**A Political Perspective on Product Development Schedules:
Evidence from Software**

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To my dearest Janet,
all my love and gratitude
for her support and encouragement
throughout a much longer process
than I know she anticipated.

And to my parents,
Harvey and Mary Allen

Abstract

The effects of project structure and the organizational politics of stakeholders on software product development project schedules are examined to gain insight into the impacts of organizational politics within the broader arena of new product development scheduling. Most software product development project schedules are built with little consideration of either a project's organizational or political context. Few such projects deliver "on spec, on time, and on budget". The theoretical context of this research holds that project scheduling is an ongoing political process for allocating finite resources. Professional software project manager interviews were held to enrich the understanding of the political issues around project schedules. Questionnaires completed by professional software project managers supported the hypotheses that project structure influences organizational politics, and that organizational politics influences schedule behaviour. Indications are that early political intervention may result in smaller schedule overruns while increasing levels of political activity later in project's lifecycle may be a response to accumulating schedule overruns.

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1 Introduction

Research into the management of new product development has tended until recently to focus on the mechanics of the process, what should be done, when it should be done, who should do it, and how to ensure that they did it on time and within budget. Little notice was taken of why those involved might not want to do it. It was assumed that because it was sanctioned at least locally by the organization that everyone would fall into line with its goals.

The goal of this research is to gain insight into the impacts of organizational politics on new product development schedules by examining how project structure and the political activities of project stakeholders affect the schedules of software product development projects.

A literature review sets the stage by covering the evolution of scheduling methods for product development projects and the current state of the relevant literature sets the stage for the research that follows.

Five case study projects are offered as background to the development of hypotheses, a theoretical model, and a questionnaire. The questionnaire was used to collect the data necessary to test the hypotheses.

Presented is an examination of how the structure of a software product development project and the political activities of the project's stakeholders affect the behaviour of its schedule.

2 Literature Review

The literature reviewed presents an overview of the evolution of scheduling focusing on its mainly deterministic approach, attempts at more proactive and adaptive methods, and an introduction to the pervasiveness of organizational politics. A sense of the diverse political approaches and project structures employed when organizations undertake to develop new products are presented. Frameworks for describing the organizational politics these organizations encounter and the schedule behaviour (under / overruns) experienced by their projects are also presented.

2.1 Evolution of Scheduling

Most software product development project schedules are built with little or no consideration being given to either a project's organizational or its political context. Typically, technical resources are called upon to construct schedules, using their experience to identify lists of activities, and predict the effort required to complete these activities.

Naively focusing on such methods has resulted in the prevalence of theories and tools that have remained very task oriented and reactive rather than proactive in dealing with deviations from the original plan. Law and Lach (1968) characterized the Critical Path

Method (CPM) as a “deterministic, activity-oriented method” which takes on the viewpoint of the person planning and/or performing the actual work.

Success is assumed to result from detailed tracking of activities and reactive adjustment of the schedule as deviations occur. Little is discussed about either why such deviations occur or in fact that the probability of such deviations might better have been anticipated when structuring the initial schedule.

Over the years since Law and Lach (1968), much research that has gone into the search for better models and techniques for planning, estimating, scheduling and tracking of software product development projects. While retaining a primarily mechanistic approach, most of this research can be loosely grouped around various “themes”: alternate estimation techniques (sizing) such as Function Point Analysis (Garmus 1996), the enhanced control (process) of Total Quality Management (Bent and Humphreys 1996), new scheduling algorithms (timing) like concurrent engineering (Eldin 1997), genetic based indirect chromosome encoding (Ozdamar 1999) or heuristic rules based scheduling (Lova and Tormos 2001) and the non-regular success measure (valuation) of early-tardiness penalty costs (Van Houcke, *et al.* 2001). Common to all, with the exception of the Van Houcke approach, is the underlying goal of shortening a project’s critical path.

Another definition of “better” project scheduling held that maximizing the net present value of a project by scheduling those activities that will incur costs to be initiated/completed as late as possible while those that generate revenues are initiated/completed as early as possible thus ensuring the best return to the organization for the project costs incurred (Kolisch and Padman, 2001).

However, most software development methodologies (McConnell 1996) impose a strict order of initiation and completion on project activities and discourage revisiting previous activities. This linearity contributes to the premature “locking in” of development teams to project schedules that were at best, experience based guestimates and at worst pure wishful thinking. However, once made public they become the yardstick against which everything is measured. Seldom does memory of or consideration for how what should have been considered initial estimates was arrived at, survive.

2.2 Proactive and Adaptive Methods

McConnell (1996) attempts to improve upon these linear “locked-in” methods by presenting an approach to scheduling that is based on estimate ranges where the initial range is broad enough to recognize the lack of requirements clarity. The project schedule is periodically updated to reflect the narrowing of the original estimate range as more information is acquired. Additional information includes clarification of requirements and experiential information from the ongoing project.

While, in an informal sense, McConnell is advocating the use of the sort of feedback loops more formally explored in System Dynamics (Abdel-Hamid and Madnick 1991) his primary focus remains the mechanics of the project. What I would term the “first order” inputs and outputs of the development process, such things as additional business requirements knowledge, projected resource levels, and actual expenditures of time and effort.

The System Dynamics model, while focused on the “core” software development project activities of design, coding and testing, includes feedback loops that allow for the dynamic modification of a project’s inputs and outputs. Such a model presents a more realistic vehicle for the management of software development projects in general and the impacts of organizational politics specifically.

From the works of McConnell and others a consensus appears that the process for arriving at initial estimates and by extension, schedules must be more sophisticated than is most often the case. Initial estimates that almost immediately become cast-in-stone yardsticks of success or failure must also be presented in ways that encourage recognition of their necessary inaccuracy and impending revision.

2.3 Pervasive Organizational Politics

The advancements of proactive and adaptive methods notwithstanding, “a great number of software projects fail to deliver software systems meeting stakeholders requirements within schedule and budget” (Dakhli and Toffolon 1998).

Little attention has been paid to the scheduling (and execution) of software product development projects in the political contexts of the organizations within which they occur.

Pinto (1996) maintains that too much of what project managers do depends upon their ability to effectively manage not only the technical side but also the behavioural side of the job. He suggests that politics is a natural and pervasive human response to conflict situations and that it is neither inherently evil nor virtuous but is often perceived as such as a result of the uses to which it is put. He asserts that while “conflict is inevitable; it need not be disastrous” when handled by the politically adept.

Ratzburg (2001) concurs with a definition that holds that organizational politics is the mechanism employed to reconcile conflicting interests where conflict has resulted because of a diversity of interests and resources are too limited to satisfy all such interests. These mechanisms attempt to create or maintain “order” among organizational members each with their own interests, wants, desires, and needs.

2.4 Political Approaches

There is a wide range of opinions about what constitutes organizational politics, and how one should deal with it and its practitioners, if at all. Not only is this true between researchers but in fact individual researchers struggle with it within their own research.

Prasad (1986) appears to agree with Pinto (1996) and Ratzburg (2001) when he contends in his thesis that the levels of what he calls General, Innovation-related (Organization) Politics (GIOP) encountered within an organization is inversely proportional to the fit between an organization's formal structure and processes, and its actual workflow and external environment.

However, he reveals a more traditional stance when he refers to organizational politics as "self-interested gamesmanship". This adds to the sense that the motivation for better understanding these issues is so that one could take actions that would minimize their levels.

In fact one of the appeals of ISO 9000 standardization, with its detailed documentation of all facets of organizational activity norms, may be the desire to limit organizational politics by minimizing ambiguity. The downside of such attempts to avoid ambiguity is that they tend to reinforce single loop learning to the detriment of double loop learning opportunities. Making sure that everyone follows the same procedures discourages questioning whether something should be done at all.

Similarly, some suggest that Bent and Humphreys (1996) proposed the use of the comprehensive processes of Total Quality Management to avoid the politics that lead “90 percent of project managers to identified conflicting interests and struggles with department managers” as a major concern.

Prasad (1986, 1993a, 1993b) seems conflicted as to his own position on whether organizational politics is an unnecessary evil of organizational life to be minimized or an acceptable avenue for achieving legitimate goals.

Prasad (1986) offers morally neutral definitions for power and organizational politics. Power being the ability of A to get B to do something B would not normally do, without A having to change its behaviour, while organizational politics is distinguished from power by A’s need and/or willingness to do something as a *qui quid pro quo* for B). Subsequently Prasad (1993a) adds to his definition by stating that “organizational politics arises not because of individual or group perversity but because ... lobbying and manoeuvring are essentially exercises in power mobilization...” This suggests a move towards the broader definition of Organizational Power Politics (Fairholm, 1993) where morality issues from the motivations of those involved in organizational politics and not the activities themselves.

Prasad (1993a) also makes reference to the different attitudes about organizational politics held at different levels of the organization. At the lower levels of an organization organizational politics is typically seen as “playing games”. Higher management levels tended to be more accepting of organizational politics and its ability to move them closer to the center of power.

He (Prasad, 1993b) recognizes both positive and negative impacts of organizational politics on the individual and the project team. However, in this context positive and negative are reflections of the success or failure of the individual or team at “playing the (organizational politics) game” and not an ethical evaluation of its application. Politically successful individuals acquire empowerment and are rewarded with advancement, recognition, and status. Unsuccessful individuals are negatively impacted which may explain their exhibiting the maladaptive behaviour associated with Organizationally Induced Helplessness (OIH).

Anecdotally, consider the manager who spends most of his time engaged in organizational politics related pursuits “robbing Peter to pay Paul”. While his efforts often stretched the bounds of propriety, and as frustrating as it may be to deal with him from time to time, no one whether subordinate, peer, or superior would attributed to him any motive other than to get done the job he was charged with.

While recognizing the possibility that organizational politics can have negative and/or positive consequences for the individual, Prasad (1993b) does not truly recognize that a significant amount of organizational politics is focused on “getting the job done”. To paraphrase Harrison (1992) the underhandedness of politics represents only the dark (negative) side, while the lighter (positive) side sees politics used “for the benefit of others, the organization and the common good”.

Pinto (1996) suggested that project managers and indeed all of a project’s stakeholders must “use politics or risk being used by politics”.

Pinto (1996) offers what amounts to a “How-To and Why” manual for dealing with the organizational politics involved in project management. He points out that project managers must be aware of all stakeholder positions and needs. In fact he suggests that the “process of stakeholder analysis is valuable because it forces a firm to recognize a broader range of impacts that their actions might have. The project manager’s challenge is that each stakeholder would have his or her own goals and agendas, which often do not align with those of the project.

Pinto (1996) presents a six step cyclical framework for understanding and managing their conflicting interests: assess the environment, identify the goals of the principal actors, assess your own capabilities, define the problem, develop solutions, and test and refine these solutions. Conflict is central to organizational life because of scarce resources and

enduring differences. Finally, the use of power and politics become important tools to resolve these inevitable conflicts.

Far from advocating what he terms the “naïve” attitude of “it’s unappealing and I don’t do it” attitude, Pinto (1996) holds that politically sensible individuals enter organizations with few illusions about how many decisions are made. They use politics as a way of making contacts, cutting deals, and gaining power and resources for their departments or projects to further corporate, rather than entirely personal ends. These astute project managers learn to recognize political games and develop and employ political tools as appropriate.

Just as there are many different opinions about organizational politics there are also many tools aimed at assisting project managers deal with it.

2.5 Prevalence and Diversity of Project Structures

Harrison (1992) stated that, “projects and project management are taking increasingly important roles in industry, commerce, and public sector organizations” and has extended “to many less traditional industries and to more intangible applications.”

He goes on to identify four primary reasons for the widespread adoption of project management:

1. Organizations are recognizing that many of its activities are projects in nature, i.e., single in purpose and finite in duration, and require different management approaches for their other operations
2. More demanding market conditions and larger project sizes require more professional project managers.
3. The accelerating rate of change results in more activities being undertaken as projects with their tight time, cost, and performance objectives.
4. The need to integrate multiple disciplines in multi-company undertakings is requiring project management techniques to be successful.

Most significant to this research is his segregation of project organization (structure) and its related issues into two levels: “internal” and “external”. The internal project organization pertains to the structure of the relationships between individuals and groups on the project team. The external project structure relates to the relationships between those on the project team and their parent functional departments and companies.

This research focuses on external relationships and adopts the Wheelright and Clark (1992) model of the four dominant project structure types: functional, lightweight, heavyweight, and autonomous.

1. **Functional** projects group people by discipline, under a functional manager. The primary responsibility for the project passes sequentially from one function to the next with no one individual responsible for the overall project.

2. **Lightweight** projects retain the functional grouping of team members but each functional area designates a liaison person to “represent” its interests on the project coordinating committee. The project manager is usually a middle- or junior-level person with little status or influence in the organization and the project resources remain under control of functional managers.
3. **Heavyweight** projects are led by a project manager who has been invested with direct access to and responsibility for the work of all those involved in the project. They tend to be senior managers with primary influence over the people on their project. However, long-term “ownership” of the people remains with their functional managers.
4. **Autonomous** projects are staffed by individuals from functional areas who have been formally assigned, dedicated and co-located to the project team. The project manager has complete control over them and their evaluation.

2.6 Schedule Behaviour and Project Lifecycle

Although schedule has a singular inference of time about it a broader definition of schedule behaviour was used in this research. Schedule behaviour was measured on the two distinct scales of cost and duration or more specifically on the under / overruns of cost and duration experienced by a project during its lifecycle.

A project's lifecycle as characterized by Callahan and Moretton (1998) consists of five (5) major activities which are common to all development processes and that may be undertaken concurrently:

- Defining detailed product requirements – the determination of the commercial (or customer) requirements for the product together with its functional specification;
- System/Product design – the definition of the product design at the level of the modules to be used and their interdependencies;
- Creation of source code – the creation of the source code for the software product in whatever languages that are used;
- System testing – the internal, laboratory based testing of versions of the entire product; and
- Beta testing – the testing of pre-release versions of the product by an end user / customer often at one of their sites.

The overlaying of the schedule behaviour (under / overruns) scales onto the Callahan and Moretton framework of major activities provides a profile of the project's schedule behaviour not only for the project as a whole but over time as represented by these major activities.

2.7 Organizational politics Defined

Fairholm (1993) compiled a list of twenty-two power (political) tactics typically encountered by project managers. His focus was on definition, model of use, and that they can be used at and between all levels of an organization. Similarly, Harrison's (1992) toolkit, a list of ten political tools a project manager must be adept at using and/or counteracting in support of his project goals, is presented below:

1. Gaining support from a higher power source or sources
2. Alliance or coalition building, i.e. gaining support from peers
3. Controlling a critical resource, i.e. money, and people
4. Controlling the decision process
5. Controlling the committee process
6. Using positional authority
7. Use of the scientific element
8. Deceit and deception
9. Information, i.e. censoring or withholding
10. Miscellaneous games, i.e. divide and rule, or whistle blowing

The measurement of organizational politics was operationalized for this research by using a list of nine (9) political activities. The first seven (7) are based upon a regrouping of the political tools in Harrison's toolkit and the final two (2) are extracted from Harrison's (1992) discussion of change control.

The nine (9) political activities and how seven (7) of them were related to Harrison's tools follows:

1. "Persuading senior management to support your project", is a direct translation of the first tool in Harrison's list, "Gaining support from a higher power".
2. "Convincing peers that the success of your project aligned with their own interests", is a direct translation of the second tool, "Alliance or coalition building".
3. "Negotiating the availability of sufficient resources such as personnel, money, expertise, and relevant information", was an amalgamation of the third tool, "controlling a critical resource", and the ninth, "Information".
4. "Ensuring that (project) favourable (product) decisions were reached", is likewise an amalgamation of Harrison's fourth tool, "Controlling the decision process" and the fifth tool, "Controlling the committee process".
5. "Protecting projects from the competing agendas of others", was an attempt to capture the essence of Harrison's eighth tool, "deceit and deception", and his tenth tool, "miscellaneous games" while avoiding the negative biases associated with these activities that might result in their being under reported.
6. "Using positional authority to further project goals", is based directly on Harrison's sixth tool, 'use of positional authority'
7. "Using recognition as a knowledgeable resource to further project goals", is a translation of Harrison's seventh tool, "Use of the scientific element".

