INFORMATION TECHNOLOGY PROJECT MANAGERS' PRODUCTIVITY AND PROJECT SUCCESS: THE INFLUENCE OF POLYCHRONIC COMMUNICATION

By

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I declare that:

Information Technology Project Managers' Productivity and Project Success:

The Influence of Polychronic Communication

is my own work and that all the sources that I have used or quoted have been

indicated and acknowledged by means of complete references.

June 13, 2014

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Acknowledgements

I wish to express my sincere appreciation to:

Abstract

This research focuses on the role that polychronic Communication (PC) plays in the productivity and project success of Information Technology (IT) Project Managers (PMs). PC refers to a communication style where the communicator switches rapidly between several conversations, irrespective of topic similarity, instead of completing one conversation before starting another.

An online questionnaire collected data from Information Technology workers in multiple industries across the globe. The data consisted out of two distinct groups: IT PMs (n = 202) and IT project team members (n = 122).

Statistical analysis on the dataset considered the perspectives of both participant groups, first separately and then combined. The results showed relationships between:

1. IT PMs' individual polychronicity and their PC.

2. IT PMs' PC and their opinion of the influence of PC on the success of the projects that they are managing.

3. IT PMs' PC and their opinion of the influence of PC on their productivity.

4. IT PMs' PC and the corporate polychronicity of their employers.

In addition, when IT PMs rate their PC, the rating is lower than when other IT project team members rate the IT PMs' PC. By contrast, there was no difference between IT PMs rating the influence of their PC on their project success and productivity versus IT project teams rating the influence of the IT PMs' PC on their project success and productivity.

These findings contribute to the factors that a corporation has to consider in hiring new IT PMs or training their current IT PMs.

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List of Acronyms

CoD	Coefficient of Determination
IBM	International Business Machines
II	Impatience and Irritability
IM	Instant Message
IPV	Inventory of Polychronic Values
IT	Information Technology
KPI	Key Performance Indicator
PAI	Polychronic Attitude index
PC	Polychronic Communication
PDA	Personal Digital Assistant
PM	Project Manager
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PMP	Project Manager Professional
R & D	Research and Development
ROA	Return on Assets
ROE	Return on Equity
ROS	Return on Sales
SEC	Security and Exchange Commission

SPSS   Statistical Package for Social Sciences

VM   Virtual Meeting

WMD   Weapons of Mass Destruction

Chapter 1: Introduction

1.1. Background

Multitasking is a part of everyday life for the modern Information Technology (IT) worker. IT managers assign multiple coding tasks to each programmer on multiple IT projects, analysis tasks to analysts on multiple IT projects, and management tasks to Project Managers (PMs) on multiple IT projects. IT managers and other project stakeholders expect concurrent execution of these tasks. Use of the terms *concurrently* and *simultaneously* interchangeably throughout this dissertation suggests the person performing the tasks switches rapidly between tasks, usually before completing the current task. This creates an *illusion* of concurrency or multitasking.

Only a few years ago, published job descriptions for IT PMs specifically stated the ability to manage multiple projects concurrently as a "must have" requirement. Today, job descriptions rarely state this requirement, but it has become an expected skill. A search on the key phrase "project manager" on the technical recruitment website Dice.com™ for open positions in the researcher's hometown of San Diego, California, performed on May 12, 2012 produced 175 hits. Four listings (roughly 3%) included the ability to multitask or a variation of the same theme as a required skill. Similarly, the ability to work on multiple projects concurrently has become an expected requirement for other IT workers such as programmers, analysts, software engineers, system architects and others. To prevent chaos in this dynamic and challenging environment, IT managers assign IT projects to IT PMs to manage according to a prescribed project management methodology. Corporations primarily derive their project management methodology from the principles published in the Project Management Institute's (PMI) Project Management Body of Knowledge Guide (PMBOK), or PRINCE2 (Projects in Controlled Environments). Often, job requirements for IT PMs include holding either a Project Management Professional (PMP) credential issued by the

Project Management Institute (PMI) or a PRINCE2 Practitioner credential. These credentials signal to the hiring organisation that the prospective employee has the knowledge and experience to apply the methodology prescribed in the PMBOK or PRINCE2.

The term polychronicity originated in 1983 when Edward Hall studied different world cultures and classified them into either polychronic or monochronic cultures. Hall defined polychronicity as the preference by an individual, organisation or national culture to perform more than one task simultaneously, believing that it is the best way to operationalise tasks. In contrast, monochronicity is the preference to perform tasks sequentially, believing that it is the best way to operate. Polychronicity and monochronicity are therefore behaviours. According to Hall, the polychronicity of a culture varies along a chronicity continuum (§1.4.6) (Hall, 1983).

Excellent and effective verbal and written communication (sometimes referred to in job descriptions as being articulate) is an essential and required skill for all project managers. In his book *The Project Management Communications Toolkit,* Carl Pritchard refers to communication as the "cornerstone of effective project management" (Pritchard, 2004). To complete any IT project successfully, an IT PM must have the ability to communicate clearly and concisely to stakeholders at all levels of the organisation. The search results described earlier contained 135 listings (77% of the total results) that included the ability to communicate effectively as a requirement. Expanding the search terms to include variations of the term "multi-communicate" failed to return a single hit. Including all the United States of America in the search terms also did not return a single hit. The conclusion is therefore that the ability to communicate simultaneous on different threads do not appear in job descriptions, even though the practice is widespread.

Advances in communication technology simplified multi-communicating. For example, telephones made it possible to converse with a remote person while concurrently conversing (possibly different threads) with another person within

hearing distance. Additional technologies invented over the years simplified connecting more parties to the other end of the conversation (e.g. cellular phones, email, smartphone applications and instant messaging).
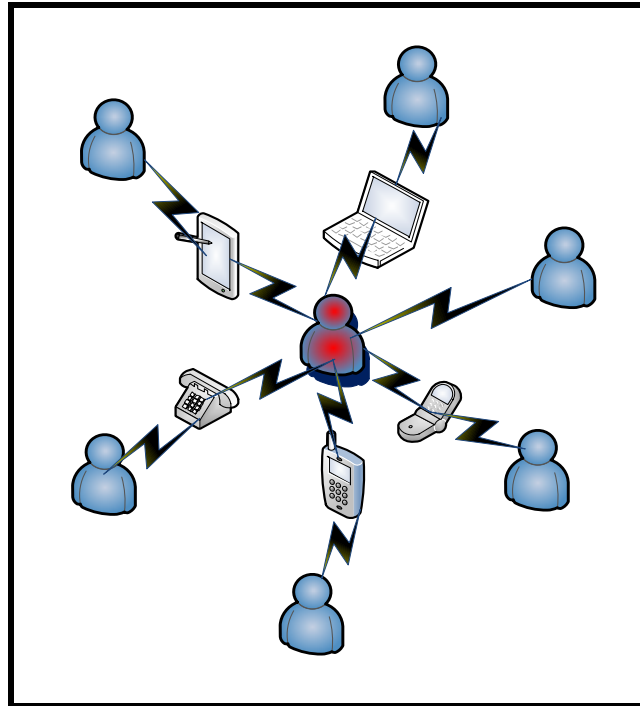
Figure 1.1 Multi-communicating Model (Source; Own)

Figure 1.1 depicts a multi-communicating model, which shows the person in the centre is communicating with six other people simultaneously using direct face-to-face communication and various communication technologies.

