)	-.16	-1.45(.15)	-.15	-1.32(.19)	-.17	-1.39(.16)
Time Pressure			.15	.29(.78)	.06	.11(.92)	-.45	-.67(.25)
Interruptions			.45+	1.40(.08)	.44+	1.42(.08)	-5.55	-1.32(.19)
Anticipation					.37	.53(.60)	-3.66	-1.26(.21)
A X I							1.71	1.40(.16)
Model Chi Square		8.27		11.04		10.78		13.82
Pseudo R2		.19		.26		.26		.33
Log Likelihood		-17.21		-15.82		-15.34		-13.82
Δ Log Likelihood				-1.39		-.48		-1.52
Chi Square				2.78		.96		3.04
		n = 31		n = 31		n = 30		n = 30

(t-tesst for Interruptions (model 2 and 3) and Time Pressure (model 4) are 1-tailed, all others are two-tailed)

\+ $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 31

Probit Regression Results: External Best Practice Search (S2)

(50% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	-.30	-.45(.65)	.38	.40(.69)	.43	.45(.65)	.71	.61(.54)
Outcome Interdependence	.25	.33(.74)	-.96	-.80(.43)	-1.70	-1.07(.28)	-2.20	-1.03(.31)
Company 1	-2.67	-1.62(.11)	-6.86	-1.51(.13)	-11.31	-1.41(.16)	-12.48	-1.49(.14)
Company 2	-.58	-.48(.63)	-.30	-.19(.85)	.16	.07(.94)	.61	.24(.81)
Length of Time Team Exists	-.02	-.46(.65)	.08	1.03(.31)	.16	1.16(.25)	.18	1.20(.23)
Team Size	-.20	-1.08(.28)	-.18	-.80(.42)	-.02	-.08(.94)	.07	.19(.85)
Time Pressure			-1.15	-1.13(.13)	-1.62	-1.23(.11)	-1.57	-1.22(.11)
Interruptions			1.05+	1.50(.07)	1.99+	1.36(.09)	-.84	-.13(.90)
Anticipation					2.11	1.02(.31)	.65	.16(.87)
A X I							.84	.43(.67)
Model Chi Square		6.85		11.53		12.77		12.96
Pseudo R2		.25		.42		.46		.47
Log Likelihood		-10.34		-8.00		-7.38		-7.28
Δ Log Likelihood				-2.34		-.62		-.10
Chi Square				4.68+		1.24		.20
		n = 20		n = 20		n = 20		n = 20

(t-tests for Interruptions (model 2 & 3) and Time Pressure are 1-tailed, all others are two-tailed)

\+ p < .10
* p < .05
** p < .01
*** p < .001

TABLE 32

Probit Regression Results: Any External Adoption (A1, A2)

(Full Sample)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	.18	.40(.70)	.52	.98(.33)	.56	1.01(.32)	.67	1.16(.25)
Outcome Interdependence	.48	1.39(.16)	.10	.24(.81)	.01	.03(.98)	.06	.11(.91)
Company 1	-.45	-.53(.60)	-.60	-.52(.61)	-.47	-.39(.69)	-1.21	-.73(.46)
Company 2	-.16	-.23(.82)	.81	.89(.38)	.78	.80(.43)	.65	.65(.52)
Length of Time Team Exists	-.00	-.10(.92)	.01	.29(.78)	.00	.12(.91)	.02	.63(.53)
Team Size	-.01	-.08(.94)	-.01	-.11(.91)	.00	.01(.99)	-.01	-.12(.90)
Time Pressure			.93+	1.81(.07)	.96+	1.85(.06)	.99+	1.84(.07)
Interruptions			.38*	1.98(.02)	.30+	1.43(.08)	-2.35	-1.45(.15)
Anticipation					.19	.34(.73)	-2.19	-1.46(.15)
A X I							.75+	1.63(.10)
Model Chi Square		3.38		12.12		9.82		12.99
Pseudo R2		.07		.23		.21		.27
Log Likelihood		-24.21		-19.84		-19.08		-17.49
Δ Log Likelihood				-4.37		-.76		-1.59
Chi Square				8.74*		1.52		3.18
		n = 40		n = 40		n = 37		n = 37