8. “Resisting outside pressures to reduce schedule duration”, was added as a prevalent activity encountered by project managers
9. “Resisting outside pressures to increase project scope”, was added as an equally prevalent activity encountered by project managers.

2.8 Literature Insights

This section highlights the insights gained while compiling the above literature review.

1. Organizational politics is a natural and pervasive human response to conflict situations. It is neither inherently evil nor virtuous. The morality issues from the implementer (Pinto, 1996).
2. There are two basic approaches to dealing with organizational politics. The first holds that the amount of political activity that occurs in an organization can be limited through open communication, reduction of uncertainty, and political awareness (Ratzburg, 2001). This approach seeks to minimize the impact of organizational politics by ensuring all procedures are documented in advance and performance is controlled in accordance with these procedures. The second approach recognizes the fluid nature of organizations and attempts to plan for conflict situations by gathering as much information about stakeholder needs in advance and throughout project lifecycle (Pinto, 1996).
3. The structural relationships between a project and its “parent” organization was clarified by Harrison’s (1992) segregation of project organization (structure) and its related issues into two levels: “internal” and “external”.

3 Research Focus

This research presents a theoretical context, a model, and hypotheses that are used to study the relationships between project structure, organizational politics and schedule behaviour (under / overruns).

“Requirements management is a political process, not a technical one” (Andriole 1998). Redefining project scheduling as an ongoing political process for allocating finite resources provides the theoretical context of this research.

This thesis contends that how a project is organized influences the level of organizational politics that the project manager must deal with. It is further suggested that both project structure and the resultant organizational politics influence how the project’s schedule may change over its lifecycle.

3.1 Hypotheses

Hypothesis one: Project structure influences schedule behaviour.

Much has been written about the relative strengths and weaknesses of the various project structure types. Most research has focused on how efficiently each deals with communication, ownership and commitment to a project, cross-functional problem solving, and staffing issues. For example, Clark and Wheelwright (1992) cite the increased level of project manager and team member control over project resources.

Smith and Reinertson (1998) also make reference to the increase in speed to be expected as one moves from a functionally structured project towards a heavyweight structure. They attribute this to improved horizontal communication that in turn speeds up cross-functional decision-making.

Functional projects are dependant upon upfront project specifications to provide cross-functional coordination and integration (Clark and Wheelright, 1992). The need for definitive documents based on less than complete information may increase schedule variation. Clark and Wheelright (1992) point out that greater rigor is usually applied to the construction and tracking of work programs and schedules for heavyweight projects than for functional projects. For example, explicit contract books are constructed detailing agreements between the heavyweight team and the organization. Heavyweight project managers are also in a position to provide “hands-on” coordination and integration of additional information / understanding of the project tasks and constraints as the project progresses.

Functional project activities may be pushed aside by other functional workloads (Burke, 1999). Conversely, being explicitly dedicated to the project, heavyweight project team members have a higher sense of ownership and a tendency to be more focused on identifying, scheduling, executing, and tracking workloads of their specific project.

Disaggregating a project's lifecycle into major activities, as proposed by Callahan and Moretton (1998), permits a more detailed investigation of the relationship between project structure and schedule behaviour (under / overruns). The characteristic differences of these major activities reinforce the expectation of further variations in the relationship between project structure and schedule behaviour (under / overruns) from one activity to another.

Major activities require varying levels of interactions outside of the project team, greater for defining detailed product requirements and beta testing, lesser for creating code and system testing. Such interactions may counteract the benefits associated with the increased control attributed to heavyweight and/or autonomous projects.

In light of such differences it would seem reasonable to expect a significant relationship between a project's structure and its schedule behaviour as measured by cost and duration under / overruns.

More formally, this hypothesis uses the four discreet project structure types outlined by Clark and Wheelright (1992) to suggest that there is a statistically significant relationship between a given project's structural type and the deviations from the projects' expected schedule behaviour in terms of the under / overruns of cost and duration.

Hypothesis two: Project structure influences organizational politics.

The motivation behind this hypothesis centers around the differing circumstances in which project managers, or in the case of a functional project, the group of project impacted functional managers, find themselves as a result of the structure of the project they are assigned.

Functional manager roles and their decision-making responsibilities are limited to the interests of their own function although they have clearly defined responsibility and authority within their own departments. They also have limited ability or motivation to influence the decisions of other functions “particularly when the scope has moved to another department” (Burke, 1999). Functional projects have no single point of responsibility for the overall project, a feature that limits cross-functional communication and coordination, and could be expected to raise the level of organizational politics occurring between functional departments.

The appointment of even a lightweight project manager provides a focal point for providing improved communication and coordination across functional boundaries (Clark and Wheelright, 1992). The project manager’s motivation shifts from one concerned solely with functional interests to one of ensuring that project goals are met in a timely fashion. Team members on such projects find they have two managers, the project manager and their “home” functional manager (Harrison, 1992).

In the case of autonomously structured projects, the project manager has a high level of authority to manage and control the project resources and constraints (Burke, 1999). Unlike lightweight and heavyweight project team members, autonomous team members have only one boss, their project manager. This fact alone infers a difference in the political landscape.

A functionally structured projects' decision-making takes place within the relative homogeneity of the functional department, lightweight and/or heavyweight project decisions require cooperation between project manager and functional managers, and autonomously structured project decisions take place within the context of a whole project answerable to a single project manager.

Given the different decision-making circumstances as mandated by the various project structure types, it would seem reasonable to expect a significant relationship between project structure and organizational politics.

Once again, this hypothesis uses the four discreet project structure types outlined by Clark and Wheelright (1992) to suggest that there is a statistically significant relationship between a given project's structural type and the levels of organizational politics encountered by its project manager.

Hypothesis three: Organizational politics influences schedule behaviour.

The impacts of organizational politics have been variously characterized as either something to be minimized through enhanced control (Bent and Humphreys, 1996) or embraced. As Pinto (1996) says “use it or be used by it”. Neither camp make any direct attempt to explore what impact organizational politics may or may not have on schedule behaviour (under / overruns).

Anecdotally, project managers expect organizational politics to rise as schedules change, specifically, cost and duration overruns. Senior management and peers question the wisdom of continuing their support, securing and/or increasing the necessary resources to continue becomes increasingly difficult when projects overrun their costs and/or durations. Salancik and Pfeffer (1974) support this expectation with their finding that the scarcer resources were the more power (politics) was applied to their allocation. Overruns effectively represent increased scarcity of resources.

At the same time, to paraphrase Pinto (1996), politically sensible project managers use their political skills as a way of furthering organizational goals. They are convinced that their political skills are all that keeps the overruns from soaring out of control.

The existence of these opposing views infers the presence of reciprocal but contrary relationships between organizational politics and schedule behaviour (under / overruns).

This hypothesis uses the nine (9) political activities outlined above as the operational model for investigating the statistical significance of the relationship(s) between schedule behaviour (under / overruns) and the levels of organizational politics encountered by a project's project manager.

3.2 Theoretical Model

This research uses the theoretical model pictured in Figure 1 to represent the relationships between the model components: project structure, organizational politics, and schedule behaviour (under / overruns).

Each **project's structure** is characterized as one of four types (Clark and Wheelwright, 1992)):

functional – no one person is assigned overall project responsibility. Each functional area is responsible for its own contribution to the project;

lightweight – resources are explicitly assigned to the project but the project manager has little real authority over them or the project,

heavyweight – resources are temporarily removed from their home departments and assigned exclusively to the project. The project manager has real decision making authority over the project and its resources; or

autonomous – resources are removed from their home departments and assigned permanently to the project. The project manager is responsible for all aspects of the project and its staff.

Figure 1: Theoretical Framework

Organizational politics is quantified by measuring the following eight individual activities:

- securing **senior management support**,
- ensuring **peer alignment**,
- negotiating **sufficient resources**,
- ensuring project **favourable decisions**,
- protecting against **competing agendas**,
- using **positional authority**,
- using recognition as **knowledgeable resource and**
- resisting **scope/date pressure** (to increase scope and/or advance schedule dates).

Schedule behaviour is captured as a function of the percentage deviations in **cost** (person months) and **time** (duration) from the intended project plan and tracked for each of the following five major activities (Callahan and Moretton, 1999) of a project's life cycle:

- defining detailed product requirements**
- product design**
- creation of source code**
- system testing**
- beta testing**

Control variables for team location, organizational experience, and respondent position and experience have also been included in the model.

3.3 Methodology

The unit of analysis for this research is the software product development project. The research instruments employed were structured interviews and a questionnaire (see Appendix A).

The actual research effort was comprised of two discrete steps. The first step involved structured interview based case studies. The case study participants, identified through professional and academic contacts were interviewed individually and either in person or by telephone. The interviews were structured around an initial version of the questionnaire. While the case study results are reported upon below, their true value was in providing the additional insights necessary to enhance the understanding of the theoretical model and its associated questionnaire to its current form.

The second step involved distributing a questionnaire to collect data from a statistically significant number of professional software product development project managers.

Access to sufficient respondents was accomplished through an association with the Project Management Institute's Information Systems Special Interest Group (PMI-ISSIG). In response to a query about getting accessing to their membership, which

understandably they were not willing to accommodate, they offered to have my questionnaire (see Appendix A) hosted on the website SurveyMonkey, to send an Invitation to Participate (see Appendix B) to each of their approximately nine thousand (9000) members world wide, and to forward the accumulated responses to me, which they did.

In fact, PMI-ISSIG was prevailed upon to repeat the questionnaire distribution process a second time when problems were encountered with the responses to the first questionnaire. These problems and the corrective actions taken are outlined below in the Questionnaire Design section.

The theoretical model was used to formulate and organize the questions in the questionnaire. These questions solicited information about the project that the respondent had chosen to report on. The majority of the questions captured information describing one of the three module components: project structure, organizational politics, or schedule behaviour (under / overruns). Additional questions captured information about the actual respondent, the respondents' organization, and the team's location(s).

The responses (variable values) to these questions, grouped according to the model component they described, formed a data model or representation of the project organized in terms of the theoretical model. The raw variable values were then translated

(encoded) into an SPSS compatible format and loaded into SPSS in preparation for analysis.

The characteristics of the variables within each of the resulting groupings were used to determine the appropriate statistical techniques to apply. As a result of the categorical and ordinal nature of the data, the main three techniques used were the Non-parametric techniques Kruskal-Wallis H, Median test, and Spearman's correlations.

Further details are given below in the respective subsections of the Data Gathering Strategy section about how the data was gathered, validated, organized, and encoded in preparation for loading into the statistical analysis software SPSS (version 11.5) in preparation for testing the hypotheses.

4 Case Study Research

Case study research was undertaken as a learning exercise directed at reaching a clear understanding of what theoretical variables best represented the proposed theoretical model. This understanding was used to construct (and trial) questionnaire questions with as little ambiguity of meaning as possible so that respondents would be answering the questions as they were intended. These case study interviews also provide the opportunity to explore the issues around the proposed hypotheses as we attempted to determine whether it was worthwhile pursuing them further.

The following case studies, based upon interviews of professional software project managers, were conducted to provide both a context for and an enriched understanding of the political issues surrounding project scheduling.

4.1 Case Studies

After an overview of each project is presented, project details are presented in support of the project structure type selected by the respondent to describe the structure of their respective project. Schedule changes experienced by the project are then identified and related back to its structure and the organizational politics its project manager encountered. Once each case has been reviewed a cross-case study comparison of the relationships between project structure, organizational politics and schedule behaviour (under / overruns) is presented.

4.1.1 Case Study One - a heavyweight project

Overview. The eligibility and entitlement calculations (EEC) module project, part of a larger multi-year (Sept '96 to Dec '98) services delivery network project built for a large government department, incurred an overall cost overrun of seventy-five percent (75%).

This project was needed to address the changing demographics and service requirements of the department's client base. It also provided an opportunity to modernize the related computer systems and reduced maintenance and staffing costs.

All schedule dates, except the final release date - a customer decision, were met.

Stakeholders. Included the department's overall project management team, their EEC subject experts, the non-EEC project team, the EEC project team, various other government agencies, and a local resource provider involved in staffing issues.

EEC project team was organized into an adjudication system team, a calculation system team, a testing team, and a configuration management team with agency representatives assigned to each. The project manager, an external contractor, had previous experience with the project's business rules.

Structure. The project manager interviewed for this case study classified his project as having a heavyweight structure. He substantiated this classification by correlating a number of its features and events with the heavyweight definition outlined by Clark and Wheelright (1992). Initially he mentioned that functional representatives were assigned to the project team, a feature more consistent with a “lightweight” structure. Clarification that these representatives were actually performing functional work for the team and the project manager was directly responsible for their work assignments supported the “heavyweight” classification.

This authority was further demonstrated when the project manager successfully removed non-project related work from team member workloads. The return of project team members to their pre-project assignments at the end of the project was also consistent with the project’s “heavyweight” structure.

Schedule Changes. Although managing a heavyweight project, the project manager still had to deal with various political activities, cost overruns, and a final release date delay. The contentiousness of applying the same eligibility and entitlement rules in all regions required the project manager to spend nearly twice the average amount of time convincing the regional reps (peers) of the need for consensus.

The project manager also had to respond to a program manager with a propensity to assign project resources to non-project activities. This nearly doubled the average time he

would have spent normally defending the project from competing agendas. These two issues were seen as the primary contributors to the forty-two percent (42%) aggregate cost overrun experienced during requirements definition, system design, and code creation.

An initial testing team composed of subject experts with no previous testing experience contributed to the testing activity overrun of one hundred percent (100%) and required the project manager to spend a greater amount of time than expected negotiating for additional resources.

On the other hand, the project manager suggested that the project's heavyweight structure and the strong commitment of senior agency management that accompanied it resulted in his needing to spend nearly none of his time maintaining their support.

4.1.2 Case Study Two - an autonomous project

Overview. The public access to government information portal project, a huge undertaking over 12-months that required the cooperation of multiple departments each with their own internal cultures and languages, suffered a two hundred and fifty percent (250%) average cost overrun. It followed a previous attempt that failed to implement such a portal.

All completion and delivery dates were met, notwithstanding the project's average cost overrun. This would seem more indicative of a committed team's force of will than successfully planning and execution of the project schedule.

Stakeholders. Included various government departments, information content providers, technical infrastructure providers, and a development team of individual contractors recognized as experts in their specialties. The team members, were known to each other, if not personally, certainly by reputation having worked together previously in various combinations.

Structure. This project manager, an external consultant, selected "autonomous" as the project structure that best described the structure of the project he chose to report on. The project manager brought the development team of external consultants together, for the sole purpose of completing this project. Their being formally assigned (by contract), dedicated (by choice of assignment), and co-located with the rest of the team was consistent with the definition of an autonomous structure (Clark and Wheelright, 1992). This was further reinforced by the team's freedom to institute customized work processes.

Schedule Changes. Although set up as an autonomously structured project that ultimately met all its completion and delivery dates, this highly visible project's manager dealt with a very fragmented customer base. A customer base often found to be working at crossed

purposes (peer alignment). As a result, the project manager was required to expend an increased level of effort securing senior management support, negotiating project favourable decisions, and protecting the project from competing agendas.

The lead client's inexperience and a lack of centralized budgetary authority were identified as the primary causes of cost overruns ranging from one hundred seventy-five percent (175%) to three hundred percent (300%) across each of the project's major activities. Client inexperience was particularly costly requiring rework and forcing the project manager to seek support from senior management to ensure that favourable decisions were taken. The lack of budgetary authority also increased the time project manager spent protecting the project from the competing financial agendas of the various stakeholders. Underestimation of the time required managing the various government stakeholder departments' expectations also contributed.