The term polychronic communication (PC) indicates that the communicator actively practices multi-communication, prefers to multi-communicate, and believes that it is the best communication method. PC is therefore a multi-communication behaviour. The remainder of this dissertation will use the term PC to refer to polychronic communication.

1.2. Motivation for this study

Literature on topics such as general project management, software project management and IT project management are in abundance. The literature

suggests the IT PM needs to control project schedules tightly (a *project* definition is given in §1.4.1). However, Edward Hall described polychronic cultures as unconcerned with time or schedules (Hall, 1983). This contrast in schedule adherence needs further investigation.

The increased availability of communication technology has provided more opportunity for effective and efficient communication. Logically, one would expect IT PMs therefore to become more efficient and productive, given varied communication technologies that lent themselves reasonably well to PC. In addition, given the importance of effective communication as an IT PM skill, one would expect that an increase in communication efficiency would result in an increase in IT PM productivity and successful projects. However, based on Hall's description of polychronic culture, the following question arises: Will a polychronic IT PM who is practising PC, deviate from scheduled tasks and deliver a significant number of projects late? If the answer is positive, then polychronicity may lead to an increase in project failures rather than project success. This contradiction needs scientific study to resolve.

A thorough literature review revealed that some research on the broader topics of polychronicity and monochronicity has been undertaken. However, research on PC is in its infancy. In addition, several gaps exist in the current literature, specifically related to the productivity and the project success of a PC practitioner in the IT Project Management domain. This study addressed the PC phenomenon and its influence on IT PM productivity and project success.

1.3.   Research Problem

Yan (2005) listed social culture, national culture, social groups, work groups, individual character and task character as influencing an individual's polychronic orientation. The basis of this study is that factors influencing polychronicity, specifically in a corporate IT project management environment, may be different from those listed by Yan. In particular, the factors influencing PC may be different

from those influencing polychronicity. In addition, IT PMs' PC may be a primary factor in their productivity and project success. To explore the influence of PC on IT PMs' productivity and project success, the study included the following potentially secondary factors:

- The polychronicity of the IT PMs;

- The corporate polychronicity of the IT PMs' employers.

This study excluded all other potentially influencing factors by using peer reviewed individual and corporate polychronicity measuring instruments. A description of this instrument, known as the Inventory of Polychronic values (IPV), follows in later sections of this document.

1.3.1   Research Problem Statement

IT PMs as individuals, as well as corporations (specifically IT PM employers) have a measurable polychronicity based on the Inventory of Polychronic Values (IPV) (Bluedorn, Kalliath, Strube & Martin, 1999). In addition, effective communication plays an important role in their daily routine. One has to expect the demands placed on the modern IT PM (i.e. managing multiple projects concurrently while practising effective communication) may lead to the IT PM practising PC. However, while the corporation is demanding higher productivity, the main objective of IT PMs is to deliver successful projects to their stakeholders. This leads one to the question: "What is the influence of PC on the productivity of IT PMs and their ability to deliver projects successfully?" A project is successful if it satisfies the expectations of the project stakeholders (PMBOK, 2008).

Primary Research Questions:

1. *Does the PC of IT PMs have an influence on their productivity?*

2. *Does the PC of IT PMs have an influence on the success of their projects?*

Secondary Research Questions:

1. *Is there a relationship between IT PMs' PC and their polychronicity?*

2. *Is there a relationship between IT PMs' PC and their employers' corporate polychronicity?*

1.3.2 Theoretical Model

Figure 1.2 is a theoretical model developed to help answer the research questions. The model depicts various theoretical constructs with their respective relationships as it pertains to the research problem.

The staff complement of typical IT projects consists out of two distinct groups: the IT PMs and the IT project team members (indicated by IT-Other in the model). Each one of these individuals has a measurable polychronicity based on the IPV (Bluedorn et al., 1999).

This study explored the following relationships as depicted in the theoretical model (R1 to R11):

1. From the IT PMs' perspective, the relationship between IT PMs' PC and their:

    (i) individual polychronicity (R1);

    (ii) productivity (R2);

    (iii) project success (R4).

2. From an IT project team member's perspective, the relationship between IT PMs' PC and their:

    (i)   productivity (R3);

    (ii) project success (R5).

3. A comparison between IT PMs and IT project team members in their ratings of the IT PMs':

    (i)   PC (R6);

    (ii) project success (R7);

    (iii) productivity (R8).

4. From an overall perspective (IT PMs' ratings combined with IT Team members' ratings), the relationship between IT PMs' PC and their:

    (i)   project success (R9);

    (ii) productivity (R10);

    (iii) employers' corporate polychronicity (R11).
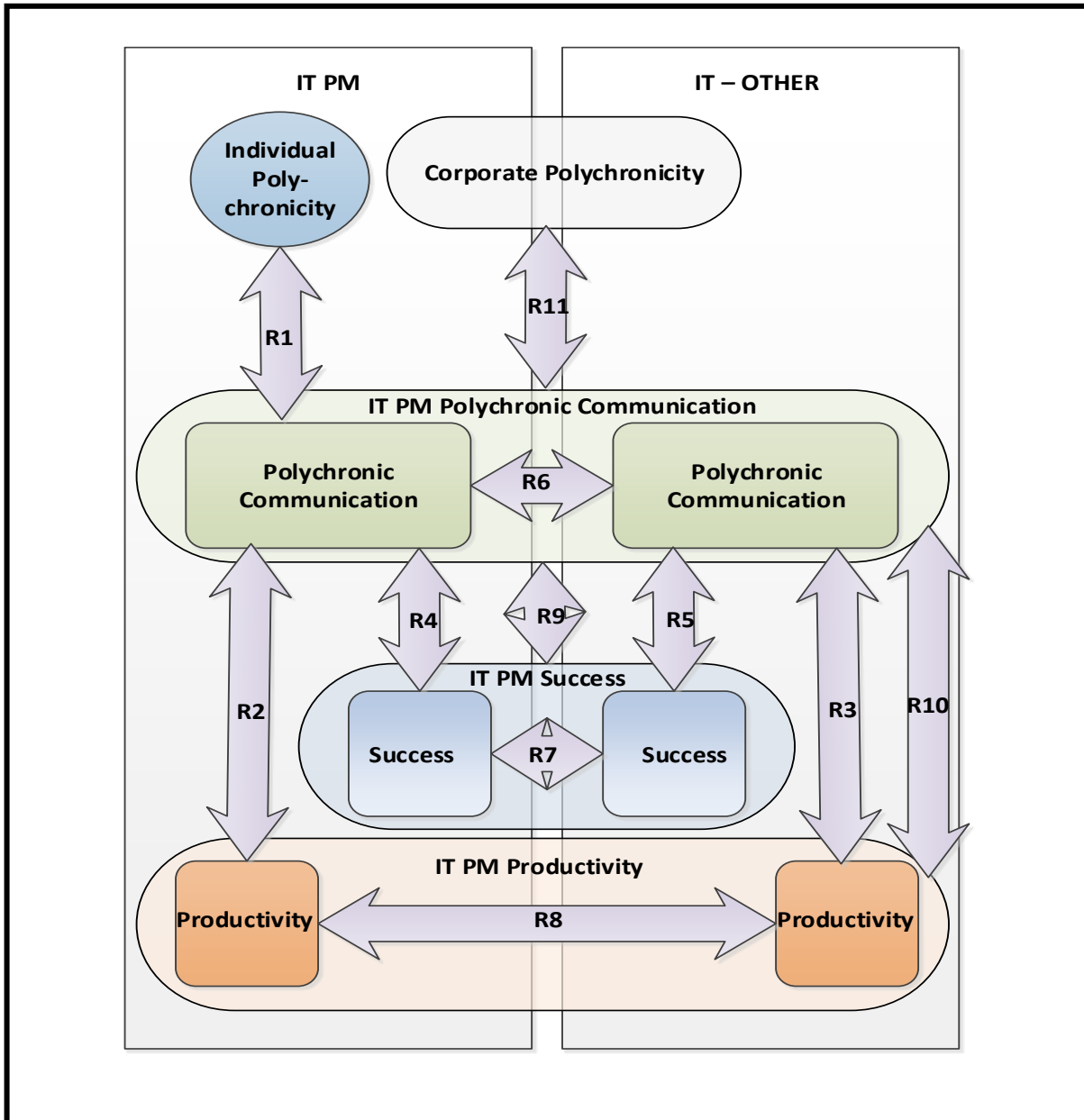
Figure 1.2 Theoretical Model of the Proposed Relationships between the Study Variables
(Source; Own)