(t-tests for Interruptions (model 2 & 3) are 1-tailed, all others are two-tailed)

+ p < .10
* p < .05
** p < .01
*** p < .001

TABLE 33

Probit Regression Results: Any External Adoption (A1, A2)

(30% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	,56	1.02(.31)	,81	1.21(.23)	,76	1.14(.26)	1.16	1.42(.16)
Outcome Interdependence	,54	1.07(.28)	-.08	-.12(.91)	-.13	-.18(.86)	-.26	-.35(.73)
Company 1	-1.44	-1.32(.19)	-1.75	-1.03(.30)	-1.48	-.83(.40)	-2.79	-1.13(.26)
Company 2	-.45	-.57(.59)	.33	.34(.74)	.44	.41(.68)	.10	.09(.93)
Length of Time Team Exists	-.01	-.54(.59)	.01	.28(.78)	.01	.31(.76)	.03	.66(.51)
Team Size	-.12	-1.04(.30)	-.09	-.80(.42)	-.08	-.76(.45)	-.09	-.77(.44)
Time Pressure			.58	1.04(.30)	.58	1.01(.31)	.34	.51(.61)
Interruptions			.45+	1.46(.07)	.43+	1.38(.08)	-2.70	-.83(.41)
Anticipation					-.11	-.14(.89)	-2.27	-.96(.34)
A X I							.87	.96(.34)
Model Chi Square		4.79		9.25		7.46		8.43
Pseudo R2		.12		.23		.20		.22
Log Likelihood		-17.77		-15.54		-15.37		-14.88
Δ Log Likelihood				-2.23		-.17		-.49
Chi Square				4.46+		.34		.98
		n = 31		n = 31		n = 30		n = 30

(t-tests for Interruptions (model 2 & 3) are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 34

Probit Regression Results: Any External Adoption (A1, A2)

(50% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	.58	.88(.38)	.97	1.08(.28)	1.08	1.11(.27)	1.43	1.32(.19)
Outcome Interdependence	.40	.59(.55)	-.55	-.59(.56)	-.73	-.75(.46)	-1.08	-.99(.32)
Company 1	-.87	-.63(.53)	-1.01	-.48(.63)	-2.04	-.86(.39)	-2.12	-.79(.43)
Company 2	-.02	-.01(.99)	.86	.57(.57)	.46	.29(.77)	.68	.40(.69)
Length of Time Team Exists	-.02	-.68(.50)	.02	.50(.62)	.03	.64(.62)	.04	.80(.42)
Team Size	-.03	-.17(.86)	.12	.54(.59)	.20	.86(.39)	.31	1.07(.28)
Time Pressure			.08	.11(.92)	.04	.05(.96)	-.01	-.01(.50)
Interruptions			.59*	1.73(.04)	.77*	1.96(.03)	-2.92	-.62(.54)
Anticipation					1.23	1.03(.30)	-.97	-.31(.75)
A X I							1.00	.78(.44)
Model Chi Square		2.49		6.39		7.54		8.22
Pseudo R2		.09		.24		.28		.31
Log Likelihood		-12.22		-10.26		-9.69		-9.35
Δ Log Likelihood				-1.96		-.57		-.34
Chi Square				3.92		1.14		.68
		n = 20		n = 20		n = 20		n = 20

(t-tests for Interruptions (excepte model 4) and Time Pressure (model 4 only) are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 35

Probit Regression Results: External Adoption (A1)