Conversely, as might be expected with an autonomous project, the project manager was not required to spend significant time convincing peers, securing resources, or resisting scope and time pressures.

4.1.3 Case Study Three - a lightweight project

Overview. The extraction, transformation, and load (ETL) project, a 10-month undertaking, to develop an ETL tool initially targeted on SAP databases experienced a thirty-nine percent (39%) average cost overrun and was completed two months late.

A core company product, it was to be sold to clients for use in constructing data retrieval applications. These applications would retrieve data from existing databases and present them in compatible format for use by subsequent applications (i.e. report generators, etc.).

Stakeholders. For this project included the company's senior management, its local development team, and an external testing team. The software regression and platform testing was conducted by a team overseas. The development methodology used was a more traditional phased approach.

Midway through this project, the company was sold to its current parent company based in a different country.

Structure. The manager of this project characterized it as having a "lightweight" structure. This was as a result of the project manager's lengthy discussion during the interview of how the new parent company was insisting that development work be done within their functional areas. Authority over the work of project team members was being shifted to the functional managers with the project manager's role becoming more of coordinator between them, an approach consistent with Clark and Wheelright's (1992) definition of a "lightweight" structure. This was a very radical shift from the project

structures used before the company was acquired to what she took to be an early example of the new parent company's preference for "lightweight" project structures.

Schedule Changes. As a lightweight project, it seemed to be more vulnerable to external pressures than some of the others studied. Supporting this is the project manager having spent greater portions of her time (re)negotiating and defending resource availabilities, and ensuring that project favourable decisions prevailed

The upheaval from the company having been sold to its current parent company based in a different country undoubtedly contributed to the cost overruns encountered during requirements definition, system design, and code creation. Much as the local project team's iterative relationship with the external testing team, located in another country and time zone, would have contributed to the cost overruns experienced during code (re)creation and system testing.

This arms-length testing arrangement also contributed to the already higher than average amounts of project manager time spent (re)negotiating and defending resource availabilities, and ensuring that project favourable decisions prevailed.

4.1.4 Case Study Four - an autonomous project

Overview. The thin-client access tool project was an eight-month effort, to develop a thin-client web-based OLAP database access tool. It was to be part of a larger software

platform for sale to the company's external clients. This project incurred a comparatively low cost overrun of thirty-five percent (35%).

The scope, risks, and deliverables were well understood by a self-contained local development team. There were minimal dependencies outside of the development team and the larger platform was quite stable.

Project tracked very close to planned costs (in person months), delivery dates were met, and functionality was well received by client.

Stakeholders. Included the local development team, the platform development team within their parent organization, and a couple of established customers who had identified key product requirements.

Structure. The project manager was very clear that this project was an autonomously organized project. The characteristics he cited were consistent with Clark and Wheelright's (1992) autonomous structure definition. This project was the only work assignment for individual project team members. The whole project team was co-located and there was no functional "home" beyond the project.

The internal organization and working practices of this self-contained local development team as established by the project manager and project team members were heavily

influenced by extreme programming practices (Kent Beck, 2000) – automated testing, pair programming, using the simplest design, and putting a minimal system into production quickly.

Schedule Changes. This project achieved its best results during activities like product design and code creation, activities that were performed within the project team. On the other hand the requirements definition, and system testing activities with less politically isolation suffered the highest overruns at fifty percent (50%).

Isolation protected project team members but thrusts the project manager into the role of point man - a role that might explain his spending a higher than average amount of time securing senior management support. However, team cohesion and productivity levels were cited by the project manager as a primary reason for lower than usual amounts of project manager time spent convincing peers, negotiating resources, and protecting the project from other agendas, and scope increasing and schedule decreasing pressures.

This project was the closest example of a project that completed “on time, on budget, and on schedule” of the five studied.

4.1.5 Case Study Five - a lightweight project

Overview. The project, a twelve-month effort to redevelop and integrate the thin-client web-based OLAP database access tool with the parent corporation’s new framework, was

one hundred-ten percent (110%) over budget. It took two to three times longer, and on a “cost-per-functionality-delivered” basis, was nearly four times more costly than its original implementation.

The instability of having the new framework itself still under development was identified as a large contributing factor to these overruns.

Stakeholders. The stakeholders for this redevelopment project included the local development team, the new platform development teams within their parent organization, and a couple of established customers who had identified key product requirements.

Structure. The project manager characterized the structure of this project as “lightweight”. This even though it used the same local development team staffed by the same people as used in the previous case study, an autonomously structured project.

He stated that the parent organization’s larger platform team lacked proper decision-making processes and that as the thin-client project manager he was unable to convince them (peers) of the need for such processes.

He suggested that contributing factors to his lack of success were the larger new framework team’s geographic dispersion, with locations in other countries. Their employment of a more traditional phased development approach and their lack of

experience developing software “from scratch”. The two teams were also separated by the cultural differences inherent in being residents of different countries.

The failure of the project manager, although not for a lack of trying, to influence the people and/or processes involved with his project’s external structure demonstrated the lack of project manager status or influence associated with a “lightweight” project structure. He effectively became a status reporter with little status or influence.

Schedule Changes. The project manager on the project indicated that extraordinary amounts of his time were spent trying to secure and maintain senior management support, attempting to convince peers, negotiating project favourable decisions, and counteracting the impacts of the design and implementation decisions of the new framework development team (competing agendas).

All major activities, with the exception of the definition of requirements, incurred overruns of between fifty percent (50%) and three hundred percent (300%) as a result of rework due to integration failures between the local product and the new platform.

Once again, these failures were attributed decision-making processes that permitted/required decisions to be taken without sufficient information. These decisions then often not communicated to all those affected and there was no corrective mechanism in place to ensure that such decision-making failures did not reoccur.

4.2 Cross-Case Comparative Analysis

Project structure vs. Organizational Politics. The proportion of project manager time spent securing (and maintaining) senior management support appears to increase as we moved from lightweight to heavyweight to autonomous projects. This is consistent with the expectation that the project manager's role as gatekeeper would become more significant and powerful as this shift occurred. The apparent contradiction of this by the first project studied may be resolved by the project manager's observation that senior management was extremely committed to the project for purely business reasons.

The time spent convincing peers seems to decrease as we moved from lightweight to heavyweight to autonomous projects. This might be expected, as the perceived rise in level of organizational (political) support would encourage cooperation. Although the lightweight project in the third case study appears to contradict this the lack of time spent may just be a less experienced project manager spending time elsewhere. Case study one's heavyweight project seems to be another contradiction although this result may be due to the extremely fractious nature of the project's client community.

The correlations with project structure outlined in the previous two paragraphs appear to continue through the remaining six political activities and though there are exceptions that seem to contradict they each have a plausible alternate cause often linked to a circumstance of the specific project.

Finally and intuitively reasonable, all project managers felt that being recognised as knowledgeable helped them further project goals.

Project structure vs. Schedule Behaviour. A relationship similar to the one between project structure and organizational politics would hold true for project structure and schedule behaviour (under / overruns) if the contradictory results of the projects of case studies two and three is disregarded. The justifications for disregarding them being that the unexpectedly high cost overrun of the one project may be attributable to its clients' extremely fractious nature, as sighted above, while the lower than expected cost overrun results of the other may be due to the vigorousness of the project manager's actions in defending an otherwise lightweight project.

Organizational Politics vs. Schedule Behaviour: Anecdotally, the five case studies presented appear to support the expectation that heightened levels of project manager time spent dealing with organizational politics increased the schedule overruns projects experienced.

Further clarification of these relationships is provided by the questionnaire based research results that follow.

4.3 Case Study Insights

This section highlights the insights gained while conducting the above case study research:

1. A couple of the case study interviewees were external consultants hired by the organization for the sole purpose of leading the project being reviewed. During these interviews it became obvious that, while it was possible for external consultants to be hired into projects with one of the four structure types we were using, the dynamics between these individuals and the project stakeholders were sufficiently different that they should be investigated separately. It was also obvious that there was at least one additional structure type “out there” when external consultants were contracted as a standalone project team. It was decided that consultants would be excluded from the survey phase of the research.
2. The questionnaire questions, scales, and terminology were broadened and clarified.
3. Using the same already successful team members with the same internal project structures and methods is not necessarily enough if the external structure is not supportive. Case studies four (4) and five (5) involved the same people, same methods, same product, but because of a change in corporate ownership between the two projects the second laboured under a very different external structure with very different outcomes.

4. Ultimately, the case studies gave indications that the hypotheses were reasonable questions to ask and that there might be supportable once sufficient data was gathered.

5 Questionnaire Survey Research

Details of the questionnaire based research conducted for this thesis is presented in the following five subsections.

The first subsection, Questionnaire Design, outlines the problem encountered when respondents were invited to complete the first version of the questionnaire. It also gives details about how the questionnaire was redesigned to overcome those problems.

The second subsection, Organization of Data, relates the questionnaire answers to the theoretical model in a way that demonstrates what information is associated with each hypothesis. It also explains why mean variables were added to the SPSS data file and how their values were calculated.

The third subsection, Data Gathering Strategy, presents details of how and from whom the questionnaire data was gathered, and an overview of the questions asked. It presents details about how the questionnaires were reviewed for completeness, how missing values and outliers were treated, and a basis for establishing its external validity. How the questionnaire responses were encoded in preparation for loading into SPSS as well as how to relate the individual questionnaire questions to the variables in the resulting SPSS dataset is also presented.

The fourth subsection, Data Analysis Approach presents more details with respect to which (and why) specific statistical techniques were applied to the data groupings while relating them to their respective hypotheses.

The fifth section, Data Analysis Results, as its name would imply, presents the results of the analysis applied to the data associated with each hypothesis and offers preliminary observations about any patterns that may have been observed. It also provides a review of the results received when the same statistical tests that were run on all questionnaires are run on each of the questionnaire subsets created to control for respondent experience, team location, and organizational experience.

5.1 Questionnaire Design

As was already stated above, PMI-ISSIG agreed to post my questionnaire on the website “SurveyMonkey”, send an email Invitation to Participate to each of their members, and forward to me the data (questionnaire responses) thus captured.

In fact two cycles of this process were required before enough completed questionnaires were received to provide sufficient data for analysis.

5.1.1 Design Problem with First Questionnaire

The first cycle resulted in only sixteen (16) completed questionnaires from the seventy-six (76) people who initiated questionnaires.

Reviewing this first set of questionnaire responses indicated that nearly everyone had completed the first two sections composed of questions for which they were required to select from a list of possible responses. Most of those who abandoned their questionnaire did so when they encountered the questionnaire's third "section" which requested detailed project data in the form of dollar costs, person months of effort, and activity completion dates (see Figure 2 below).

PROJECT SIZE		
Please extract planned person months and costs for each major activity from the initial project plans. Actual person months and costs are amounts spent to complete each major activity of the project.		
1. What was the planned "head count" in person months allocated to this project? What did it turn out to be actually?		
Major Activity	Planned person months (e.g. 500)	Actual person months
a) Defining detailed product requirements		
b) System design		
c) Creation of source code		
d) System testing		
e) Beta testing		
SCHEDULE BEHAVIOUR: This section attempts to capture schedule changes experienced by your project. "Planned" dates are those dates extracted from the initial project schedule, usually constructed during project initiation. "Actual" dates are those dates when activities or milestones actually occurred. 2. Please indicate the date personnel were first assigned to the project to begin defining detailed product requirements. Planned (dd/mm/yy) [ ] Actual (dd/mm/yy) [ ]		

Figure 2: First questionnaire project size and schedule behaviour questions

5.1.2 Redesign for Second Questionnaire

This section outlines the changes made to the “first” questionnaire to improve the completion rate of the “second” questionnaire.

The “third section” concerning schedule behaviour (under / overruns) was rewritten to permit respondents to answer the questions of all three “sections” by selecting from lists of provided responses. This was made possible by shifting from an attempt to collect raw cost and duration numbers (planned and actual) to the collection of under / overrun percentages. The questions of all three “sections” were also rearranged in an attempt to further raise the likelihood that once having started a questionnaire a respondent would complete it.

In the second (and last) version of the questionnaire the purpose of the first two questions (Q1a to e & Q2a to e) is to capture the project cost and schedule under / overrun percentages for the project they have chosen to base their responses on. For each of their project’s major activities and the project as a whole, the respondents select from a list of six (6) possible ranges, the under / overrun percentage range that most closely coincided with that experienced by their project.

The possible ranges were derived initially from professional experience that was then confirmed during the case study research are: more than 10% under, within 10% under/over, 11-50% over, 51-150% over, or more than 150% over. The major activities

are: defining detailed product requirements, product design, creating code, system testing, and beta testing (Callahan and Moretton, 1998).

Although referred to in the questionnaire as project cost behaviour and schedule behaviour, they are grouped together as the two attributes of schedule behaviour (under / overruns) called cost and duration, respectively. This is how they are treated and referred to throughout this document.

The next ten (10) questions (Q3a to e, through Q12a to e) are presented in a section called Organizational Dynamics, a term used in an attempt to avoid any negative bias that respondents might attribute to the alternative of Organizational Politics.

Once again, the first five (5) of these ten questions share the same format. For each question, respondents are asked in each major activity, to select one of four (4) percentages (less than 10%, 11-30%, 31-50%, and more than 50%) that they believe represents the percentage of their time spent attending to the respective political activity. Specifically, persuading senior management to support your project, convincing peers that their interests align with the success of your project, negotiating the availability of sufficient resources, ensuring project favourable decisions are taken, and protecting your project from the competing agendas of others.

The next two questions (Q8 & Q9) in the Organizational Politics section offer four (4) percentage options (less than 10%, 11-30%, 31-50%, and more than 50%) with respect to the amount of respondent time spent resisting outside pressure on schedule duration, and outside pressure to increase scope for the project as a whole.

The next two questions (Q10a to e, & Q11a to e) ask the respondent to indicate his/her level of agreement (strongly agree, agree, disagree, or strongly disagree) with the statements that positional authority and being recognized as a knowledgeable resource helped them further project's goals

Question 13 (Q13) captures the project structure data by requesting that the respondent categorize the structural organization of their project as one of four, functional, lightweight, heavyweight, or autonomous by selecting the option a, b, c, or d who's structure diagram and accompanying text best describes it.

The remaining seven (7) questions (Q14 to Q20) solicit control information about the physical location of the team members, the level of company and team experience developing such products, the respondent's position within the organization, and his or her personal experience level.

A copy of the actual "second" questionnaire is included in Appendix A

The second cycle resulted in sixty-nine (69) completed questionnaires and only twenty incomplete questionnaires.

5.2 Organization of Data

The organization of data outlined in this section is derived from the theoretical model presented above and is reflected in the questionnaire. Each question in the questionnaire corresponds to a variable that either describes one of the model components: project structure, organizational politics, schedule behaviour (under / overruns), or it describes the respondent, the respondent's organization, or the team location(s) for use as control variable.

The list that follow present these variables grouped by hypothesis. A question number (in brackets) provides a cross-reference to the corresponding question in the questionnaire. The remaining variables are grouped by whether they describe the respondent, the respondent's organization, or the team location(s).

1) Hypothesis One: Project Structure influences Schedule Behaviour

Notice that while Project Structure has only the one scale (and one value for the project as a whole) Schedule behaviour (under / overruns) has two scales, cost and duration, and that an under / overruns value of each is captured for each major activity and for the project as a whole.

Project Structure	vs	Schedule behaviour (under / overruns) - Cost	
Project structure (Q13)		Cost – Requirements	(Q1a)
		Cost – Product Design	(Q1b)
		Cost – Creating Code	(Q1c)
		Cost – System Testing	(Q1d)
		Cost – Beta Testing	(Q1e)
		Cost – Whole (project)	(Q1w)

Project Structure	vs	Schedule behaviour (under / overruns) - Duration	
Project structure (Q13)		Duration– Requirements	(Q2a)
		Duration– Product Design	(Q2b)
		Duration– Creating Code	(Q2c)
		Duration– System Testing	(Q2d)
		Duration– Beta Testing	(Q2e)
		Duration– Whole (project)	(Q2w)

2) Hypothesis Two: Project Structure influences Organizational politics

Notice once again that Project Structure has only the one scale (and one value for the project as a whole). However organizational politics has nine scales. Two of these scales (Outside Scope Pressure (Q8), and Outside Duration Pressure (Q9)) have only one value each per project. For the seven remaining organizational politics scales a value of each is captured for each major activity.