1.3.3 Hypotheses

The following hypotheses formed the basis of this study, based on the research questions and the theoretical model:

H1.   There is a relationship (R1) between IT PMs' PC and their polychronicity.

H2.   There is a relationship (R2) between IT PMs' PC and their perception of the influence of PC on their productivity.

H3.   There is a relationship (R3) between how IT project team members perceive IT PMs' PC and their perception of the influence of PC on the PMs' productivity.

H4.   There is a relationship (R4) between IT PMs' PC and their perception of the influence of PC on their project success.

H5.   There is a relationship (R5) between how:

   a.   IT project team members perceive IT PMs' PC and

   b.   Their perception of the influence of IT PMs' PC on their project success.

H6.   There is a significant difference (R6) between how:

   a.   IT PMs as a group rate their PC compared with how

   b.   IT project team members as a group rate the IT PMs' PC.

H7.   There is a significant difference (R7) between how:

   a.   IT PMs as a group rate the influence of PC on their project success compared with how

      b. IT project team members as a group rate the influence of the IT PMs' PC on their project success.

H8.   There is a significant difference (R8) between how:

      a. IT PMs as a group rate the influence of PC on their productivity compared with how

      b. IT project team members as a group rate the influence of the IT PMs' PC on their productivity.

H9.   There is a relationship (R9) between IT PMs' PC and the overall perception of the influence of PC on their project success.

H10. There is a relationship (R10) between IT PMs' PC and the overall perception of the influence of PC on their productivity.

H11. There is a relationship (R11) between IT PMs' PC and the corporate polychronicity of their employers.

1.3.4   Study Limitations and Delimitations

1. This study included only the PC of IT PMs by filtering out the others with a specific question in the data generation instrument (refer to §3.2 and Appendix A). Refer to the definition of IT (§1.4.3) and the definition of PM (§1.4.2).

2. The population sample included only IT PMs and IT project team members.

3. The population sample was selected from the researcher's professional network and colleagues which included IT workers (IT PMs and others) across the world. The participants resided in the following countries: Afghanistan, Argentina, Australia, Belgium, Brazil, Bulgaria, Canada, China, Colombia, Costa Rica, Czech Republic, Denmark, Egypt, France, Germany, Hungary, India, Ireland, Israel, Italy, Japan, Lithuania, Malaysia,

Mexico, Netherlands, New Zealand, Panama, Peru, Poland, Portugal, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, Ukraine, United Kingdom and the United States of America.

4. The study only measured corporate polychronicity, individual polychronicity, project success and IT PM productivity. The study excluded other factors, but not limited to, personality types, communication styles, gender, personality or origin, although the questionnaire asked study participants to provide their country of residence. Other than using peer-reviewed instruments to measure individual and corporate polychronicity, these factors were not explicitly controlled. Certain bias, such as personality type, may be present in the collected data.

5. The IT project team members' rating of IT PMs' PC, project success and productivity may or may not refer to the same IT PM participants.

6. The email solicitation described the study objectives in broad terms to minimise bias.

7. The questionnaire used to collect the data sample was web based. Several respondents contacted the researcher with questions related to authenticity and privacy. Potential respondents may also have felt uncomfortable clicking a link in an email due to these concerns. As a result, the response rate was slightly lower than expected.

8. The questionnaire expired two months after the first email solicitation to the population sample. This period may have been too short for some, especially if they were away from the work environment. However, the period could also have had a negative effect on procrastinators, who would put it off to the last minute and then rush through it or not complete it at all.

9. The communication preferences of individuals, such as preferring email to verbal communication, were out of scope. The assumption is that

individuals select a particular communication channel considered the best for a particular circumstance, based on their own evaluation.

1.3.5   Study Assumptions

1. Assessing the entire population of IT PMs across the world would be a near impossible task. This study assumed the researcher's professional network and associates across many countries was a representative sample because of the wide geographical and industry spread.

2. The study also assumed the respondents to the questionnaire (being part of a large sample), are random in terms of the relevant characteristics, i.e. polychronicity and PC orientation.

1.4.   Key Terminology

This section defines certain key terminology used throughout this dissertation.

1.4.1   Project

The PMBOK defines a project as "a temporary endeavour to create a unique product, service, or result". The term t*emporary* implies that all projects have defined start and end dates. Some projects may be repetitive in nature; e.g., a real estate developer may have a limited number of building plans to choose from, repeating the same design at various sites. In those cases, the product is still unique because the site is different, providing its own challenges in size, slope and soil composition and the like (PMBOK, 2008).

1.4.2   Project Management

To satisfy the project stakeholders, each project must deliver a set of requirements (objectives). The delivery process consists of completing a set of activities according to a planned sequence (e.g. to build a house, the activities include planning, designing and building). A PM manages the project, ensuring

the team completes activities to the stakeholders' satisfaction, while keeping within the predetermined schedule, budget and scope. The PM applies knowledge, tools (e.g. a work breakdown structure), techniques (e.g. the Delphi estimating technique) and skills (e.g. leadership) to keep the project on track (PMBOK, 2008). This facilitation process followed by the project manager is *project management* (Schwalbe, 2010).

1.4.3   Information Technology (IT)

The term IT is all encompassing in that it includes all the technology used in the development, processing and use of information systems. Typical technologies used in IT include but are not limited to databases (e.g. Oracle™), program languages (e.g. Java™), operating systems (e.g. Windows™), networks (e.g. Local Area Networks) and hardware (e.g. servers, routers) (Schwalbe, 2010).