(Full Sample)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	.06	.14(.89)	.48	.83(.40)	.50	.84(.40)	.48	.84(.40)
Outcome Interdependence	.61	1.66(.10)	.25	.55(.58)	.17	.31(.76)	.24	.43(.67)
Company 1	-.27	-.31(.75)	-.25	-.21(.84)	-.39	-.32(.75)	-.80	-.55(.58)
Company 2	-.09	-.13(.90)	1.22	1.17(.24)	.99	.90(.37)	.78	.72(.47)
Length of Time Team Exists	-.001	-.06(.95)	.01	.28(.78)	.00	.08(.93)	.01	.43(.67)
Team Size	.01	.09(.93)	.01	.11(.91)	.02	.28(.78)	.01	.17(.87)
Time Pressure			1.23*	2.04(.04)	1.26*	2.01(.05)	1.20*	2.01(.05)
Interruptions			.39*	2.02(.02)	.34+	1.54(.06)	-1.53	-.92(.36)
Anticipation					.59	.96(.34)	-1.13	-.72(.47)
A X I							.52	1.13(.26)
Model Chi Square		4.10		14.37+		12.67		14.02
Pseudo R2		.08		.29		.27		.30
Log Likelihood		-23.17		-18.04		-16.98		-16.30
Δ Log Likelihood				-5.13		-1.06		-.68
Chi Square				10.26**		2.12		1.36
		n = 40		n = 40		n = 37		n = 37

(t-tests for Interruptions (models 2 & 3) are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 36

Probit Regression Results: External Adoption (A1)

(30% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	.39	.72(.47)	.60	.91(.36)	.61	.92(.36)	.69	.96(.34)
Outcome Interdependence	.70	1.38(.17)	.20	.30(.77)	.04	.05(.96)	.03	.04(.97)
Company 1	-1.18	-1.08(.28)	-1.08	-.68(.49)	-1.11	-.67(.51)	-1.39	-.70(.48)
Company 2	-.38	-.46(.64)	.67	.63(.53)	.57	.50(.62)	.44	.37(.71)
Length of Time Team Exists	-.01	-.53(.60)	.01	.16(.87)	.01	.16(.88)	.01	.26(.80)
Team Size	-.10	-.85(.39)	-.05	-.49(.62)	-.04	-.40(.69)	-.04	-.37(.71)
Time Pressure			.90	1.46(.14)	.81	1.29(.20)	.73	1.08(.28)
Interruptions			.41+	1.39(.08)	.40+	1.36(.09)	-.69	-.22(.83)
Anticipation					.35	.45(.65)	-.41	-.18(.86)
A X I							.29	.34(.73)
Model Chi Square		4.45		9.81		8.02		8.14
Pseudo R2		.11		.25		.22		.22
Log Likelihood		-17.27		-14.59		-14.32		-14.26
Δ Log Likelihood				-2.68		-.27		-.06
Chi Square				5.36+		.54		.12
		n = 31		n = 31		n = 30		n = 30

(t-tests for Interruptions (models 2 & 3) are 1-tailed, all others are two-tailed)

\+ $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 37

Probit Regression Results: External Adoption (A1)

(50% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	,35	,53(,60)	,71	,77(,44)	,79	,71(,48)	,94	,81(42)
Outcome Interdependence	,55	,81(,42)	-,29	-,30(,76)	-,81	-,79(,43)	-1,01	-,90(,37)
Company 1	-,49	-,35(,73)	-,31	-,15(,88)	-3,75	-1,19(,24)	-3,66	-1,18(,24)
Company 2	,17	,15(,88)	1,24	,77(,44)	,54	,25(,80)	,81	,38(,71)
Length of Time Team Exists	-,02	-,65(,51)	,02	,44(,66)	,05	,85(,40)	,06	,93(,35)
Team Size	-,01	-,08(,94)	,15	,63(,53)	,53	1,62(,11)	,64	1,61(,11)
Time Pressure			,36	,46(,65)	,64	,64(,52)	,53	,53(,60)
Interruptions			,55*	1,63(,05)	1,38*	2,07(,04)	-2,15	-,35(,73)
Anticipation					5,28+	1,64(,10)	3,16	,67(,51)
A X I							,94	,56(,58)
Model Chi Square		2,28		6,02		12,38		12,74
Pseudo R2		,09		,23		,48		,49
Log Likelihood		-11,81		-9,34		-6,76		-6,58
Δ Log Likelihood				-2,47		-2,58		-,18
Chi Square				4,94+		5,16+		,36
		n = 20		n = 20		n = 20		n = 20