Project Structure	vs	Organizational Politics (Persuading Senior Mgmt)	
Project structure (Q13)		Persuading Senior Mgmt – Requirements	(Q3a)
		Persuading Senior Mgmt – Product Design	(Q3b)
		Persuading Senior Mgmt – Creating Code	(Q3c)
		Persuading Senior Mgmt – System Testing	(Q3d)
		Persuading Senior Mgmt – Beta Testing	(Q3e)

Project Structure	vs	Organizational Politics (Convincing Peers)	
Project structure (Q13)		Convincing Peers – Requirements	(Q4a)
		Convincing Peers – Product Design	(Q4b)
		Convincing Peers – Creating Code	(Q4c)
		Convincing Peers – System Testing	(Q4d)
		Convincing Peers – Beta Testing	(Q4e)

Project Structure	vs	Organizational Politics (Negotiating Resources)	
Project structure (Q13)		Negotiating Resources – Requirements	(Q5a)
		Negotiating Resources – Product Design	(Q5b)
		Negotiating Resources – Creating Code	(Q5c)
		Negotiating Resources – System Testing	(Q5d)
		Negotiating Resources – Beta Testing	(Q5e)

Project Structure	vs	Organizational Politics (Favourable Decisions)	
Project structure (Q13)		Favourable Decisions – Requirements	(Q6a)
		Favourable Decisions – Product Design	(Q6b)
		Favourable Decisions – Creating Code	(Q6c)
		Favourable Decisions – System Testing	(Q6d)
		Favourable Decisions – Beta Testing	(Q6e)

Project Structure	vs	Organizational Politics (Competing Agendas)	
Project structure (Q13)		Competing Agendas – Requirements	(Q7a)
		Competing Agendas – Product Design	(Q7b)
		Competing Agendas – Creating Code	(Q7c)
		Competing Agendas – System Testing	(Q7d)
		Competing Agendas – Beta Testing	(Q7e)

Project Structure	vs	Organizational Politics (Outside Scope Pressure)	
Project structure (Q13)		Outside Scope Pressure	(Q8)

Project Structure	vs	Organizational Politics (Outside Duration Pressure)	
Project structure (Q13)		Outside Duration Pressure	(Q9)

Project Structure	vs	Organizational Politics (Positional Authority)	
Project structure (Q13)		Positional Authority – Requirements	(Q10a)
		Positional Authority – Product Design	(Q10b)
		Positional Authority – Creating Code	(Q10c)
		Positional Authority – System Testing	(Q10d)
		Positional Authority – Beta Testing	(Q10e)

Project Structure	vs	Organizational Politics (Knowledgeable Resource)	
Project structure (Q13)		Knowledgeable Resource – Requirements	(Q11a)
		Knowledgeable Resource – Product Design	(Q11b)
		Knowledgeable Resource – Creating Code	(Q11c)
		Knowledgeable Resource – System Testing	(Q11d)
		Knowledgeable Resource – Beta Testing	(Q11e)

3) Hypothesis Three: Organizational Politics influences Schedule Behaviour

Once again, organizational politics has nine scales. Two of these scales, Outside Scope Pressure (Q8), and Outside Duration Pressure (Q9), have only one value each per project. For the seven remaining organizational politics scales a value of each is captured for each major activity. Schedule behaviour (under / overruns) has two scales, cost and duration.

The following data organization was used within each of the five major activities: defining detailed product requirements, product design, creating source code, system testing, and beta testing.

a) For the major activity, defining detailed product requirements:

Organizational Politics	vs	Schedule behaviour (under / overruns)	
Persuading Senior Mgmt			
– Requirements (Q3a)		Cost – Requirements	(Q1a)
		Duration– Requirements	(Q2a)
Convincing Peers			
– Requirements (Q4a)		Cost – Requirements	(Q1a)
		Duration– Requirements	(Q2a)
Negotiating Resources)			
– Requirements (Q5a)		Cost – Requirements	(Q1a)
		Duration– Requirements	(Q2a)
Favourable Decisions			
– Requirements (Q6a)		Cost – Requirements	(Q1a)
		Duration– Requirements	(Q2a)
Competing Agendas			
– Requirements (Q7a)		Cost – Requirements	(Q1a)
		Duration– Requirements	(Q2a)

Outside Scope Pressure (Q8)	Cost – Requirements	(Q1a)
	Duration– Requirements	(Q2a)
Outside Duration Pressure (Q9)	Cost – Requirements	(Q1a)
	Duration– Requirements	(Q2a)
Positional Authority		
– Requirements (Q10a)	Cost – Requirements	(Q1a)
	Duration– Requirements	(Q2a)
Knowledgeable Resource		
– Requirements (Q11a)	Cost – Requirements	(Q1a)
	Duration– Requirements	(Q2a)

b) For the major activity, product design:

Organizational Politics	vs	Schedule behaviour (under / overruns)
Persuading Senior Mgmt		
– Product Design (Q3b)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)
Convincing Peers		
– Product Design (Q4b)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)

Negotiating Resources)

– Product Design (Q5b)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)

Favourable Decisions

– Product Design (Q6b)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)

Competing Agendas

– Product Design (Q7b)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)

Outside Scope Pressure (Q8)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)

Outside Duration Pressure (Q9)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)

Positional Authority

– Product Design (Q10b)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)

Knowledgeable Resource

– Product Design (Q11b)	Cost – Product Design	(Q1b)
	Duration– Product Design	(Q2b)

c) For the major activity, creating code:

Organizational Politics	vs	Schedule behaviour (under / overruns)	
Persuading Senior Mgmt			
– Creating Code (Q3c)		Cost – Creating Code	(Q1c)
		Duration– Creating Code	(Q2c)
Convincing Peers			
– Creating Code (Q4c)		Cost – Creating Code	(Q1c)
		Duration– Creating Code	(Q2c)
Negotiating Resources			
– Creating Code (Q5c)		Cost – Creating Code	(Q1c)
		Duration– Creating Code	(Q2c)
Favourable Decisions			
– Creating Code (Q6c)		Cost – Creating Code	(Q1c)
		Duration– Creating Code	(Q2c)
Competing Agendas			
– Creating Code (Q7c)		Cost – Creating Code	(Q1c)
		Duration– Creating Code	(Q2c)
Outside Scope Pressure (Q8)		Cost – Creating Code	(Q1c)
		Duration– Creating Code	(Q2c)

Outside Duration Pressure (Q9)	Cost – Creating Code	(Q1c)
	Duration– Creating Code	(Q2c)

Positional Authority

– Creating Code (Q10c)	Cost – Creating Code	(Q1c)
	Duration– Creating Code	(Q2c)

Knowledgeable Resource

– Creating Code (Q11c)	Cost – Creating Code	(Q1c)
	Duration– Creating Code	(Q2c)

d) For the major activity, system testing,

Organizational Politics   vs   Schedule behaviour (under / overruns)

Persuading Senior Mgmt

– System Testing (Q3d)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

Convincing Peers

– System Testing (Q4d)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

Negotiating Resources)

– System Testing (Q5d)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

Favourable Decisions

– System Testing (Q6d)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

Competing Agendas

– System Testing (Q7d)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

Outside Scope Pressure (Q8)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

Outside Duration Pressure (Q9)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

Positional Authority

– System Testing (Q10d)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

Knowledgeable Resource

– System Testing (Q11d)	Cost – System Testing	(Q1d)
	Duration– System Testing	(Q2d)

e) For the major activity, beta testing:

Organizational Politics   vs   Schedule behaviour (under / overruns)

Persuading Senior Mgmt

– Beta Testing (Q3e)   Cost – Beta Testing   (Q1e)

Duration– Beta Testing   (Q2e)

Convincing Peers

– Beta Testing (Q4e)   Cost – Beta Testing   (Q1e)

Duration– Beta Testing   (Q2e)

Negotiating Resources)

– Beta Testing (Q5e)   Cost – Beta Testing   (Q1e)

Duration– Beta Testing   (Q2e)

Favourable Decisions

– Beta Testing (Q6e)   Cost – Beta Testing   (Q1e)

Duration– Beta Testing   (Q2e)

Competing Agendas

– Beta Testing (Q7e)   Cost – Beta Testing   (Q1e)

Duration– Beta Testing   (Q2e)

Outside Scope Pressure (Q8)

Cost – Beta Testing   (Q1e)

Duration– Beta Testing   (Q2e)

Outside Duration Pressure (Q9)	Cost – Beta Testing	(Q1e)

	Duration– Beta Testing	(Q2e)

Positional Authority

– Beta Testing (Q10e)	Cost – Beta Testing	(Q1e)

	Duration– Beta Testing	(Q2e)

Knowledgeable Resource

– Beta Testing (Q11e)	Cost – Beta Testing	(Q1e)

	Duration– Beta Testing	(Q2e)

4) Control Variables describing respondent, team location, and respondent's organization.

a. Respondent	- Previous Experience – Similar Position	(Q19)

b. Team Location	- Team Members' Location	(Q14)

c. Respondent's Organization - Prior Company Experience		(Q15)

5.3 Data Gathering Strategy

The strategy used to gather data involved creating a questionnaire that was posted to the website, SurveyMonkey. A PMI-ISSIG staffer then broadcast an Invitation to Participate by email to each PMI-ISSIG member directing them to go to the website and complete the survey. The completed questionnaires were collected and forwarded to me in a data file by PMI-ISSIG. This was done once two weeks after the email was sent and then

again two weeks later when the final file containing all completed questionnaires was sent.

5.3.1 Data Validation and Review

Because the questions in the questionnaires were effectively multiple-choice questions there were no outliers in the sense of data values far removed from the majority. There were no contradictions in the data to be resolved as each question was independent of the next. However, twenty questionnaires were removed because of patterns of missing responses that indicated they had been abandoned and never completed. Other questionnaires with missing responses were retained, as they were substantially complete. Their missing values were simply ignored by any statistical calculation that would normally have used the scale for which a response was not given.

5.3.2 Data Encoding Scheme

This section outlines the encoding scheme used to translate the raw questionnaire data into the SPSS compatible format that was used to load it into SPSS in preparation for analysis.

Those questions where the answers were selected from an ordered set of possible answers such as more than 10% under, ..., more than 150% over were coded as integer numbers 1 through 5, respectively.

Those questions with possible answers ranging from “less than 10%”, through to “more than 50%” were coded as integer numbers 1 through 4, respectively.

Questions ten (10) and eleven (11) saw “strongly agree, agree, disagree, and strongly disagree” coded as integer numbers 4, 3, 2, and 1, respectively.

The project structure question (Q13) coded functional, lightweight, heavyweight, and autonomous as integer numbers 1, 2, 3, and 4, respectively.

Answers to Question 14 concerning geographic organization were assigned integer numbers in proportion to their degrees of dispersion (i.e. “co-located next to each other” (the least dispersed) was assigned a one (1) while “in different countries” was assigned a six (6)).

Those questions related to experience were assigned integer numbers in proportion to the quantities being measured (i.e. experience).

Finally, the respondent’s position within the organization was characterized in two dimensions. First, as either Management Resource – coded as one (1), or Technical Resource – coded as a two (2) and second as Senior – coded as three (3), Middle – coded as two (2), or junior – coded as one (1).

Throughout this document textual references to individual questions have been accompanied by the corresponding SPSS variable name. For example the SPSS variable names for question one (1) which requests project cost information by major activity and the whole project are Q1a, Q1b, Q1c, Q1d, Q1e, and Q1w.

5.3.3 External Validity

The data these research results are based on was gathered from a convenience sampling of projects identified through association with the Project Management Institute. Comparing descriptive statistics about schedule under / overruns from this research data and those of previously recognised research data on software project schedule overruns (Gopalan, 1995) were compared to establish the external validity of the results presented above.

Table 1 below displays the comparable median, range, minimum, and maximum statistics for both data sets. Note the similarity of values for the two data sets once the Gopalan statistics were converted to the scales used by the research presented here.

	Costs - whole project	Duration - whole project	Gopalan Percentage overrun data	Gopalan Data converted common scales
Median	3.00	3.00	44.4	3
Range	3	4	332.42	3
Minimum	2	1	5.08	2
Maximum	5	5	337.5	5

Table 1 – comparison of descriptive statistics to establish validity

5.4 Data Analysis Approach

This section provides details about what data was used in the analysis, what types of data measurement scales were used, and what statistical techniques were applied as a result.

5.4.1 Data Analysed

Only “second cycle” questionnaire results were used in the analysis. This was done for a number of reasons. First, it was not possible to avoid the possibility of double counting someone who might have responded to both versions of the questionnaire.

Second, the rewrite was extensive and resulted in such an improved questionnaire that establishing commonality between the two datasets would have been problematic.

Third and most compelling, conversion of the data gathered by the first questionnaire to the second questionnaire’s format would have required assuming that major activities were executed sequentially, a direct contradiction of the directions given to respondents. In fact, the dates in certain first questionnaire responses were clearly not sequential.

5.4.2 Data Measurement Scales

While the scale used to capture project structure is clearly categorical in nature an argument could be made for treating it as ordinal because of the continuous nature of such underlying project structure characteristics as project manager power.

The schedule behaviour (under / overruns) attribute scales of cost and duration are at a minimum ordinal and could be considered to be ratio scales in the sense that project completion on time (duration) and on budget (cost) would equate to a scale value of zero.

Similarly, the scales used to capture the levels of organizational politics are ordinal given their incremental nature while the possibility of a zero value supports suggestions they too could be treated as ratio scales.

5.4.3 Statistical Techniques Applied

With the more conservative characterizations of the project structure scale as categorical and the schedule behaviour (under / overruns) scales as ordinal, the statistical technique of Kruskal-Wallis H and median tests were used to investigate the relationship between project structure and schedule behaviour (under / overruns) - hypothesis one.

Kruskal-Wallis H and median tests were also used to investigate the relationship between project structure and organizational politics - hypothesis two, once again categorical and ordinal scales, respectively.

Given the ordinal nature of both scales, the investigation of the third hypothesis, the relationship between organizational politics and schedule behaviour (under / overruns), was accomplished using Spearman correlations.

5.5 Data Analysis Results

This section presents those significant relationships that were identified among project organizational types, individual organizational politics scales and schedule behaviour (under / overruns) scales within specific major activities. They are grouped by hypothesis.

While no significant results were identified for hypothesis one when testing the complete sample, a direction for further investigation is suggested. Significant relationships were found when the control variables project manager experience, team member location(s), and organizational experience, were used to partition the sample.

Significant relationships were identified in both the complete sample and the sample partitions for hypothesis two and three. These significant results were identified and are reported below.

5.5.1 Hypothesis One

Hypothesis one, which holds that project structure influences schedule behaviour (under / overruns), was tested using Kruskal-Wallis H and median tests. The results of these tests on the complete sample showed no significant relationships between these two components of the research model at either the major activity or whole project level.

However, by excluding functionally structured projects, two “nearly” significant relationships were identified. The relationships between project structure and the cost under / overrun incurred while creating code, and between project structure and the duration under / overrun incurred during beta testing returned median testing significance values of ((cc 3.573, df 2, sig. .168), (cc 4.102, df 2, sig. .129), respectively.

Reviewing the mean plots (in Figure 3) of these two relationships seem to suggest that these “nearly” significant relationships might take on added significance given further data.