1.4.4   IT Project Management

IT projects need to be managed in similar fashion to regular projects (refer to the definitions of a project, project management and IT). IT project management refers to the practice of specifically managing IT projects (Cadle & Yeates, 2008).

1.4.5   Project Management Body of Knowledge (PMBOK)

The PMBOK is a collection of best practices, processes, norms and methods, combined in a formal standards document. This document is called the PMBOK Guide and its purpose is to *guide* the project manager in applying the tools, skills and techniques to deliver a successful product, service or result. The Project Management Institute (PMI), a professional organisation with project managers as members, publishes the PMBOK Guide (PMBOK, 2008). Practising project managers with a Project Management Professional (PMP) credential issued by the PMI, may contribute to the contents of the PMBOK Guide and perform the editing.

1.4.6   Polychronicity

Hall described polychronicity as a cultural variable, based on the way different global cultures organise everyday activities. A polychronic culture organises and schedules multiple events to occur at the same time, leading to multitasking. In contrast, a monochronic culture schedules events to occur sequentially. Polychronic cultures *believe* that their way is the best way of performing activities and *prefer* involvement in several concurrent activities (Hall, 1983). This cultural definition of polychronicity encompasses three distinct facets:

- The *belief* that polychronicity is the best way to perform tasks;

- The *preferenc*e to behave in a certain way;

- The *behaviour* of practising their beliefs and preferences.

This dissertation discusses polychronicity as a time variable, based on the work of Bluedorn, Kaufman and Lane (1992). As a time variable then, the polychronicity of an individual or organisation varies along a chronicity continuum as depicted in Figure 1.3.
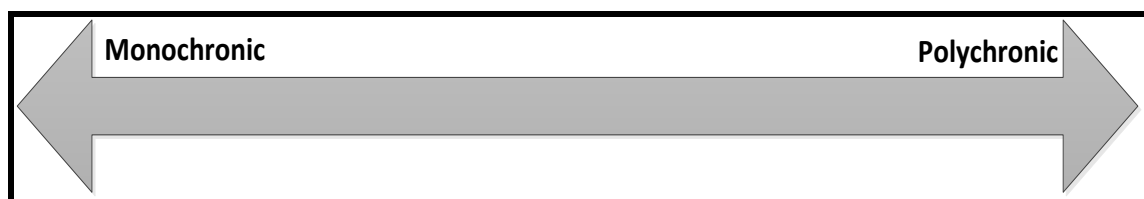
Figure 1.3 Monochronic-Polychronic Continuum (Bluedorn et al., 1992)

1.4.7   Monochronicity

Monochronicity is the opposite of polychronicity, i.e. monochronic cultures schedule events to occur sequentially instead of concurrently. A monochronic person completes one task before starting another and is controlled *by their schedules*, instead of being *in control of their schedules* (Hall, 1983).

However, based on the chronicity continuum, an individual, a corporation or a culture can vary on this continuum depending on the particular circumstances (Bluedorn et al., 1992).

1.4.8   Polychronic Communication

Drawn from the definition of polychronicity, Polychronic Communication (PC) has the following three facets:

- The *behaviour* of engaging in multiple conversations concurrently;

- The *preference* to behave this way;

- The *belief* PC is the best way to communicate.

Figure 1.4 displays an example of PC, showing an employee of a company conversing with a client as well as a co-worker simultaneously.
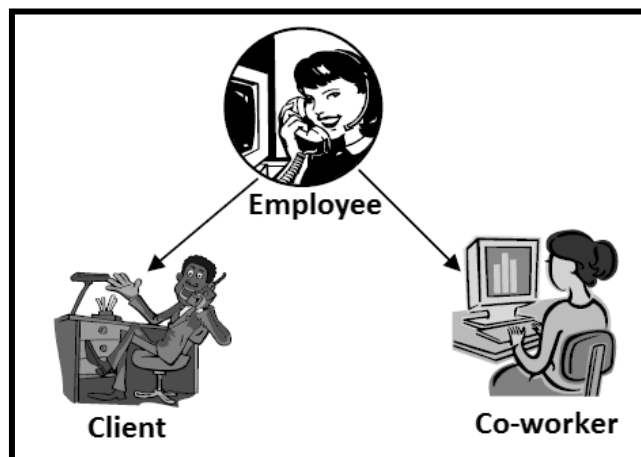
Figure 1.4 Polychronic Communication (Mills, 2003)

1.4.9   Polychronic Attitude Index

The Polychronic Attitude Index (PAI) is a scale developed by Kaufman, Lane & Lindquis (1991) to measure an individual's orientation towards polychronicity. The scale scored 0.6802 on Cronbach's alpha; an indicator of the reliability of a scale

that varies between 0 and +1. According to Nunnally (1978), a score of 0.68 is too low for basic research.

Table 1.1 lists the statements that make up the PAI. The preferred method used to administer the test is usually a questionnaire format on a five-point Likert-type scale. A value is calculated for each question using a codebook that assigns a numeric value to each choice (e.g. Strongly Agree = 1, Strongly Disagree = 5, etc.) Items 1, 2 and 3 are reverse scored (e.g. Strongly Agree = 5 instead of 1, etc.). The values are summed to provide a PAI score, ranging from 5 to 20. Higher scores suggest a greater tendency towards polychronicity and lower scores a greater tendency towards monochronicity.

Table 1.1 Polychronic Attitude Index

1.	I do not like to juggle several activities at the same time.
2.	People should not try to do many things at once.
3.	When I sit down at my desk, I work on one project at a time.
4.	I am comfortable doing several things at the same time.
	(Kaufman et al., 1991)

1.4.10 Inventory of Polychronic Values

Because of the insufficient reliability of the PAI for basic research (see above), Bluedorn, et al. (1999) set out to develop a more reliable scale to measure the polychronicity of an individual or a corporation. Their research resulted in the 10-item Inventory of Polychronic Values (IPV). The IPV consistently scored in the 0.80 range on Cronbach's alpha. The IPV questions are in Table 1.2 .Several items are reversed scored (shown with an "R" at the end). Higher scores suggest a greater tendency towards polychronicity and lower scores a greater tendency towards monochronicity.