(t-tests for Interruptions (models 2 & 3) are 1-tailed, all others are two-tailed)

\+ $p < .10$

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 38

Probit Regression Results: External Best Practice Adoption (A2)

(Full Sample)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	-.14	-.31(.76)	.15	.25(.80)	.16	.26(.79)	.55	.64(.52)
Outcome Interdependence	.55	1.53(.13)	.02	.04(.97)	-.02	-.05(.96)	-.16	-.25(.81)
Company 1	-.01	-.01(.99)	-.25	-.21(.84)	-.03	-.03(.98)	-2.11	-.69(.49)
Company 2	-.73	-.91(.36)	.22	.20(.84)	.35	.30(.77)	.51	.28(.78)
Length of Time Team Exists	-.01	-.42(.67)	-.001	-.03(.98)	.00	.03(.98)	.01	.11(.92)
Team Size	.02	.21(.84)	.02	.23(.82)	.02	.27(.79)	.01	.14(.89)
Time Pressure			1.01+	1.79(.07)	.99+	1.75(.08)	1.52*	2.01(.04)
Interruptions			.59***	2.58(.01)	.55**	2.27(.01)	-5.47+	-1.85(.06)
Anticipation					-.12	-.20(.85)	-6.68+	-1.86(.06)
A X I							1.88+	1.89(.06)
Model Chi Square		3.71		16.83*		13.73		22.49**
Pseudo R2		.08		.34		.31		.50
Log Likelihood		-22.58		-16.02		-15.65		-11.27
Δ Log Likelihood				6.56		-.37		-4.38
Chi Square				13.12**		.74		8.76*
		n = 40		n = 40		n = 37		n = 37

(t-tests for Interruptions (models 2 & 3) are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 39

Probit Regression Results: External Best Practice Adoption (A2)

(30% Within Team Response Rate)

	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	.11	.20(.84)	.19	.25(.80)	-.21	-.26(.79)	.92	.69(.49)
Outcome Interdependence	.55	1.10(.27)	-.71	-.87(.39)	-.63	-.76(.45)	-.94	-.97(.33)
Company 1	-.71	-.69(.49)	-1.92	-.89(.38)	-.17	-.07(.95)	-4.34	-.84(.40)
Company 2	-.91	-1.06(.29)	-.44	-.34(.73)	1.03	.64(.52)	-.20	-.08(.93)
Length of Time Team Exists	-.02	-.71(.48)	.03	.50(.62)	.05	.80(.43)	.04	.47(.64)
Team Size	-.08	.67(.50)	-.06	-.53(.60)	-.05	-.39(.70)	-.08	-.55(.58)
Time Pressure			.69	1.11(.27)	1.21	1.55(.12)	.73	.76(.45)
Interruptions			1.10*	2.12(.02)	1.31*	2.08(.02)	-4.88	-.90(.37)
Anticipation					-1.71	-1.31(.19)	-6.07	-1.37(.17)
A X I							1.79	1.10(.27)
Model Chi Square		2.83		14.28		14.40		16.07
Pseudo R2		.08		.38		.41		.46
Log Likelihood		-17.26		-11.54		-10.20		-9.36
Δ Log Likelihood				-5.72		-1.34		-.84
Chi Square				11.44**		2.68		1.68
		n = 31		n = 31		n = 30		n = 30

(t-tests for Interruptions and Anticipation X Interruptions are 1-tailed, all others are two-tailed)

\+ $p < .10$
* $p < .05$
** $p < .01$
*** $p < .001$

TABLE 40

Probit Regression Results: External Best Practice Adoption (A2)

(50% Within Team Response Rate)