Figure 3: “Nearly” significant project structure vs schedule behaviour relationships

5.5.2 Hypothesis Two

Hypothesis two, which holds that project structure influences organizational politics, was tested using Kruskal-Wallis H and median tests. Testing the influences of organizational politics on the complete sample identified persuading senior management to support or continue supporting the project, and positional authority while defining detailed product requirements as significantly related to project structure ((cc 7.311, df 3, sig. .063), (cc 10.022, df 3, sig. .018), respectively). Being recognized as a knowledgeable resource during beta testing was also identified as significantly related to project structure (cc 8.303, df 3, .040).

5.5.3 Hypothesis Three

Hypothesis three, which holds that organizational politics influences schedule behaviour (under / overruns), was tested using Spearman correlation tests on the complete sample. Testing the relationships between the individual organizational politics scales and schedule behaviour (under / overruns) scales within each major activity produced the following significant results.

a) Defining Detailed Product Requirements

During the product requirements activity the amount of project manager time spent ensuring that project favourable decisions were taken was significantly and positively

related to schedule behaviour as measured by duration under / overruns (cc .212, sig. 085, N 67).

b) Product Design

During the product design activity the amount of project manager time spent convincing peers that the success of the project aligns with their own interests is significantly and positively related to schedule behaviour as measured by cost under / overruns (cc .206, sig. 091, N 68).

The amount of project manager time spent convincing peers that the success of the project aligns with their own interests, ensuring that project favourable decisions were taken, and protecting the project from people with competing agendas is significantly and positively related to schedule behaviour as measured by the duration under / overrun ((cc .310, sig. 011, N 66), (cc .205, sig. 098, N 66), and (cc .211, sig. 091, N 65), respectively).

c) Creating Code

During the creating code activity the amount of project manager time spent persuading senior management to support or continue supporting the project, ensuring that project favourable decisions were taken, and protecting the project from people with competing agendas are all significantly and positively related to schedule

behaviour as measured by cost under / overruns ((cc .366, sig. 002, N 68), (cc .293, sig. 015, N 68), and (cc .368, sig. 002, N 68), respectively).

The amount of project manager time spent persuading senior management to support or continue supporting the project, convincing peers that the success of the project aligns with their own interests, ensuring that project favourable decisions were taken, and protecting the project from people with competing agendas are all significantly and positively related to schedule behaviour as measured by the duration under / overrun ((cc .436, sig. 000, N 67), (cc .379, sig. 002, N 62), (cc .235, sig. 056, N 67), and (cc .257, sig. 036, N 67), respectively).

d) System Testing

During the system testing activity the amount of project manager time spent convincing peers that the success of the project aligns with their own interests, negotiating the availability of sufficient resources, and ensuring that project favourable decisions were taken are all significantly and positively related to schedule behaviour as measured by cost under / overruns ((cc .326, sig. 010, N 61), (cc .276, sig. 025, N 66), and (cc .288, sig. 019, N 66), respectively).

The amount of project manager time spent convincing peers that the success of the project aligns with their own interests, negotiating the availability of sufficient resources, and ensuring that project favourable decisions were taken are all

significantly and positively related to schedule behaviour as measured by duration under / overruns ((cc .217, sig. 093, N 61), (cc .295, sig. 017, N 65), and (cc .226, sig. 068, N 66), respectively).

e) Beta Testing

During the creating code activity the amount of project manager time spent persuading senior management to support or continue supporting the project, convincing peers that the success of the project aligns with their own interests, negotiating the availability of sufficient resources, ensuring that project favourable decisions were taken, and protecting the project from people with competing agendas are all significantly and positively related to schedule behaviour as measured by cost under / overruns ((cc .338, sig. 004, N 69), (cc .333, sig. 006, N 68), (cc .502, sig. 000, N 68), (cc .338, sig. 006, N 64), and (cc .309, sig. 014, N 63), respectively).

The amount of project manager time spent persuading senior management to support or continue supporting the project, convincing peers that the success of the project aligns with their own interests, negotiating the availability of sufficient resources, ensuring that project favourable decisions were taken, and protecting the project from people with competing agendas are all significantly and positively related to schedule behaviour as measured by duration under / overruns ((cc .301, sig. 015, N 65), (cc .249, sig. 045, N 65), (cc .489, sig. 000, N 64), (cc .350, sig. 006, N 61), and (cc .248, sig. 058, N 59), respectively).

5.5.4 Controlling for Experience and Location

A final step in the analysis applied to this questionnaire data attempts to “control” for potential differences in responses based upon project manager experience, location of project members, and the level of the organization’s prior experience. Each of the three control variables just listed are used to partition the sample into two subsets. The same analysis techniques applied to the complete sample were then applied to each subset and the results compared. A brief interpretation of any resulting differences is also presented.

However, it must be noted that partitioning the sample reduces the number of questionnaire responses in each subset thereby diminishing the reliability of these specific results.

5.5.4.1 Project Manager Experience

The project manager experience subsets are based upon the project manager’s number of years of experience, as indicated by his/her selection from the four experience ranges: none, less than 5 yrs, 5 – 10yrs, and over 10 yrs. Five (5) years experience was selected as the separation point between subsets because the mean and median experiences of all project managers, 2.9 and 3.0 respectively, both fell within the “less than 5 years” range. Thus twenty-three (23) with less than five (5) years experience were placed in one subset and forty-four (44) with five or more years experience in the other.

1) Hypothesis one: Project Structure influences Schedule Behaviour

While no significant relationships between project structure and schedule behaviour (under / overruns) were identified when testing the complete sample, significant relationships were found when these sample subsets were retested within each major activity. The significant relationships identified are presented below by sample subset.

a) Less than five (5) years experience

Project structure was found to be significantly and positively related to schedule behaviour as measured by cost under / overruns during the product requirements activity (chi-sq 6.847, df 3, sig. 077).

Project structure was also found to be significantly and positively related to schedule behaviour as measured by duration under / overruns, during product design, and creating code activities ((chi-sq 6.814, df 3, sig. 078), and (chi-sq 8.953, df 3, sig. 030), respectively).

b) Five (5) years or more experience

Project structure was found to be significantly and positively related to schedule behaviour as measured by cost under / overruns during the product design, and beta testing activity ((chi-sq 7.106, df 3, sig. 069), and (chi-sq 7.226, df 3, sig. 065), respectively).

Project structure was also found to be significantly and positively related to schedule behaviour as measured by duration under / overruns, during creating code, and system testing activities ((chi-sq 15.923, df 3, sig. 001), and (chi-sq 6.615, df 3, sig. 085), respectively).

2) Hypothesis two: Project Structure influences Organizational Politics

The following significant relationships were found when these sample subsets were retested within each major activity. The significant relationships identified are presented below by sample subset.

a) Less than five (5) years experience

Project structure was found to be significantly and positively related to the level of organizational politics as measured by the amount of project manager time spent negotiating the availability of sufficient resources during the product design activity (chi-sq 6.680, df 3, sig. 083), convincing peers that the success of the project aligns with their own interests during system testing and beta testing ((chi-sq 8.075, df 3, sig. 044), and (chi-sq 7.210, df 3, sig. 066), respectively), and protecting the project from people with competing agendas during system testing and beta testing ((chi-sq 6.702, df 3, sig. 082), and (chi-sq 6.483, df 3, sig. 090), respectively).

Project structure was also found to be significantly and positively related to the level of organizational politics as measured by the impact of positional authority during creating code activity (chi-sq 7.673, df 3, sig. 053).

b) Five (5) years or more experience

Project structure was also found to be significantly and positively related to the level of organizational politics as measured by the amount of project manager time spent persuading senior management to support or continue supporting the project during the product requirements and creating code activities ((chi-sq 9.417, df 3, sig. 024), and (chi-sq 7.892, df 3, sig. 048), respectively), and convincing peers that the success of the project aligns with their own interests during the creating code activity (chi-sq 7.201, df 3, sig. 066).

Project structure was also found to be significantly and positively related to the level of organizational politics as measured by the impact of positional authority during product requirements, creating code and beta testing activities ((chi-sq 9.248, df 3, sig. 026), (chi-sq 7.056, df 3, sig. 070), and (chi-sq 7.019, df 3, sig. 071), respectively).

Project structure was again found to be significantly and positively related to the level of organizational politics as measured by the impact of being recognized as a knowledgeable resource during the beta testing activity (chi-sq 14.146, df 3, sig. 003).

3) Hypothesis three: Organizational Politics influences Schedule Behaviour

The following significant relationships were found when these sample subsets were retested within each major activity. The significant relationships identified are presented below by sample subset.

a) Less than five (5) years experience

The amount of project manager time spent persuading senior management to support or continue supporting the project was significantly and positively related to schedule behaviour as measured by cost under / overruns during the system testing, and beta testing activities ((cc .376, sig. 077, N 23), and (cc .566, sig. 005, N 23), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the beta testing activity (cc .502, sig. 017, N 22).

The amount of project manager time spent convincing peers that the success of the project aligns with their own interests was significantly and positively related to schedule behaviour as measured by cost under / overruns during the system testing, and beta testing activities ((cc .579, sig. 005, N 22), and (cc .590, sig. 004, N 22), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the system testing, and beta testing activities ((cc .504, sig. 017, N 22), and (cc .601, sig. 003, N 22), respectively).

The amount of project manager time spent negotiating the availability of sufficient resources was significantly and positively related to schedule behaviour as measured by cost under / overruns during the system testing, and beta testing activities ((cc .537, sig. 008, N 23), and (cc .743, sig. 000, N 23), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the system testing, and beta testing activities ((cc .413, sig. 056, N 22), and (cc .696, sig. 000, N 22), respectively).

The amount of project manager time spent ensuring that project favourable decisions were taken was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, system testing, and beta testing activities ((cc .405, sig. 061, N 22), (cc .650, sig. 001, N 21), and (cc .624, sig. 002, N 21), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the system testing, and beta testing activities ((cc .486, sig. 026, N 21), and (cc .633, sig. 002, N 21), respectively).

The amount of project manager time spent protecting the project from people with competing agendas was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, system testing, and beta testing activities ((cc .574, sig. 005, N 22), (cc .437, sig. 054, N 20), and (cc .571, sig. 008, N 20), respectively). It was also significantly and positively related to schedule

behaviour as measured by duration under / overruns during the beta testing activities (cc .553, sig. 014, N 19).

The amount of project manager time spent resisting outside pressure to reduce project duration was significantly and positively related to schedule behaviour as measured by cost under / overruns during the system testing, and beta testing activities ((cc .441 sig. 040, N 22), and (cc .481, sig. 023, N 22), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the beta testing activities (cc .377, sig. 092, N 21). Finally, it was significantly and negatively related to schedule behaviour as measured by duration under / overruns during the product requirements activities (cc -.440, sig. 046, N 21).

The amount of project manager time spent resisting outside pressure to increase project scope was significantly and positively related to schedule behaviour as measured by cost under / overruns during the system testing (cc .510, sig. 013, N 23). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the beta testing activities (cc .364, sig. 096, N 22).

The impact of being recognized as a knowledgeable resource was significantly and negatively related to schedule behaviour as measured by cost under / overruns during the product design activity (cc -.454, sig. 029, N 23).

b) Five (5) years or more experience

The amount of project manager time spent persuading senior management to support or continue supporting the project was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, and beta testing activities ((cc .361, sig. 016, N 44), and (cc .264, sig. 084, N 44), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the creating code, and beta testing activity ((cc .473, sig. 001, N 43), and (cc .289, sig. 067, N 41), respectively).

The amount of project manager time spent convincing peers that the success of the project aligns with their own interests was significantly and positively related to schedule behaviour as measured by cost under / overruns during the product design activity (cc .308, sig. 042, N 44). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the product design, and creating code activities ((cc .291, sig. 058, N 43), and (cc .460, sig. 003, N 39), respectively).

The amount of project manager time spent negotiating the availability of sufficient resources was significantly and positively related to schedule behaviour as measured by cost under / overruns during the beta testing activity (cc .338, sig. 026, N 43). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the beta testing activity (cc .359, sig. 023, N 40).

The amount of project manager time spent ensuring that project favourable decisions were taken was significantly and positively related to schedule behaviour as measured by duration under / overruns during the product design activity (cc .271, sig. .079, N 43).

5.5.4.2 Project Team Location

Similarly, the sample subsets for location of project members are based upon the location(s) occupied by project team members. Thirty-three (33) with locations in different cities or countries in one sample subset and thirty-four (34) within the same city, although possibly in different building, etc., occupy the second sample subset.

1) Hypothesis one: Project Structure influences Schedule Behaviour

While no significant relationships between project structure and schedule behaviour (under / overruns) were identified when testing the complete sample, significant relationships were found when these sample subsets were retested within each major activity. The significant relationships identified are presented below by sample subset.

a) Located in the same city

Testing this sample subset failed to identify any significant relationships between project structure and schedule behaviour (under / overruns), whether measured by cost under / overruns or duration under / overruns, during any major activity.

b) Located in different cities and/or countries

Project structure was found to be significantly and positively related to schedule behaviour as measured by cost under / overruns, during the product requirements activity (chi-sq 6.618, df 3, sig. 085).

Project structure was also found to be significantly and positively related to schedule behaviour as measured by duration under / overruns, during the product requirements activity (chi-sq 7.124, df 3, sig. 068).

2) Hypothesis two: Project Structure influences Organizational Politics

The following significant relationships were found when these sample subsets were retested within each major activity. The significant relationships identified are presented below by sample subset.

a) Located in the same city

Project structure was found to be significantly and positively related to the level of organizational politics as measured by the impact of the project manager's positional authority during the product requirements, system testing, and beta testing activity ((chi-sq 9.612, df 3, sig. 022), (chi-sq 6.860, df 3, sig. 076), and (chi-sq 6.368, df 3, sig. 095), respectively). It was also found to be significantly and positively related to the level of organizational politics as measured by the impact of the project manager being

recognized as a knowledgeable resource during the product design activity (chi-sq 7.614, df 3, sig. 055).

b) Located in different cities and/or countries

Project structure was found to be significantly and positively related to the level of organizational politics as measured by the amount of project manager time spent negotiating the availability of sufficient resources during the system testing activity (chi-sq 6.710, df 3, sig. 082). It was also found to be significantly and positively related to the level of organizational politics as measured by the impact of the project manager's positional authority during the product requirements activity (chi-sq 7.325, df 3, sig. 062).

Project structure was also found to be significantly and positively related to the level of organizational politics as measured by the impact of the project manager being recognized as a knowledgeable resource during the creating code, system testing, and beta testing activities ((chi-sq 6.497, df 3, sig. 090), (chi-sq 8.103, df 3, sig. 044), and (chi-sq 8.252, df 3, sig. 041), respectively).

3) Hypothesis three: Organizational Politics influences Schedule Behaviour

The following significant relationships were found when these sample subsets were retested within each major activity. The significant relationships identified are presented below by sample subset.

a) Located in the same city

The amount of project manager time spent persuading senior management to support or continue supporting the project was significantly and negatively related to schedule behaviour as measured by cost under / overruns during the product requirements activity (cc -.291, sig. .095, N 34). It was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code activity (cc .451, sig. .007, N 34). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the creating code activity (cc .338, sig. .051, N 34).

The amount of project manager time spent convincing peers that the success of the project aligns with their own interests was significantly and positively related to schedule behaviour as measured by cost under / overruns during the product design, activity (cc .329, sig. .057, N 34).

The amount of project manager time spent negotiating the availability of sufficient resources was significantly and positively related to schedule behaviour as measured by cost under / overruns during the beta testing activity (cc .547, sig. .001, N 34). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the system testing, and beta testing activities ((cc .318, sig. .071, N 33), and (cc .443, sig. .011, N 32), respectively).

The amount of project manager time spent ensuring that project favourable decisions were taken was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, and beta testing activities ((cc .411, sig. 016, N 34), and (cc .351, sig. 057, N 30), respectively).

The amount of project manager time spent protecting the project from people with competing agendas was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, and beta testing activities ((cc .308, sig. 076, N 34), and (cc .324, sig. 086, N 29), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the creating code, and beta testing activities ((cc .406, sig. 017, N 34), and (cc .353, sig. 071, N 27), respectively).