Bluedorn, et al. (1999) provided the following instructions to adapt the scale for measuring the polychronicity of individuals:

1. Replace "We" with "I".

2. Replace "ourselves" with "myself".

Table 1.2 Inventory of Polychronic Values

1	We like to juggle several activities at the same time.
2	We would rather complete an entire project every day than complete parts of several projects (R).
3	We believe that we should try to do many things at once.
4	When we work by ourselves, we usually work on one project at a time (R).
5	We prefer to do one thing at a time (R).
6	We believe that we do our best work when we have many tasks to complete.
7	We believe it's best to complete one task before beginning another (R).
8	We believe it is best for us to be given several tasks and assignments to perform.
9	We seldom like to work on more than a single task or assignment at the same time (R).
10	We would rather complete parts of several projects every day than complete an entire project.
	(Bluedorn et al., 1999)

1.5. Outline of the Study

Olivier (2007) provided an adaptation of the rational problem-solving process for conducting and reporting research in his book *Information Technology Research.* He proposed a process that consists out of various phases; noting that in practice, the process does not necessarily follow the proposed sequence. A further adaptation of the process as described by Olivier formed the basis of this study. Figure 1.5 depicts this adapted process.
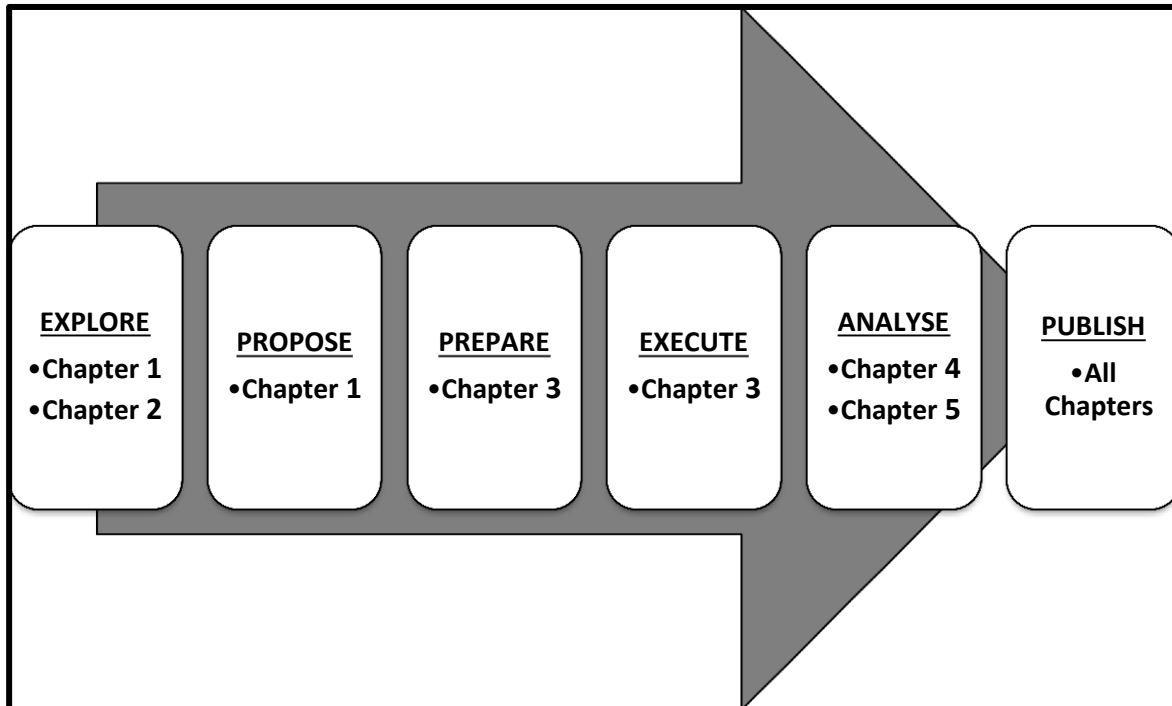
Figure 1.5 Rational Problem-Solving Process (Olivier, 2007)

Explore

The exploration phase identified a specific research topic and formulated the research questions. This phase also included a preliminary literature review. Chapter 1 of this dissertation documented the exploration phase, with a thorough review of the relevant literature in Chapter 2.

Propose

The propose phase culminated in a written proposal of the research topic, the research questions and a justification for performing the research. Moreover, the proposal contained forward-looking statements – essentially laying out the path to address the research problem. Chapter 1 of this dissertation detailed the research problem and the rationale for selecting the topic.

Prepare

In the preparation phase, a detailed protocol was prepared that described how the research problem would be solved. Chapter 3 documents the research methodology and design.

Execute

During the execute phase, the research methods described in the *Prepare* phase were executed. Chapter 3 describes the execution of the data collection instrument (questionnaire). The questionnaire is included in Appendix A.

Analyse

The analysis phase was in reality part of the execution phase. It refers to analysing the data collected via the various instruments. Chapter 4 presents a write-up of the data analysis methods. Chapter 5 discusses the conclusions of the analysis.

Publish

This document, namely this dissertation, presents the published research methodology, results, research instruments, questionnaire and the cleaned dataset.

1.6.   Summary

Chapter 1 introduced the research problem. It discussed the study background, motivation, hypotheses, assumptions, limitations and key terminology. It included an outline of the document and an explanation of the research methodology and various chapters.

Chapter 2 will explore the existing literature on the research topic.

Chapter 2:   Literature Review

2.1.   Introduction

Chapter 1 introduced the research topic and presented a high-level outline of the research. Chapter 2 covers the literature review and represents the '**Explore'** phase of the research, as depicted in Figure 1.5.
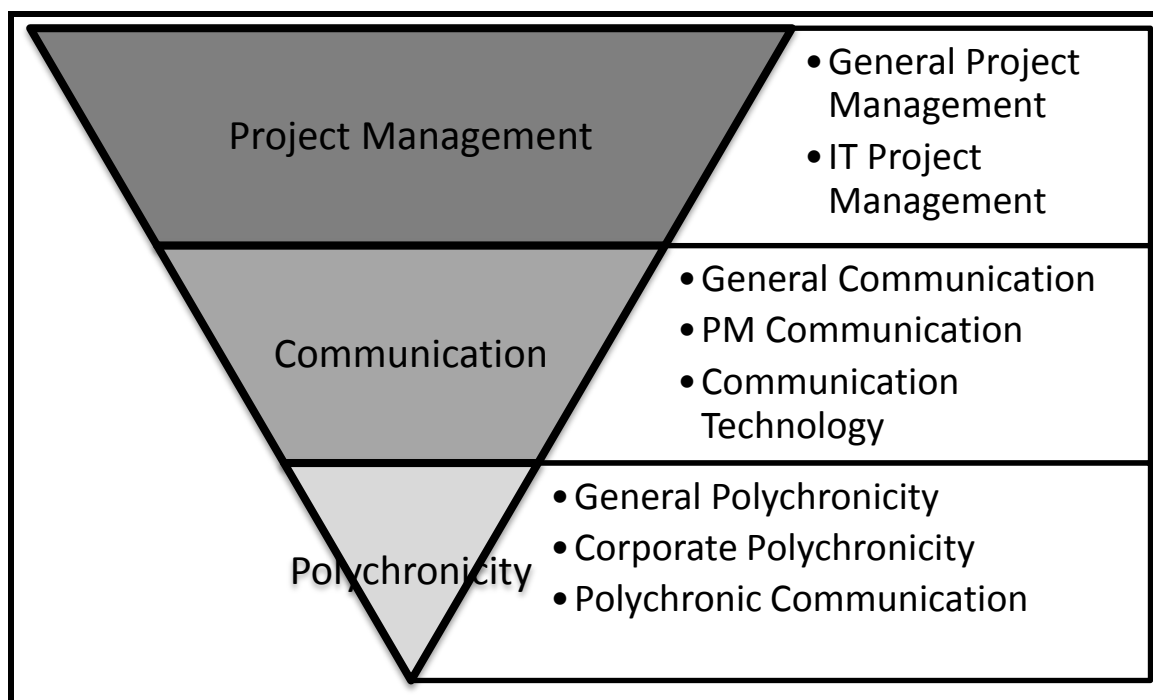
Figure 2.1 Literature Review Model (Source; Own)

The literature review presentation follows an inverted pyramid model as depicted in Figure 2.1. The model starts from a broad base of project management, which includes a contrast between General Project Management and IT Project Management. The General Project Management topic includes a discussion on project success and PM productivity.