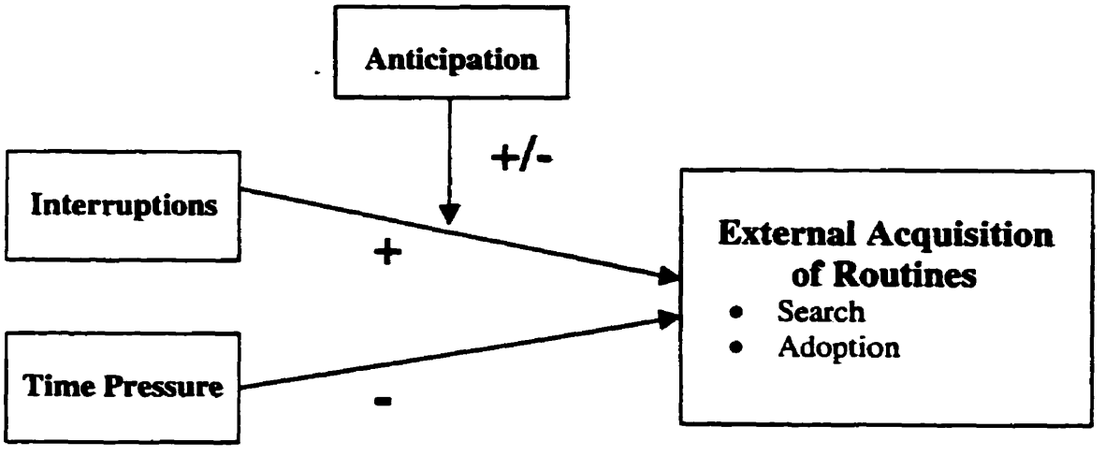
	H1a & H2a				H2c			
Variable	b	t (p)	b	t (p)	b	t (p)	b	t (p)
Decision Making	.04	.06(.95)	.35	.18(.86)				
Outcome Interdependence	.28	.41(.69)	-3.21	-1.24(.22)				
Company 1	.10	.07(.94)	1.68	.27(.79)				
Company 2	-.34	-.29(.77)	1.88	.49(.62)				
Length of Time Team Exists	.03	-.72(.48)	.12	1.17(.24)				
Team Size	.02	.09(.93)	.73	.99(.33)				
Time Pressure			-.58	-.46(.32)				
Interruptions			2.27*	2.27(.04)				
Anticipation								
A X I								
Model Chi Square		1.12		16.07				
Pseudo R2		.05		.66				
Log Likelihood		-11.66		-4.18				
Δ Log Likelihood				-7.48				
Chi Square				14.96**				
		n = 20		n = 20				

(t-tests for Interruptions (models 2 & 3) are 1-tailed, all others are two-tailed)

\+ p < .10
* p < .05
** p < .01
*** p < .001

FIGURE ONE

Antecedents to Team External Acquisition of Routines



APPENDIX A

Sample Questions From Interviews

1. What are some of the techniques this organization uses to share practices?
2. How would you say practices get shared in your organization?
3. Do you have an awards program for best practices? If so, please describe it.
4. Are there formal mechanisms to find innovative practices among teams and get them spread around to other teams?
5. How does your team learn about new or successful practices?
6. When practices have been published, have you found any that your team has incorporated? Why or why not?
7. To what extent are new practices or ways you do your work dictated to your team?
8. Does headquarters have a big impact on the practices you use?
9. Why would or wouldn't your team adopt a practice identified as a "best practice?"
10. Do you feel that you can learn from other teams or locations? Why or why not?

APPENDIX B

Interview Questions for Dependent Variable Development

1. Does your team or organization use the term best practice? Work practices? How do you define these terms?

2. Did the _____ team SEARCH for *individual level* practices in the month of _____? If yes, please describe how this search took place.

3. Did the _____ team SEARCH for *team level* practices in the month of _____? If yes, please describe how this search took place.

4. If yes to searching, what sources were searched? Internal? External?
5. If yes to searching, can you estimate how much time or what percentage of the team's time the search took?