The amount of project manager time spent resisting outside pressure to reduce project duration was significantly and positively related to schedule behaviour as measured by cost under / overruns during the product requirements activity (cc .360 sig. 036, N 34).

The amount of project manager time spent resisting outside pressure to increase project scope was significantly and positively related to schedule behaviour as measured by duration under / overruns during the product requirements activity (cc .386, sig. 024, N 34).

b) Located in different cities and/or countries

The amount of project manager time spent persuading senior management to support or continue supporting the project was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, and beta testing activities ((cc .374, sig. .035, N 32), and (cc .416, sig. .016, N 33), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the creating code, and beta testing activity ((cc .497, sig. .004, N 31), and (cc .373, sig. .039, N 31), respectively).

The amount of project manager time spent convincing peers that the success of the project aligns with their own interests was significantly and positively related to schedule behaviour as measured by cost under / overruns during the system testing, and beta testing activities ((cc .528, sig. .003, N 30), and (cc .392, sig. .027, N 32), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the product design, creating code, and beta testing activities ((cc .339, sig. .067, N 30), (cc .515, sig. .003, N 31), and (cc .418, sig. .019, N 31), respectively).

The amount of project manager time spent negotiating the availability of sufficient resources was significantly and positively related to schedule behaviour as measured by cost under / overruns during the system testing, and beta testing activities ((cc .329, sig.

066, N 32), and (cc .485, sig. 005, N 32), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the beta testing activity (cc .646, sig. 000, N 30).

The amount of project manager time spent ensuring that project favourable decisions were taken was significantly and positively related to schedule behaviour as measured by cost under / overruns during the system testing, and beta testing activities ((cc .444, sig. 012, N 31), and (cc .352, sig. 048, N 32), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the system testing, and beta testing activities ((cc .368, sig. 045, N 30), and (cc .512, sig. 003, N 31), respectively).

The amount of project manager time spent protecting the project from people with competing agendas was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code activity (cc .414, sig. 019, N 32).

The impact of the project manager being recognized as a knowledgeable resource was found to be significantly and negatively related to schedule behaviour as measured by duration during the beta testing activity (cc -.317, sig. 083, N 31).

5.5.4.3 Organizational Experience

The third partitioning subsets the sample according to the level of the organization's prior experience. Thirty-four (34) with some or no experience make up one sample subset while thirty-four (34) with considerable experience form the second sample subset.

1) Hypothesis one: Project Structure influences Schedule Behaviour

The test results relative to the first hypotheses appear unaffected by this partitioning. No significant relationships were identified in either subset when testing the relationships between project structure and schedule behaviour (under / overruns). This is consistent with the results when the complete sample was tested.

2) Hypothesis two: Project Structure influences Organizational Politics

The following significant relationships were found when these sample subsets were retested within each major activity. The significant relationships identified are presented below by sample subset.

a) None / some experience

Project structure was found to be significantly and positively related to the level of organizational politics as measured by the amount of project manager time spent persuading senior management to support or continue supporting the project during the product requirements activity (chi-sq 9.461, df 3, sig. 024).

Project structure was found to be significantly and positively related to the level of organizational politics as measured by the amount of project manager time spent convincing peers that the success of the project aligns with their own interests, during the creating code activity (chi-sq 7.622, df 3, sig. 055).

Project structure was found to be significantly and positively related to the level of organizational politics as measured by the impact of the project manager's positional authority during the system testing activity (chi-sq 6.275, df 3, sig. 099).

Project structure was also found to be significantly and positively related to the level of organizational politics as measured by the impact of the project manager being recognized as a knowledgeable resource during the system testing activity (chi-sq 8.169, df 3, sig. 043).

b) Considerable experience

Project structure was found to be significantly and positively related to the level of organizational politics as measured by the amount of project manager time spent ensuring that project favourable decisions were taken during the creating code activity (chi-sq 8.473, df 3, sig. 037).

Project structure was also found to be significantly and positively related to the level of organizational politics as measured by the impact of the project manager's positional authority during the creating code activity (chi-sq 7.625, df 3, sig. 054).

3) Hypothesis three: Organizational Politics influences Schedule Behaviour

The following significant relationships were found when these sample subsets were retested within each major activity. The significant relationships identified are presented below by sample subset.

a) None / some experience

The amount of project manager time spent persuading senior management to support or continue supporting the project was significantly and negatively related to schedule behaviour as measured by cost under / overruns during the product requirements, product design activity ((cc -.329, sig. 058, N 34), and (cc -.390, sig. 023, N 34), respectively). It was also significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code activity (cc .299, sig. 091, N 33). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the creating code activity (cc .434, sig. 013, N 32).

The amount of project manager time spent convincing peers that the success of the project aligns with their own interests was significantly and positively related to schedule

behaviour as measured by duration under / overruns during the creating code activity (cc .375, sig. 041, N 30).

The amount of project manager time spent negotiating the availability of sufficient resources was significantly and positively related to schedule behaviour as measured by cost under / overruns during the beta testing activity (cc .379, sig. 027, N 34). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the beta testing activities (cc .397, sig. 030, N 30).

The amount of project manager time spent ensuring that project favourable decisions were taken was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, system testing, and beta testing activities ((cc .526, sig. 002, N 33), (cc .315, sig. 074, N 33), and (cc .329, sig. 066, N 32), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the creating code activity (cc .371, sig. 037, N 32).

The amount of project manager time spent protecting the project from people with competing agendas was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, and beta testing activities ((cc .325, sig. 065, N 33), and (cc .329, sig. 071, N 31), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under /

overruns during the creating code activity (cc .297, sig. 098, N 32). It was also significantly and negatively related to schedule behaviour as measured by duration under / overruns during the product requirements activity (cc -.320, sig. 074, N 32).

b) Considerable experience

The amount of project manager time spent persuading senior management to support or continue supporting the project was significantly and positively related to schedule behaviour as measured by cost under / overruns during the creating code, system testing, and beta testing activities ((cc .470, sig. 005, N 34), (cc .307, sig. 082, N 33), and (cc .494, sig. 003, N 34), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the creating code, and beta testing activity ((cc .423, sig. 013, N 34), and (cc .480, sig. 004, N 34), respectively).

The amount of project manager time spent convincing peers that the success of the project aligns with their own interests was significantly and positively related to schedule behaviour as measured by cost under / overruns during the product design, system testing, and beta testing activities ((cc .479, sig. 004, N 34), (cc .309, sig. 091, N 31), and (cc .378, sig. 028, N 34), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the product design, creating code, and beta testing activities ((cc .495, sig. 003, N 33), (cc .363, sig. 045, N 31), and (cc .313, sig. 072, N 34), respectively).

The amount of project manager time spent negotiating the availability of sufficient resources was significantly and positively related to schedule behaviour as measured by cost under / overruns during the product design, system testing, and beta testing activities ((cc .444, sig. 008, N 34), (cc .319, sig. 071, N 33), and (cc .568, sig. 001, N 33), respectively). It was also significantly and positively related to schedule behaviour as measured by duration under / overruns during the system testing, and beta testing activity ((cc .333, sig. 054, N 34), and (cc .566, sig. 001, N 33), respectively).

The amount of project manager time spent ensuring that project favourable decisions were taken was significantly and positively related to schedule behaviour as measured by duration under / overruns during the system testing, and beta testing activities ((cc .337, sig. 055, N 33), and (cc .419, sig. 019, N 31), respectively).

The amount of project manager time spent protecting the project from people with competing agendas was significantly and positively related to schedule behaviour as measured by cost under / overruns during the product design, creating code activity ((cc .319, sig. 070, N 33), and (cc .336, sig. 052, N 34), respectively).

The impact of the project manager's positional authority was found to be significantly and positively related to schedule behaviour as measured by duration during the product design activity (cc .358, sig. 044, N 32).

The impact of the project manager being recognized as a knowledgeable resource was found to be significantly and negatively related to schedule behaviour as measured by cost during the product requirements activity ($r = -.351$, $p = .042$, $N = 34$).

5.6 Summary and Conclusions

The objective of this study was to examine the relationships between project structure and schedule behaviour (under / overruns), project structure and organizational politics, and organizational politics and schedule behaviour (under / overruns). This section provides a summary of findings and conclusions about the contribution made by this thesis. It also provides suggestions for further research and addresses the limitations of this research.

5.6.1 Summary of Findings

This section provides a summary of findings by hypothesis. These findings include those based upon the complete sample studied together as well as those findings that resulted when the sample was segregated by the control variables, project manager experience, location of team members, and organizational experience. A table included for each hypothesis provides a visual overview and comparison of their respective results.

Each of these tables present significant results grouped by major activity. The following conventions are used to attribute each significant result to either the complete sample or one of the six sample subsets. Those identified using the complete sample are indicated using A, those identified using the sample subset with a project manager with less than five (5) years experience use P, those identified using the sample subset with a project manager with five (5) years or more experience use P⁺, those identified using the sample subset with project team members located in the same city are indicated using L, those identified using the sample subset with project team members in different cities and/or countries use L', those identified using the sample subset with organizations with less (none/some) experience developing similar products use O, and those identified using the sample subset with organizations with considerable experience are indicated by an O⁺.

1) Hypothesis one: Project structure influences schedule behaviour.

As previously stated about figure 3, the first plot suggests that additional data might support a linear relationship between project structure and the cost under / overruns of creating code, while the shape of the second plot suggests support for the Clark and Wheelright (1992) contentions about heavyweight project advantages and the risk of a lack of organizational control over autonomous projects. These suggestions gained additional credence when segregation of the complete sample by project manager experience and then by team member location yielded significant relationships.

Although the segregated samples did not provide additional support for these specific relationships they did indicate the existence of other significant relationships between project structure and schedule behaviour (under / overruns).

Project manager experience level appears to be a determinant of when in a project's lifecycle project structure will be significantly related to the project's schedule behaviour (under / overruns). For those with less experienced project managers (less than five years) these relationships were confined to the earlier activities of product requirements, product design, and creating code while those with more experienced project managers were related throughout all but the first activity of product requirements.

This would appear to indicate that the more power (as represented by project structure) that less experienced project managers had the more difficulty they had achieving the early portions of their project's schedule. Similarly, for projects with more experienced project managers (five years and more) the indication appears to be that the more power they had the greater difficulty they have keeping their projects on schedule throughout all but the first activity or product requirements.

Segregating the sample by team location, same city / different city, provided an indication that project structure and schedule behaviour (under / overruns) were significantly and positively related only for teams located in the same city and then only during the product requirements activity.

The level of experience of the project's organization yielded the same lack of significant relationships as when the complete sample was examined together.

SCHEDULE BEHAVIOUR	MAJOR ACTIVITIES				
	requirements	design	coding	system testing	beta testing
Cost under / overruns	L ⁺ P	P ⁺			P ⁺
Duration under / overruns	L ⁺	P	P P ⁺	P ⁺	
All Cases = A Project Manager experience: less than 5 years subset = P, 5 years and more = P⁺ Location: Same city = L, Different city / country subset = L⁺ Organizational Experience: none/some subset = O, Considerable subset = O⁺					

Table 2 – significant hypothesis one relationships

2) Hypothesis two: Project structure influences organizational politics.

With the complete sample, the significant and positive relationships identified between project structure and positional authority, and between project structure and recognition as a knowledgeable resource both support the notion that a project manager's positional and personal power increases as a project's structure moves from being functional towards being autonomous in nature (Smith and Reinertsen, 1998). It would also appear that a project manager's positional authority is more significantly related to project structure during a project's initial activities (i.e. defining detailed product requirements) while recognition as a knowledgeable resource is more significant during the testing activities near the end of a project.

At the same time, the project manager's increased positional and personal power does not appear to influence senior management at least during the product requirements activities as the amount of project manager time spent persuading senior management to support or continue supporting the project remains positively correlated to project structure, Smith and Reinertsen's proxy for project manager power.

Segregating the complete sample by project manager experience exposed additional significant relationships between project structure and organizational politics. Those projects where the project manager had less than five years experience exhibited significant relationships between project structure and the time spent convincing peers, negotiating sufficient resources, and defending against competing agendas. In this sample

subset, project structure was also significantly and positively related to the impact of the project manager's positional authority. On the other hand, the more experienced project managers led projects that demonstrated significant relationships between project structure and the impact of the project manager's positional authority, and recognition as a knowledgeable resource. The time spent ensuring senior management support and convincing peers was also significantly and positively related to project structure.

These results demonstrate that the project manager's experience level, a measure of standing within the organization influences which relationships are significant between project structure and organizational politics. The more influence, as measured by project structure, less experienced project managers had the more time they tended to spend on organizational politics during the later project activities of system testing, and beta testing. On the other hand, the more experienced managers tended to spend time on organizational politics in proportion to their influence levels throughout the project lifecycle.

When the sample subsets based on whether or not a project had all its team members located in the same city were tested, only positional authority and recognition as a knowledgeable resource were significantly and positively related to project structure. The single exception to this was a significant and positive relationship between project structure and the project manager time spent negotiating the availability of sufficient

resources during system testing for projects whose team members were in different cities and/or countries.

Positional authority was significantly related to project structure in both sample subsets during the product requirements activity, as it was when the complete sample was tested. This would appear to negate any impact of team location on this relationship during the product requirements activity. However, two additional significant relationships were identified for projects with all team members located in the same city. In this sample, project structure was significantly and positively related to positional authority during the system testing, and beta testing activities.

Recognition as a knowledgeable resource was significantly related to project structure for same city projects only during the product design activity while it was significantly related to project structure for projects with team members in different cities and/or countries during the creating code, system testing, and beta testing activities.

For projects with team members in different cities and/or countries being recognized as a knowledgeable resource was significantly related to project structure. Alternatively, for projects with team members in the same city the positional authority of the project manager was significantly related to project structure. The inference here being that distance dilutes a project manager's positional authority and that he/she must rely more on actual knowledge to maintain his/she influence.

In organizations with less than five years experience project structure was significantly related to the time spent persuading senior management to support or continue to support the project, and to the project manager's positional authority. These relationships occurred during the product requirements, system testing, and beta testing activities. Project managers in more experienced organizations indicated that project structure was significantly associated to the amount of time spent ensuring that project favourable decisions were taken, and to the project manager's positional power. These two relationships were confined to the creating code activity.

The broader presence of significant relationships in less experienced organizations may result from the novelty of the project and/or its product. In a more experienced organizations the project manager may be interacting with more experienced peers and thus needing to spend more time ensuring project favourable decisions are taken especially during the core activity of creating code.

ORGANIZATIONAL POLITICS	MAJOR ACTIVITIES				
	requirements	design	coding	system testing	beta testing
Persuading senior mgmt	A O P ⁺		P ⁺		
Convincing peers			O P ⁺	P	P
Negotiating resources		P		L ⁺	
Favourable decisions	O ⁺				
Competing agendas				P	P
Outside duration pressure					
Outside scope pressure					
Positional authority	A L L ⁺ P ⁺		O ⁺ P P ⁺	L O	L P ⁺
Knowledgeable resource		L	L ⁺	L ⁺ O	A L ⁺ P ⁺
All Cases = A Project Manager experience: less than 5 years subset = P, 5 years and more = P⁺ Location: Same city = L, Different city / country subset = L⁺ Organizational Experience: none/some subset = O, Considerable subset = O⁺ Note <i>Italics</i> indicates a negative correlation. All others correlations are positive					

Table 3 – significant hypothesis two relationships

3) Hypothesis three: Organizational politics influences schedule behaviour.

Table 4 presents an overview of the various significant relationships previously identified between the nine (9) political activities scales used to quantify organizational politics and the two (2) schedule behaviour (under / overruns) scales. It is visually evident that most significant relationships are confined to the first five (5) political activities and are increasingly more numerous in the projects' later occurring major activities, creating code, system testing, and beta testing.