§2.3 starts with a broad discussion on communication, and then expands further by providing detail on PM communication and communication technology. This

section unequivocally shows communication is an important skill for all types of PMs.

The topic of PC follows the discussion on communication. §2.4 starts by discussing general polychronicity, then corporate polychronicity followed by PC. This section shows PC as a subset of general communication.

The chapter ends with a summary (§2.5) relating the preceding research material to the research problem.

2.2. Project Management

The discipline of Project Management encompasses the planning, coordination and controlling of resources to meet specific organisation goals. This section discusses Project Management from the perspectives of General Project Management and IT Project Management.

2.2.1 General Project Management

Background and Definitions

§1.4.1 defines a project as an 'endeavour to create a unique product, service or result within a specified period'; meaning the project has a definite start and finish. By contrast, operations are the processes necessary to sustain a business, also known as *keep the lights on* activities or the "bread-and-butter" of a business (Schwalbe, 2010; PMBOK, 2008).

The PMBOK (2008) defines a PM as the person accountable for achieving the project objectives. The PM answers to project stakeholders when the project objectives are at risk or not met. The PM also takes ownership of the project tasks and is accountable for project success. In addition, to be successful, the PM must possess knowledge about project management; know how to apply the knowledge and must have certain personality traits, such as leadership abilities.

The PM will use tools and techniques specific to project management in this role (PMBOK, 2008).

Project Success

There are several ways to define project success. However, the following three criteria are common (Schwalbe, 2010):

1. The project completed within the agreed upon budget, schedule and scope. This infers the PM needs to balance a project's scope, time and cost, referred to as the *triple constraints*. Scope management, time management and cost management are three of the nine Knowledge Areas discussed in individual chapters of the PMBOK; underscoring their importance.

2. The project's customer or sponsor is satisfied with the project deliverables.

3. The project's main objective was met.

Scope Management

A project's scope definition details all inclusions and exclusions, i.e. it lists the items (deliverables) included in the project as well as the items excluded. This creates a project boundary with inclusions inside and exclusions outside. However, project scope may change throughout the project life cycle and therefore needs careful management (Schwalbe, 2010; PMBOK, 2008; Wysocki, 2009).

The PMBOK (2008) describes the following scope management processes:

1. **Plan scope management:** Create a scope management plan to document project scope definition, validation, and control.

2. **Collect requirements:** Collect, document and validate project stakeholder needs.

3. **Define scope:** Develop a detailed description of the project inclusions and exclusions.

4. **Create Work Breakdown Structure:** Develop smaller, more manageable work components; subdividing the project scope.

5. **Validate scope:** Validate the final deliverables against the defined project scope.

6. **Control scope:** The PM follows a formal change control process to evaluate and document project scope changes.

It is important to measure completing the project scope against the project management plan. If the project objective is product delivery, then the measurement is against the product scope requirements (PMBOK, 2008).

Time Management

Time management starts with the development of a project schedule, using as input the work breakdown structure. The PMBOK (2008) mapped the time management knowledge area to the planning, and the monitoring and controlling processing groups. Project time management are all the processes needed to facilitate timely project completion. The processes are (PMBOK, 2008):

1. **Plan schedule management:** Create a schedule management plan to document the definition, validation, and control of the project schedule.

2. **Define activities:** Create an activity list of the actions needed to produce the project deliverables, the activity attributes and a project milestone list. A project milestone is defined as a significant event in the project life cycle.

3. **Sequence activities:** Determine and document the dependencies of the project activities.

4. **Estimate activity resources:** Estimate all the resources needed to complete the project, including human resources and materials.

5. **Estimate activity durations**: Determine, with the use of estimation tools and techniques, the expected duration of each activity.

6. **Develop schedule**: Develop a detailed schedule of work packets, resources, dependencies, durations and timings of all the project activities. The process also considers all project constraints.

7. **Control schedule**: The PM follows a formal change control process to evaluate and document project schedule changes. The current status of each project activity is measured against the project schedule.

Cost Management

Project cost management are the processes related to planning, defining, managing and controlling the project budget. The following processes are included (PMBOK, 2008):

1. **Plan cost management:** Create a cost management plan to document the planning, validation, expending, and control of the project costs.

2. **Estimate costs:** Determine, with the use of estimation tools and techniques, the expected cost of each identified project resource.

3. **Determine budget:** Aggregate all the project costs into one project budget.

4. **Control costs:** The PM follows a formal change control process to evaluate and document project cost changes. The current project expenditure is measured against the approved project budget.

Balancing the Triple Constraints

Any changes to one constraint may affect other constraints. Each constraint, if not properly managed, may affect the quality of the project (Figure 2.2). The PM balances constraints by considering the importance of each. If for example, meeting a time constraint is more important, the PM may decide to decrease the project scope by reducing features. Another alternative is to increase the cost by having teams work overtime. Both alternatives may result in the project meeting the timeline and keeping the stakeholders satisfied. The project type also plays a role in decision-making. For example, if the project scope is placing a team of astronauts on Mars, then it does not make sense to reduce the scope (or cost) and place astronauts on the Moon instead (Schwalbe, 2010; PMBOK, 2008).
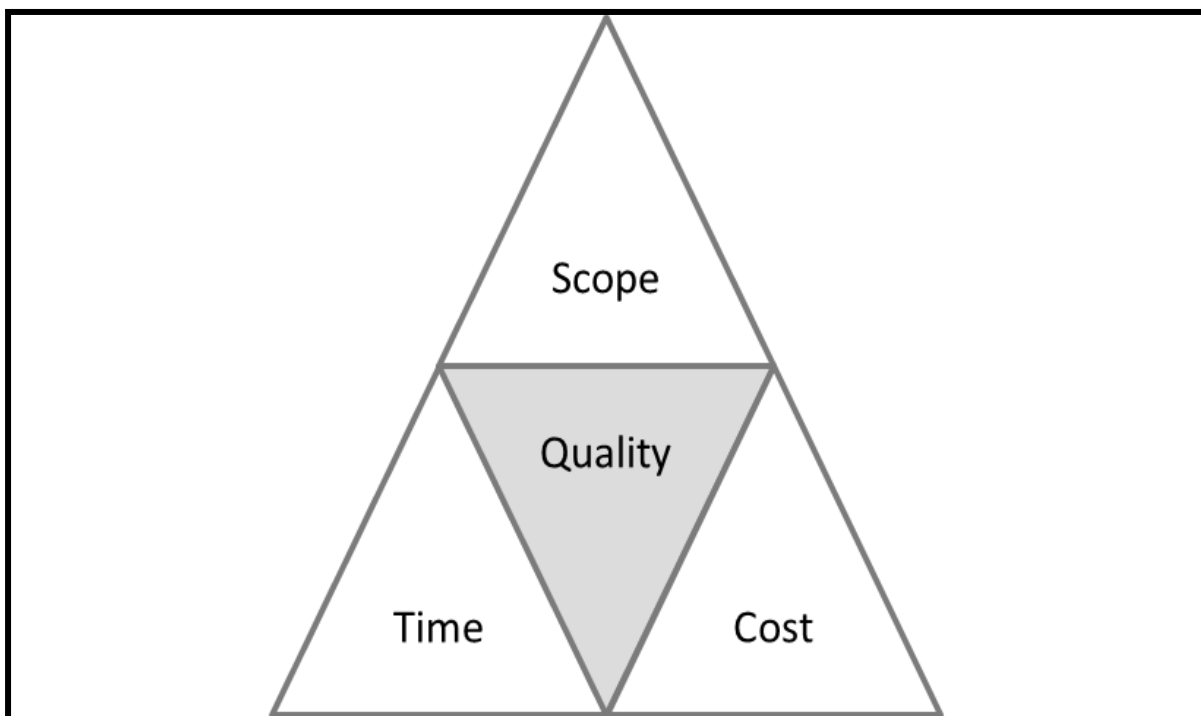
Figure 2.2 PM Triple Constraint Model (Source; Own)