6. Did the team search as an entire unit? Or did a few individuals or you yourself as the leader just conduct the search?

7. If yes, what modes or channels were searched?
8. Did the _____ team ADOPT any *individual* level practices in _____?
9. Did the _____ team ADOPT and *team* level practices in _____?
10. Please briefly describe each new practice adopted in March. April.

APPENDIX B CONTINUED

11. If team adopted new practices, what were the sources of each? Were they different for team level vs. individual level?

12. If team adopted new practices, what were the methods of communication of each? Were they different for the team vs. individual level?

APPENDIX C

KEY VARIABLE SURVEYS

Recent Practice Transfer Activities

Practices are how your team's work is done. Please focus only on your **team's** activities and on **team-level practices.** Team-level practices involve either the entire team or a substantial number of team members.

Two examples of team-level practices for handling incoming repair calls:

Alternative 1: Central point of contact where call comes in to a central dispatcher for the team who diagnoses the needs of the customer. Dispatcher determines which team members should handle the problem, then contacts the appropriate service engineers and schedules service call. Dispatcher leads all follow-up to the customer.

Alternative 2: Each service engineer takes calls individually and determines if he/she has the time and/or expertise to handle the call. The service engineer receiving the call contacts other team members he/she needs to include in the repair, handles all scheduling, and leads all follow-up to the customer.

Recent Search for Practices	**In December**	
1. **Did the team search outside the team for work practices?**	Yes	No
2. Did the team **search** for BEST practices **outside the team**?	Yes	No

If you answered **yes** about searching, please check the sources your team searched. Check all that apply:

December	
	Other similar teams in your organization.
	Other departments in your organization.
	Other geographic locations of your organization.
	Other organizations in the same industry.
	Other organizations outside your industry.
	A web-site maintained by your organization (Internet or Intranet).
	A web-site maintained by another organization.
	Data or knowledge base maintained by your organization.
	Newsletters or other organizational communications
	Other. Please specify: _____

APPENDIX C CONTINUED

Recent Adoption of Practices	In December	
3. Did the team **adopt** work practices from **outside the team**?	Yes	No
4. Did the team **adopt** BEST practices from **outside the team**?	Yes	No

If you answered **yes** about adopting please note which of the following sources these practices were adopted from. Check all that apply:

December	
	Other similar teams in your organization.
	Other departments in your organization.
	Other geographic locations of your organization.
	Other organizations in the same industry.
	Other organizations outside your industry.
	A web-site maintained by your organization (Internet or Intranet).
	A web-site maintained by another organization.
	Data or knowledge base maintained by your organization.
	Newsletters or other organizational communications
	Other. Please specify: _____

APPENDIX C CONTINUED

PRACTICE TRANSFER EFFORT

How much **effort** did your team spend on each of the following activities in December?

1 = none; 2 = very low amount; 3 = a little; 4 = moderate amount; 5 = very high amount

	In December				
1. Searching outside the team for BEST practices?	1	2	3	4	5
2. Implementing BEST practices adopted from outside the team?	1	2	3	4	5
3. Searching outside the team for processes?	1	2	3	4	5
4. Implementing new processes adopted from outside sources?	1	2	3	4	5
5. Scanning the environment inside your organization for new work methods?	1	2	3	4	5
6. Finding out how other teams within your organization complete similar tasks?	1	2	3	4	5
7. Scanning the environment outside of your organization for practices and new methods of work?	1	2	3	4	5
8. Collecting information on practices from individuals outside the team?	1	2	3	4	5
9. Developing or modifying processes inside the team?	1	2	3	4	5

If your team searched for or adopted practices in December, please briefly describe the practice(s):

APPENDIX C CONTINUED

RECENT TEAM EVENTS

STEP 1: Please circle YES or NO for each numbered question for December.
STEP 2: If you answer yes, complete sub-questions (a) and (b) using the following scale:

1 = not at all; 2 = a little; 3 = somewhat; 4 = very; 5 = completely/extremely

	In December				
1. Did the team have changes in projects or tasks?	Yes				No
a. If yes to 1, were these changes anticipated?	1	2	3	4	5
b. If yes to 1, how disruptive were these changes?	1	2	3	4	5
	In December				
4 Did the team have changes in products or services?	Yes				No
a. If yes to 2, were these changes anticipated?	1	2	3	4	5
b. If yes to 2, how disruptive were these changes?	1	2	3	4	5
	In December				
5 Did the team have changes in machines, tools or other technologies?	Yes				No
a. If yes to 3, were these changes anticipated?	1	2	3	4	5
b. If yes to 3, how disruptive were these changes?	1	2	3	4	5
	In December				
4. Were any members added to the team?	Yes				No
a. If yes to 4, was this anticipated?	1	2	3	4	5
b. If yes to 4, how disruptive were these changes?	1	2	3	4	5
	In December				
5. Did the team lose any members?	Yes				No
a. If yes to 5, was this anticipated?	1	2	3	4	5
b. If yes to 5, how disruptive were these changes?	1	2	3	4	5
	In December				
6. Were there changes in members' roles or job descriptions?	Yes				No
a. If yes to 6, were these changes anticipated?	1	2	3	4	5
b. If yes to 6, how disruptive were these changes?	1	2	3	4	5
	In December				
7. Were there any changes in team structure?	Yes				No
a. If yes to 7, were these changes anticipated?	1	2	3	4	5
b. If yes to 7, how disruptive were these changes?	1	2	3	4	5
	In December				
8. Did the organization experience a restructuring?	Yes				No
a. If yes to 8, were these changes anticipated?	1	2	3	4	5
b. If yes to 8, how disruptive were these changes?	1	2	3	4	5

APPENDIX C CONTINUED

9. Did the team have breaks in regularly scheduled work?	In December Yes No
a. If yes to 9, were these breaks anticipated?	1 2 3 4 5
b. If yes to 9, how disruptive were these breaks?	1 2 3 4 5
10. Did the team have any serious performance problems, errors or failures?	In December Yes No
a. If yes to 10, were these problems anticipated?	1 2 3 4 5
b. If yes to 10, how disruptive were these problems?	1 2 3 4 5
11. Did the team hold a formal planning session?	In December Yes No
a. If yes to 11, was this session anticipated?	1 2 3 4 5
b. If yes to 11, how disruptive was this session?	1 2 3 4 5
12. Did the team have unusually high performance?	In December Yes No
a. If yes to 12, was this level of performance anticipated?	1 2 3 4 5
13. How many times did the team meet?	In December _____
a. How many of these were regularly scheduled meetings?	
14. Did the team experience any other unusually disruptive events in December?	In December Yes No
a. If yes, please describe:	

APPENDIX C CONTINUED

RECENT TEAM WORKLOAD

Please answer the following questions about your **Team's** workload in December :

	IN DECEMBER						
1. How much mental or perceptual activity was required to complete the team's work?	small amount 1	2	3	moderate amount 4	5	6	high amount 7
2. Were the tasks easy or demanding?	easy 1	2	3	moderate 4	5	6	7
3. Were the team's tasks slow or brisk?	slow 1	2	3	moderate 4	5	6	brisk 7
4. How much time pressure did you feel due to the rate or pace at which the tasks occurred?	low 1	2	3	moderate 4	5	6	high 7
5. Was the pace slow or rapid?	slow 1	2	3	moderate 4	5	6	rapid 7
6. Was the pace leisurely or frantic?	leisurely 1	2	3	moderate 4	5	6	frantic 7
7. Were the tasks simple or complex?	Simple 1	2	3	moderate 4	5	6	complex 7
8. Was your personal workload unusually low, typical or unusually high?	Low 1	2	3	Typical 4	5	6	High 7
9. Was your team's workload unusually low, typical or unusually high?	Low 1	2	3	Typical 4	5	6	High 7