Noteworthy outliers from this pattern are most evident when the results from sample subsets are considered. The sample subset of projects whose project manager has less than five (5) years experience yielded outlining relationships. These relationships were significant between schedule behaviour (under / overruns) and outside pressure to reduce project duration, and outside pressure to increase project scope during the product requirements, system testing, and beta testing activities. These same relationships were significant for the sample subset of projects with team members located in the same city during product requirements. In organizations with considerable experience developing similar products, the project manager time spent negotiating for sufficient resources, protecting against competing agendas and the impact of positional authority were all significantly related to schedule behaviour (under / overruns) during product design.

Apart from the outliers already mentioned, the most noteworthy may be those significant relationships that were identified as being negatively correlated. Originating with sample

subsets, they suggest that increased attention to specific political activities within specific circumstances should yield reductions in schedule under / overruns.

Additional time spent persuading senior management to support or continue supporting the project during the product requirements, and product design activities resulted in reduced schedule under / overruns for projects in organizations with less experience. The same was true during product requirements for projects with all team members located in the same city. The additional time spent protecting a project in a less experienced organization from people with competing agendas also related to reduced schedule under / overruns. Proportionally smaller schedule under / overruns were suffered during the product design activity by projects with less experienced project managers who were nonetheless recognized as knowledgeable resources. Such recognition had the same effect during the product requirements activity for projects in organizations with considerable experience. This was also the case during beta testing for projects with team members in different cities and/or countries.

ORGANIZATIONAL POLITICS	MAJOR ACTIVITIES									
	requirements		design		coding		system testing		beta testing	
	cost	duration	cost	duration	cost	duration	cost	duration	cost	duration
Persuading senior mgmt	<i>LO</i>		<i>O</i>		<i>AP⁺L⁺OO⁺</i>	<i>AP⁺LL⁺OO⁺</i>	<i>PO⁺</i>		<i>APP⁺L⁺O⁺</i>	<i>APP⁺L⁺O⁺</i>
Convincing peers			<i>AP⁺L⁺O⁺</i>	<i>AP⁺L⁺O⁺</i>		<i>AP⁺L⁺O⁺</i>	<i>APL⁺O⁺</i>	<i>AP</i>	<i>APL⁺O⁺</i>	<i>APL⁺O⁺</i>
Negotiating resources			<i>O⁺</i>				<i>APL⁺O⁺</i>	<i>APLO⁺</i>	<i>APP⁺L⁺OO⁺</i>	<i>APP⁺L⁺OO⁺</i>
Favourable decisions		<i>A</i>		<i>AP⁺</i>	<i>APLO</i>	<i>AO</i>	<i>APL⁺O⁺</i>	<i>APL⁺O⁺</i>	<i>APLL⁺O⁺</i>	<i>APL⁺O⁺</i>
Competing agendas		<i>O</i>	<i>O⁺</i>	<i>A</i>	<i>APLL⁺OO⁺</i>	<i>ALO</i>	<i>P</i>		<i>APLO</i>	<i>APL</i>
Outside duration pressure	<i>L</i>	<i>P</i>					<i>P</i>		<i>P</i>	<i>P</i>
Outside scope pressure		<i>L</i>					<i>P</i>			<i>P</i>
Positional authority				<i>O⁺</i>						
Knowledgeable resource	<i>O⁺</i>		<i>P</i>							<i>L⁺</i>
All Cases = A Project Manager experience: less than 5 years subset = P, 5 years and more = P⁺ Location: Same city = L, Different city / country subset = L⁺ Organizational Experience: none/some subset = O, Considerable subset = O⁺ Note <i>Italics</i> indicates a negative correlation. All others correlations are positive										

Table 4 – significant hypothesis three relationships

5.6.2 Conclusions

The objective of this research was to study the relationships between project structure and schedule behaviour (under / overruns), project structure and organizational politics, and organizational politics and schedule behaviour (under / overruns). The results of this research have been presented above. The purpose of this section is to identify patterns from among the significant relationships identified and present suggested reasons they occur as they do.

1) Hypothesis one: Project structure influences schedule behaviour.

Hypothesis one was not supported by the results from the complete sample. However, some support was demonstrated by the sample subsets created by segregating the complete sample by the “control” variables of project manager experience, team member location(s), and organizational experience.

Table two (2) presents nine significant relationships between project structure and schedule behaviour (under / overruns). The positive correlations of these relationships indicate that the closer the selected project structure is to an autonomous structure the larger the schedule under / overrun experienced.

Keeping this in mind, a review of table two (2) highlights three meaningful patterns in these relationships. The first indicates that employing a more functional project structure for a project led by a less experienced project manager should result in smaller schedule

cost under / overruns at least during the product requirements activity. This also appears true of duration under / overruns during the product design, and creating code activities. The increased involvement of more experienced functional managers may offset the impact of the project manager's lack of experience during the activities occurring earlier in the project's lifecycle.

The second pattern involves projects led by more experienced project managers. The results suggest that these project may also benefit from a more functional structure specifically minimizing cost under / overruns during the product design activity, and minimizing duration under / overruns during the creating code, system testing, and beta testing activities. These results are consistent with the previously cited Clark and Wheelright (1992) suggestion that the more autonomous a project the more difficult it is for senior management to maintain organizational control over it. Note also that this pattern appears in the activities occurring later in the project lifecycle.

The third pattern identified relates to the location(s) occupied by a project's team members. Projects with team members located in different cities and/or countries incurred lesser under / overruns in schedule cost and duration when more functional project structures were used, at least early in the project lifecycle, during the product requirements activity. The inefficiencies introduced by the distances between multiple locations may have been offset by the stricter procedural controls and communication protocols that tend to be in place in more functional organizations.

In summary, project manager experience and team location(s) may be predictive of when during a project's lifecycle that project structure influences schedule behaviour (under / overruns).

2) Hypothesis two: Project structure influences organizational politics.

Hypothesis two was moderately supported by the data, with a majority of that support demonstrated in only two areas of organizational politics. The importance of positional authority, and being recognized as a knowledgeable resource accounted for eighteen (18) of the thirty-one (31) significant relationships presented in table three (3). As might be expected intuitively, the more the project structure moved from functional towards autonomous, the more importance the respondents attributed to the benefit of their positional authority and of being recognized as a knowledgeable resource. This was true whether considering the complete sample, or any of the sample subsets and appears to be in direct support of the Smith and Reinertsen's (1998) suggestion of project structure as a proxy for the measurement of project manager power.

A second pattern sees less experienced project managers spending more time, as their political power increases, on the political activities of convincing peers, and protecting against competing agendas during the system testing, and beta testing activities. These major activities represent that portion of the project lifecycle during which those impacted by the project's results become increasingly more aware of how they will be

affected by it. Lacking the experience necessary to recognizing the need to prepare these folks for the transition by keeping them informed and feeling involved throughout the project may explain why less experienced project managers would be required to spend such additional time.

The third cluster of significant relationships involved the sample subsets based upon team member location(s). Of the four (4) such relationships identified between project structure and the project manager's positional authority, three of them involved projects with all team members located in the same city. This may indicate that locating team members in the same city is necessary to receive the full benefit of the project manager's positional authority. Another four (4) relationships were identified between project structure and the impact of being recognized as a knowledgeable resource. Three of these originated with the sample subset whose project team members were located in multiple cities and/or countries. In this case the suggestion may be that recognition as a knowledgeable resource is more important than positional authority is when teams are dispersed.

The overriding indication is that the impact of positional authority and recognition as a knowledgeable resource are significantly influenced by project structure.

3) Hypothesis three: Organizational politics influences schedule behaviour.

Hypothesis three presents the greatest number of significant relationships of the three hypotheses. Schedule behaviour (under / overrun) was influenced by the level of organizational politics in one hundred and twenty-eight (128) significant and positively correlated relationships. Seven (7) significant and negatively correlated relationships were identified. In these relationships the level of organizational politics determined the magnitude of schedule behaviour under / overruns experienced by projects.

Notice from table 4, that the significant and positively correlated relationships are most numerous later in the project's lifecycle. This may be due to the reluctance to report schedule slippages early, hoping they can be "made up" as well as the natural delay in responding to project results. Results must be "lived" first. Then be reported upon. Reaction naturally occurs in subsequent activities. Thus for these relationships it would appear that the natural tendency is for these relationships to cluster into the latter three major activities of creating code, system testing, and beta testing.

Characterized above as outliers from this clustering affect, the significant relationships involving pressure to reduce project duration and pressure to increase project scope experienced late in their lifecycles by projects led by less experienced project managers may bare witness to the lack of organizational standing that would tend to involve them in greater levels of organizational politics.

On the other hand the seven negatively correlated relationships identified may offer additional insights that could be taken advantage of by those organizing projects. In specific circumstances, increased levels of project manager effort with respect to the three political activities; persuading senior management to support or continue supporting the project, protecting project against people with competing agendas, and being recognized as a knowledgeable resource, were found to result in reductions in the magnitude of schedule under / overruns.

When all team members were located in the same city, the amount of project manager time spent persuading senior management to support or continue supporting the project reduced the magnitude of schedule under / overruns during the product requirements activity. Co-location may facilitate a common understanding of the project's importance as reflected in senior management support which results in improved communication and dedication to task and ultimately smaller schedule under / overruns.

In organizations with little experience developing similar products, the project appears to benefit from increased project manager time spent persuading senior management to support or continue supporting the project during the product requirements, and product design activities. This may be indicative of the need to reassure the organization and the project team in particular that they are headed in the right or at least the sanctioned direction. The effectiveness of the project manager's time spent protecting against

people with competing agendas may also be a case of if not reassuring peers but maybe reasserting their project's needs and sanctioned direction.

Otherwise, organizations with considerable experience derived greater benefit from the project manager's recognition as a knowledgeable resource during the product requirements activity. It would seem reasonable that more experienced organizations would have more experienced project team members and that to have the credibility to lead such a team successfully the project manager needed to be recognized as a knowledgeable resource.

At first glance, for a less experienced project manager to require recognition as a knowledgeable resource during the product design activity to succeed may appear a contradiction. However, the indication may be that the impact of a less experienced project manager could be somewhat mitigated by ensuring that the individual is recognized as a knowledgeable resource.

The last negatively correlated relationship indicated that it is important that the project manager be recognized as a knowledgeable resource when the project team is located in multiple cities and/or countries. Here may be evidence that distance dilutes the impact of more traditional motivations to achieve a common goal and that it take someone recognized as a knowledgeable resource to lead such teams.

At this point three conclusions for new product development in general are offered: First, project manager time spent on political activity early in a project's lifecycle appears to result in smaller schedule overruns. Second, increased levels of project manager time spent on political activity later in a project's lifecycle may be a response to accumulating schedule overruns as a project progresses.

And although further research is necessary, the ultimate conclusion from the above results may be that a project may be best served by different project structures during different major activities. Certainly, different circumstances require different project structures.

5.6.3 Contribution to Academic Understanding

This section details the contributions this research makes to new product development literature on organizational politics and the modelling of the relationships between organizational politics and schedule behaviour (under / overruns).

The first contribution deals with the expansion of F.L. Harrison's (1992) political toolkit for project managers. Four additional dimensions were added to the interpretation of Harrison's ten political tools that was used in this research. These four added dimensions were: the impact of a project manager's positional authority, the impact of the project manager being recognized as a knowledgeable resource, the project manager time spent

resisting outside pressures to reduce schedule duration, and the project manager's time spent resisting outside pressures to increase project scope.

The value of this contribution was demonstrated by the identification of significant relationships between each of these additional dimensions of organizational politics and schedule behaviour (under / overruns).

The second contribution relates to the enhancement of the research model upon which this research was conducted. The enhancement model (figure 4) reflects the realization that hypothesis three, organizational politics affects schedule behaviour (under / overruns) appears to be a bi-directional relationship.

Figure 4: Enhanced Theoretical Framework

5.6.4 Insights for Managers

This research has provided a number of insights for managers who find themselves involved in new product development projects.

The overriding insight identified during this research is that organizational politics is a fact of organizational life in general and of projects specifically that must be anticipated and managed if successful outcomes are to be achieved.

Managers contemplating what project structure to use when setting up new product development projects must consider the experience levels of their organization and staff together with the concept that a project's structure should vary as it progresses through its lifecycle. For example, a more functional structure may be most appropriate early in the lifecycle of a project led by a less experienced project manager while the increasing impact of positional authority and recognition as a knowledgeable resource could be exploited by shifting to more autonomous project structures later in the project's lifecycle.

The geographical makeup of the project team must also be considered. Projects with team members (and possibly tasks – a subject for further research) distributed across multiple locations should be structured differently from those with everyone in one location. Functional projects spanning multiple locations experienced smaller schedule overruns than did more autonomously structured projects.

Another insight for managers of new product development projects is that the impacts of all political activities are not the same. This research demonstrated that project managers could diminish the schedule overruns of their projects by spending time on certain political activities early in the project's lifecycle. Activities such as persuading senior management to support / continue supporting their project during product requirements, and product design.

On the other hand project managers would be well advised to minimize the amount of time they spend on other political activities thereby reducing the magnitude of schedule overruns. In this case activities such as convincing peers that the project aligned with their own interests and protecting their project against competing agendas of others.

5.6.5 Research Limitations

The first set of study limitations worth noting relate to the scope and selection of questionnaire respondents. The Invitation to Participate (see Appendix B) was sent to members of PMI-ISSIG, an organization for project managers who were requested to qualify themselves based on the criteria set out in the invitation. Validity of the resulting data rests on the assumption that the respondents adhered to those criteria and that those who responded are representative of project managers as a whole. While this adherence was never explicitly verified a modicum of credibility was provided by emails received from would be respondents that questioned the validity of the criteria excluding them.

Conversely, adherence to the invitation's self-selection criteria effectively limited the questionnaire results to the single perspective of project managers. No other stakeholder perspectives, neither internal nor external were solicited.

Conducting further research with the additional resources necessary to administer the questionnaire to a full sampling of respondents during face-to-face interviews might provide an opportunity to gather a richer understanding of the model and its relationships.

People are naturally drawn to power and the status it entails. So capturing or categorizing the structure of their project with a series of relatively innocuous questions about its characteristics might avoid the possible introduction of any bias, intentionally or otherwise, towards the more powerful project structure types.

It should also be noted that the data captured relied upon the respondents' perceptions and memories of events. Differences in results might have emerged had the resources been available to conduct longitudinal studies of multiple projects with access to schedule documentation, team members, and other stakeholders.

5.6.6 Opportunities for Further Research

The lack of a significant relationship between project structure and schedule behaviour (under / overruns) appears inconsistent with two previously identified trends (Smith and

Reinertson, 1998), namely that moving from functional to separate (autonomous) project structure increases speed (shorter schedule duration) but increases the potential for higher expenses (cost).

This apparent contradiction presents an opportunity for research that could investigate whether a focus upon percentage under / overruns as opposed to Smith and Reinertson's (1998) focus on efficiencies represented by shorter durations and costs per unit effort (size) explain the seemingly different results. Further research might also investigate impact of organizational politics on efficiency as well as whether relationships exist between under / overruns and efficiency measures.

One of the things highlighted during the case study phase of this research was that the experiences of external consultants hired as project managers were very different from project managers who were actual employees of the organization establishing the project. External consultants interviewed attributed the uniqueness of their experiences to the structural differences inherent in their more "arms-length" arrangements.

These arrangements can vary from simply providing the individual resources on a "time-and-materials" basis to a client who retains management of the project to providing a fully staffed project team who's objective is to provide the client with the finished product "come hell or high water".

Thus, a second opportunity may revolve around determining whether there are differences in the relationships amongst project structures, organizational politics and schedule behaviour (under / overruns) when the project team is led by and/or made up of external consultants as opposed to the employee project managers surveyed for this research.

Focus of this research has been almost exclusively external to the project team. Shifting the focus to study the impact of external organizational politics on internal project dynamics and their impact on schedule behaviour (under / overruns) would present a third opportunity for further research. What if any is the value in casting the project manager in the roll of political gatekeeper for the project?