In practice, the PM will usually not decide on a course of action unilaterally. Instead, he or she will present all alternatives with the risks, costs and recommended action to the project stakeholders. Once the project stakeholders

agree on a particular course of action, the PM will follow the organisation's project management methodology to execute the decision. This may involve preparing a project change request (PCR) document; which needs approval before implementing remedial actions. In the Mars mission project for example, a fixed budget combined with a budget-overrun forecast, may prompt the PM to seek approval for cost reduction by either reducing the payload or the astronaut team size. Mission quality however could be at risk because a smaller team may lack critical skills and a smaller payload may lack essential equipment.

The project sponsor or other stakeholders typically define the success criteria for each individual project, which may include Key Performance Indicators (KPIs).

Key Performance Indicators (KPIs)

Parmenter (2010) discussed KPIs from a corporate perspective. He provided seven characteristics of KPIs, gathered from thousands of workshops in different organisations across the world. These characteristics (adapted to apply at the project level) are (Parmenter, 2010):

1. The measurement must be in nonfinancial terms. The author argued that any financial tie to a KPI turns it into a result indicator. For example, a daily measure of money spent on project resources tracks activities that were in the past (a result of a particular action). By contrast, a KPI is a current or future oriented measurement.

2. Measurements must be taken frequently, e.g. daily. The argument is that a less frequent (e.g. monthly) measurement cannot be key to your project success.

3. The KPIs must be acted on by senior management; it therefore requires the IT PM's continuous attention.

4. Each KPI must clearly define the action required by project staff.

5. The measure must relate to a particular team or group.

6. The measure must have a significant impact to the project.

7. They must encourage actions that have a positive influence on the project. The author recommends testing KPIs to ensure a positive result.
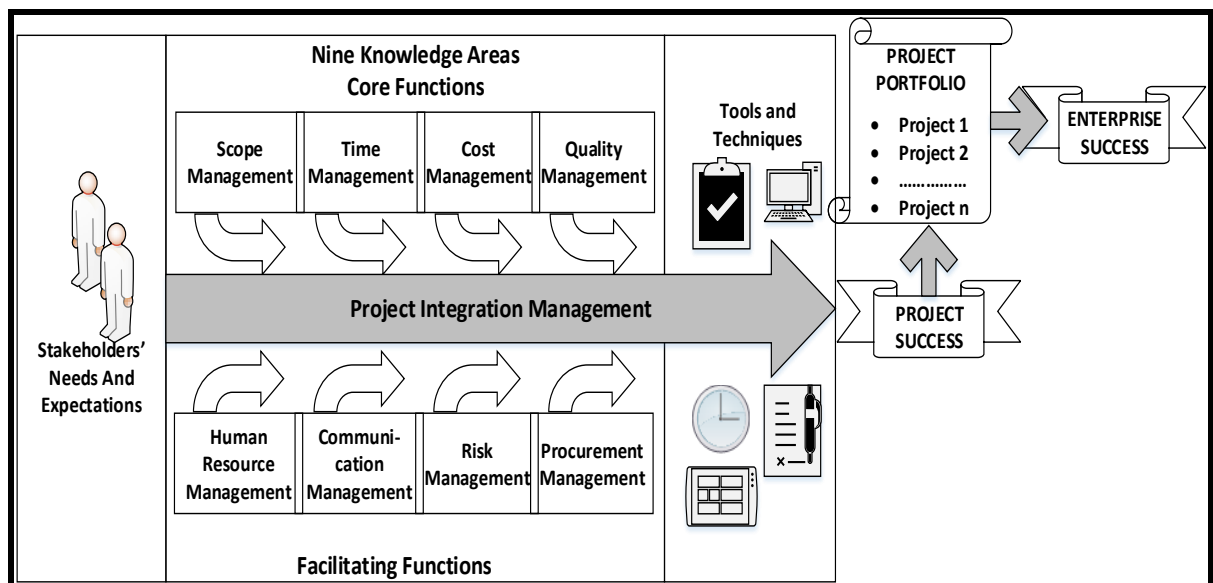
Figure 2.3 Knowledge Areas in the PM Framework (Schwalbe, 2010)

Figure 2.3 shows the nine Knowledge Areas in the project management framework (Schwalbe, 2010; PMBOK, 2008). The figure shows that applying project management tools and techniques to manage these knowledge areas may increase the likelihood of project success; measured by satisfying the project stakeholders' needs and expectations. It is evident from both the triple constraint model and the project management framework that time management is an important factor for any PM when deciding on trade-offs to achieve project success. In addition, the chronicity continuum as depicted in Figure 1.3 is an important factor in project success (Bluedorn et al., 1992). On the chronicity continuum, polychronicity and monochronicity are time constructs and are on two opposite ends with degrees of variation between (Hall, 1983; Bluedorn et al., 1992)

PM Productivity

Manual worker productivity has been easy to calculate, since it is usually based on throughput (Drucker, 1999). For example, if a factory worker assembles ten widgets in a day, then that is his or her productivity. It follows that another worker producing twelve of the same widgets in a day is more productive. This simple formula does however not apply to a knowledge worker (Drucker, 1999; Thomas & Baron, 1994). A knowledge worker is defined as 'a person who works exclusively with information; a person who works in an information industry' (www.dictionary.com, retrieved July 26, 2014). Knowledge work has also been defined by Evans & Lyndsay (1993) as the work involved in analysing information, generating ideas and teaching others using specialised expertise.