The existence of both negatively and positively correlated significant relationships between various dimensions of organizational politics and schedule behaviour attests to the complicated nature of the interaction between these two model components. Having merely identified their existence this research presents a fourth opportunity for further research. What are the causalities of the relationships between political activities and schedule behaviour?

One of the focuses of this research was determining what impact decentralized team member locations might have on the relationships involved in this research model. A fifth opportunity for further research would be to study what impact distributing the

completion of various tasks across multiple locations might have. Are certain tasks more successful when distributed than are others?

This research defined schedule behaviour in terms of two dimensions, cost under / overruns and duration under / overruns. No attempt was made to determine what proportion of the original feature set was actually delivered. A sixth opportunity for further research could ask whether considering the schedule behaviour dimension of changing what features are delivered in order to meet schedule cost and/or duration milestones would affect the results.

The results obtained from the data subsets that were created to explore the impact of project manager experience, project team location, and organizational experience, are intriguing. However, the relatively small number of questionnaire responses in each subset provides the opportunity for further investigation.

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Glossary

Autonomous (Project Structure): projects are staffed by individuals from functional areas who have been formally assigned, dedicated and co-located to the project team. The project manager has complete control over them and their evaluation.

Beta testing (major activity): the testing of pre-release versions of the product by an end user / customer often at one of their sites.

Convincing peers that the success of your project aligned with their own interests (organizational politic): is a direct translation of the second tool, “Alliance or coalition building”. Respondent selects percentage range they feel best represents the percentage of project manager’s time spent on it.

Cost (schedule behaviour): monetary value expended to complete an activity or activities.

Creating code (major activity): the creation of the source code for the software product in whatever languages that are used.

Defining detailed product requirements (major activity): the determination of the commercial (or customer) requirements for the product together with its functional specification.

Duration (schedule behaviour): time required to complete an activity or activities.

Ensuring that project favourable product decisions were reached (organizational politic): is likewise an amalgamation of Harrison's fourth tool, "Controlling the decision process" and the fifth tool, "Controlling the committee process". Respondent selects percentage range they feel best represents the percentage of project manager's time spent on it.

Functional (project structure): people are grouped by discipline, under a functional manager. The primary responsibility for the project passes sequentially from one function to the next with no one individual responsible for the overall project.

Heavyweight (project structure): projects are led by a project manager who has been invested with direct access to and responsibility for the work of all those involved in the project. They tend to be senior managers with primary influence over the people on their project. However, long-term "ownership" of the people remains with their functional managers.

Lightweight (project structure): people are retained within their functional grouping but each functional area designates a liaison person to "represent" its interests on the project coordinating committee. The project manager is usually a middle- or junior-level person with little status or influence in the organization and the project resources remain under control of functional managers.

Major Activity: five major activities of software development that are common to all development processes and may be undertaken concurrently. They are: defining detailed product requirements, product design, creating code, system testing, and beta testing.

Negotiating the availability of sufficient resources (organizational politic): such as personnel, money, expertise, and relevant information”, was an amalgamation of the third tool, “controlling a critical resource”, and the ninth, “Information”. Respondent selects percentage range they feel best represents the percentage of project manager’s time spent on it.

Organizational Politics: a natural and pervasive human response to conflict situations, neither inherently evil nor virtuous. Operationalized in terms of the political activities: persuading senior management, convincing peers, negotiating sufficient resources, ensuring favourable decisions, protecting against competing agendas, using positional authority, using recognition as a knowledgeable resource, resisting outside schedule pressure, and resisting outside scope pressure.

Persuading senior management to support your project (organizational politic): is a direct translation of the first tool in Harrison’s list, “Gaining support from a higher power”. Respondent selected percentage range they felt best represents the percentage of project manager’s time spent on it.

Product design (major activity): the definition of the product design at the level of the modules to be used and their interdependencies.

Project Lifecycle: a timeline described by the various stages through which a project progresses from initial concept or need identification through to implementation or use by end user. In this research these stages are referred to as major activities.

Project Structure: refers to how the project is organized within its parent or hosting organization.

Project Structure Type: In this model, there are four types: functional, lightweight, heavyweight, and autonomous. Supplied by questionnaire respondents based on definitions supplied with questionnaire.

Protecting projects from the competing agendas of others (organizational politic): was an attempt to capture the essence of Harrison's eighth tool, "deceit and deception", and his tenth tool, "miscellaneous games" while avoiding the negative biases associated with these activities that might result in their being under reported. Respondent selected percentage range they felt best represents the percentage of project manager's time spent on it.

Resisting outside pressures to increase project scope (organizational politic): was added as an equally prevalent activity encountered by project managers. Respondent selected percentage range they felt best represents the percentage of project manager's time spent on it.

Resisting outside pressures to reduce schedule duration (organizational politic): was added as a prevalent activity encountered by project managers. Respondent selected percentage range they felt best represents the percentage of project manager's time spent on it.

Schedule Behaviour: is defined as the deviations in duration and cost from the original project schedule that occur during the project's lifecycle. Excesses of duration and/or cost are referred to as overruns while results that are less than were planned are referred to as under-runs. These under / overruns are captured as a percentage of the originally scheduled amount of duration and/or cost. It does not measure any adjustment of features to be delivered in order to make a milestone.

Schedule Behaviour (under / overrun): see schedule behaviour.

System testing (major activity): the internal, laboratory based testing of versions of the entire product.

Using positional authority to further project goals (organizational politic): is based directly on Harrison's sixth tool, 'use of positional authority'. Respondent indicates degree to which the agree/disagree with statement that positional authority helped them achieve their project's goals.

Using recognition as a knowledgeable resource to further project goals (organizational politic): is a translation of Harrison's seventh tool, "Use of the scientific element". Respondent indicates degree to which the agree/disagree with statement that their recognition as a knowledgeable resource helped them achieve their project's goals.

Appendix A – Questionnaire

Objective

To examine how project structure and the activities undertaken by project stakeholders affect the schedules of software product development projects.

To respond to questionnaire

1. Save this questionnaire document as a Word document on your own system.
2. Open the saved questionnaire document, answer the questions, and save it again. To answer the multiple-choice questions, type an “x” between the brackets, like this: [x]. For fill-in-the-blank questions, type between the brackets, like this: [your response]. Please make no other changes to this questionnaire.
3. Return your completed questionnaire document to me by attaching it to your reply e-mail message and send it to projectmanagement@sprott.carleton.ca.

Base your answers on a software product development project that

1. Completed within the last three years,
2. Developed a software product for sale to clients outside of your own company,
3. Did not produce a “one-of” custom software application for a specific client, and
4. Was not “imbedded” within a larger hardware product.

This questionnaire should take less than 30 minutes to complete.

ALL RESPONSES WILL BE KEPT STRICTLY ANONYMOUS.

For clarification, a short follow-up telephone call might be useful. Please indicate your willingness to take a short call by entering the following:

Name:

Telephone:

Preferred call time:

If you wish to receive a copy of research results once the thesis is completed please enter the email address that it should be sent to:

Email:

If you have any questions, please email me at projectmanagement@sprott.carleton.ca

Thank you for your time and cooperation.

DEFINITIONS OF MAJOR ACTIVITIES

Defining detailed product requirements – determining and documenting the commercial and/or customer requirements for the product to the level of functional detail necessary to permit designing of the product to start.

Product design – defining the product design at the level of the modules to be used and their interdependencies.

Creation of source code – creating the source code for the software product.

System testing – internal testing of the whole product.

Beta testing – testing of pre-release versions of the product by an end user/customer often on their site.

PROJECT COST BEHAVIOUR

1. Please select for each activity the percentage range that you feel most closely reflects your project's cost overrun/underrun experience as measured in person months of effort (For example, an activity that required approximately 50 person months instead of the planned 55 person months would be considered 10% over budget. The selected range would be "Within 10% under/over").

	More than 10% under	Within 10% under/over	11 – 50% over	51 – 150% over	More than 150% over
a) Defining detailed product requirements	☐	☐	☐	☐	☐
b) Product design	☐	☐	☐	☐	☐
c) Creation of source code	☐	☐	☐	☐	☐
d) System testing	☐	☐	☐	☐	☐
e) Beta testing	☐	☐	☐	☐	☐
For the project as a whole	☐	☐	☐	☐	☐

SCHEDULE BEHAVIOUR:

2. Please select for each activity the percentage range that your feel most closely reflects your project's schedule overrun/underrun experience. (For example, an activity that completed in approximately 5 weeks time instead of the planned 4 weeks would be considered 25% late. The selected range would be 11 – 50%).

	More than 10% early	Within 10% early/late	11 – 50% late	51 – 150% late	More than 150% late
a) Defining detailed product requirements	☐	☐	☐	☐	☐
b) Product design	☐	☐	☐	☐	☐
c) Creation of source code	☐	☐	☐	☐	☐
d) System testing	☐	☐	☐	☐	☐
e) Beta testing	☐	☐	☐	☐	☐
For the project as a whole	☐	☐	☐	☐	☐

ORGANIZATIONAL DYNAMICS

In the next seven questions, what percent of your time was spent:

3. persuading senior management to support your project during:

	Less than 10 %	11 - 30 %	31 - 50 %	More than 50 %
a) Defining detailed product requirements	[ ]	[ ]	[ ]	[ ]
b) Product design	[ ]	[ ]	[ ]	[ ]
c) Creation of source code	[ ]	[ ]	[ ]	[ ]
d) System testing	[ ]	[ ]	[ ]	[ ]
e) Beta testing	[ ]	[ ]	[ ]	[ ]

4. convincing peers that the success of your project aligned with their own interests during:

	Less than 10 %	11 - 30 %	31 - 50 %	More than 50 %
a) Defining detailed product requirements	[ ]	[ ]	[ ]	[ ]
b) Product design	[ ]	[ ]	[ ]	[ ]
c) Creation of source code	[ ]	[ ]	[ ]	[ ]
d) System testing	[ ]	[ ]	[ ]	[ ]
e) Beta testing	[ ]	[ ]	[ ]	[ ]

5. negotiating the availability of sufficient resources such as personnel, money, expertise, and relevant information for your project during:

	Less than 10 %	11 - 30 %	31 - 50 %	More than 50 %
a) Defining detailed product requirements	[ ]	[ ]	[ ]	[ ]
b) Product design	[ ]	[ ]	[ ]	[ ]
c) Creation of source code	[ ]	[ ]	[ ]	[ ]
d) System testing	[ ]	[ ]	[ ]	[ ]
e) Beta testing	[ ]	[ ]	[ ]	[ ]

6. ensuring that favourable decisions were reached for product issues (i.e. feature set, launch date) impacting your project during:

	Less than 10 %	11 - 30 %	31 - 50 %	More than 50 %
a) Defining detailed product requirements	[ ]	[ ]	[ ]	[ ]
b) Product design	[ ]	[ ]	[ ]	[ ]
c) Creation of source code	[ ]	[ ]	[ ]	[ ]
d) System testing	[ ]	[ ]	[ ]	[ ]
e) Beta testing	[ ]	[ ]	[ ]	[ ]

What percent of your time was spent:

7. protecting your project from the actions of people within the organization who had competing agendas during:

	Less than 10 %	11 - 30 %	31 - 50 %	More than 50 %
a) Defining detailed product requirements	☐	☐	☐	☐
b) Product design	☐	☐	☐	☐
c) Creation of source code	☐	☐	☐	☐
d) System testing	☐	☐	☐	☐
e) Beta testing	☐	☐	☐	☐

8. resisting outside pressures to reduce estimated schedule durations without proportional scope change?

☐ Less than 10 %   ☐ 11 - 30 %   ☐ 31 - 50 %   ☐ More than 50%

9. resisting outside pressures to increase project scope?

☐ Less than 10 %   ☐ 11 - 30 %   ☐ 31 - 50 %   ☐ More than 50%

10. The authority inherent in the position you held in the project helped you further the project's goals during:

	Strongly Agree	Agree	Disagree	Strongly Disagree
a) Defining detailed product requirements	☐	☐	☐	☐
b) Product design	☐	☐	☐	☐
c) Creation of source code	☐	☐	☐	☐
d) System testing	☐	☐	☐	☐
e) Beta testing	☐	☐	☐	☐

11. Being recognized as a knowledgeable project resource helped you further the project's goals during:

	Strongly Agree	Agree	Disagree	Strongly Disagree
a) Defining detailed product requirements	☐	☐	☐	☐
b) Product design	☐	☐	☐	☐
c) Creation of source code	☐	☐	☐	☐
d) System testing	☐	☐	☐	☐
e) Beta testing	☐	☐	☐	☐

12. What percent of your project team member's time would you **guestimate** that they spent dealing with some of the activities mentioned above in this section during:

	More than 50 %	31 - 50 %	11 - 30 %	Less than 10 %
a) Defining detailed product requirements	☐	☐	☐	☐
b) Product design	☐	☐	☐	☐
c) Creation of source code	☐	☐	☐	☐
d) System testing	☐	☐	☐	☐
e) Beta testing	☐	☐	☐	☐

PROJECT STRUCTURE:

13. The following diagrams and their associated explanations describe four different ways in which development projects tend to be organized. Note that in the diagrams project manager is referred to as project leader (PL).

Please review each of the following four diagrams before responding to the question that follows them (see below).

Please enter here [ ] the letter (a, b, c or d) for the diagram that most closely represents the organization of the project you have chosen as the basis for your questionnaire answers.

14. Please describe where project team members were located by selecting ONE of the following:

☐ Adjacent desks	☐ On the same floor
☐ In the same building	☐ In different buildings
☐ In different cities	☐ In different countries

ORGANIZATIONAL EXPERIENCE:

15. Please rate your company's prior experience in developing such a product?

☐ None	☐ Some	☐ Considerable

16. Please rate your development team's prior experience in developing such a product?

☐ None	☐ Some	☐ Considerable

RESPONDENT INFORMATION:

17. Please indicate your position within your organization by selecting ONE FROM EACH of a) and b).

a. ☐ Management Resource	☐ Technical Resource
b. ☐ Senior	☐ Middle ☐ Junior

18. Please indicate the most senior position you held during this project.

☐ Sponsor	☐ Program Manager	☐ Project Manager
☐ Team Lead	☐ Team Member	

19. Please indicate what your previous level of experience was in positions similar to the one you held in the project you have chosen for this questionnaire.

☐ none	☐ less than 5 yrs	☐ 5 - 10 yrs	☐ over 10 yrs

20. Please indicate what your previous level of experience was with similar projects in any capacity.

☐ none	☐ less than 5 yrs	☐ 5 - 10 yrs	☐ over 10 yrs

Thank you again for your time and cooperation

Appendix B – Invitation to Participate

Participants Needed for Project Management Research Survey!

Participate Now!

Ever wondered why some well-scheduled software product development projects succeed while others get lost along the way?

Were the successes scheduled differently from the failures?

Is one project structure more likely to succeed than another?

Does success simply require extraordinary effort or is something else happening?

Overview

If you have ever asked any of the above questions, my research may be of interest to you. I am researching the impacts of project structure and organizational dynamics on the schedules of software development projects. This research will form the basis of my Master's thesis for the Telecommunications Technology Management degree at Carleton University.

I am looking for project managers interested in participating in a research survey by completing a short questionnaire. Participants should be company employees (as opposed to external consultants) with experience leading software product development projects within their companies.

Questionnaire Completion and Prize

Prepare to complete the questionnaire by selecting a software development project for which you have access to scheduling dates and cost data.

Please note that only those who complete the entire questionnaire by midnight (EST), Wednesday, and provide an email address they can be contacted at will be entered into a draw for a single prize, valued at approximately \$100 US.

Aggregate research results will be shared with all who provide email addresses as soon as the data have been analyzed.

Click here to participate in this Questionnaire.

If you could forward this notice to another person who might wish to participate, I would be very grateful.

Thank you for your support,

Michael (Mike) Allen

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