Since knowledge workers generally do not produce widgets at a certain rate, have fixed tasks, or follow a fixed method to perform a task, it is difficult to measure their productivity (Drucker, 1999; Evans & Lyndsay, 1993; Thomas & Baron, 1994). One may argue that a PM generally follows a project management methodology (e.g. PRINCE2), which is a set of processes guiding the PM to facilitate the successful completion of a project. However, a project management methodology is not 'intended to be a step-by-step recipe or cookbook for managing a project' (Project Management Overview, 1997). The PM also applies knowledge, tools, techniques and skills (§1.4.2) to manage projects. A PM, and by extension an IT PM, is therefore clearly a knowledge worker.

According to Drucker (1999), six factors determine knowledge worker productivity:

1. The tasks which the knowledge workers need to perform must be defined by themselves.

2. Knowledge workers need autonomy.

3. They need to be responsible for continuous innovation.

4. The knowledge worker needs to learn and teach others continuously.

5. The knowledge worker's output quality is of primary importance.

6. The knowledge worker should be regarded as an asset to the organisation, instead of a cost.

Other researchers have defined conceptual models of knowledge worker productivity as well as varied measurement methodologies. Ramírez & Nembhard (2004) discussed about 60 years of literature related to methodologies and conceptual models to assess knowledge worker productivity. The authors summarised their research using the following dimensions in the order of frequency of use: Quantity; Cost and/or Profitability; Timeliness; Autonomy; Efficiency; Quality; Effectiveness; Customer Satisfaction; Innovation/Creativity; Project Success; Responsibility/Importance of Work; Knowledge Workers' Perception of Productivity; and Absenteeism. They conclude that in general the methodologies used two to three of these dimensions to describe knowledge worker productivity (Ramírez & Nembhard, 2004).

This research study focused on IT PMs' perception of their productivity.

2.2.2   IT Project Management

The term IT is all encompassing in that it includes all the technology used in the development, processing and use of information systems (Merriam Webster, 1996).

Based on the definitions of a project and IT, an IT project is therefore an endeavour to create a unique product (e.g. word processor), service (e.g. telecommunication service) or result (e.g. election result) in the IT domain within a certain period. An IT PM is the person assigned to be accountable for achieving the objectives of an IT project. The IT PM is responsible for all the tasks needed to deliver a successful IT product, service or result. Common examples of IT projects are software projects (the product is a software system) and projects that

deliver new infrastructure (e.g. a server farm). Other IT projects may involve software, hardware **and** business processes.

The principles of IT project management are similar to that of general project management, but also include some unique characteristics and inherent difficulties. In software projects for example, the IT PM has to deal with the intangibility of software. In addition, in contrast to construction projects with a set of blueprints providing a clear understanding of the requirements, software project requirements tend to be ambiguous. The IT PM therefore needs to revisit the project requirements with stakeholders throughout the lifetime of the project. This requires greater flexibility and communication skills from an IT PM (Cadle & Yeates, 2008).

§2.3 starts with background on general communication, then explains project management communication including the similarities and differences with general communication. The section ends with explaining a selection of communication technologies typically used by IT PMs.

2.3.   Communication

Communications Management is one of the nine Knowledge Areas in the project management framework (Figure 2.3). This underscores the importance of excellent communication skills for any project manager.

2.3.1   General Communication

Communication is a system or process used to exchange information among parties. The system employs various symbols (e.g. written communication), signs (e.g. written communication, video, sign and body language) and audio (e.g. speech and radio). Effective communication is clear and unambiguous. Different technologies transmit the communication from the originator to the audience (e.g. print, telephone and fax) (Eunson, 2007; Dow & Taylor, 2008).

C*onversation,* however, differs from *communication.* A conversation is a verbal exchange of information among two or more parties and a subset of communication (Dow & Taylor, 2008). A successful conversation does not need to be between humans. Human-computer conversations take place when humans respond to voice prompts from a computer system and vice versa. The computer system interprets the responses and takes appropriate actions. The telephonic voice response systems of many corporations, such as banks and airline enquiry systems are example systems that enable human-computer conversations.
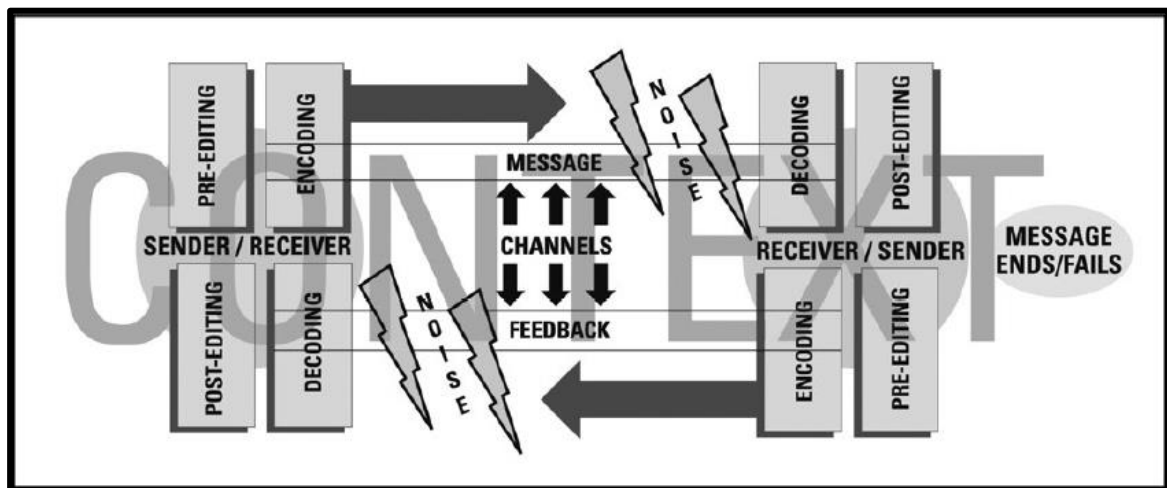
Figure 2.4 Communication Model (Eunson, 2007)

Figure 2.4 depicts a general communication model. The model shows various components: context, sender, receiver, encoding, decoding, pre-editing, post-editing, channels and noise. In addition, the model shows that every communication system has two parties involved: a sender and a receiver. The sender and receiver could be a group of people (or machines) or a single person (or machine). As the communication progresses, the role of sender and receiver may reverse multiple times. A *message* is the communication piece leaving the sender while *feedback* is the response (Eunson, 2007; Dow & Taylor, 2008).

Every message is encoded (in speech, the spoken language is the coding system, e.g. UK English). The receiver must know the key to decrypt the message (in speech, this means having the grammar knowledge and vocabulary of the

spoken language). In human communication, the tone, inflection and pitch of the voice; the cultural and social context; and body language of the communicator hide the encoding. In non-human communication, secret codes or security software encodes the message (Eunson, 2007).

Pre-editing of a message can take place in various ways. Politicians and the media often employ contextomy or self-censorship to convey their message. Contextomy refers to the removal of message context to promote a particular stance or a more favourable result. A politician may say for example "I fully support the use of deadly force by soldiers in combat", but rival politicians and the media may then quote them as "I fully support the use of deadly force". The latter clearly includes murder. The same groups also employ cognitive and social dissonance effectively for the same reasons as above (Eunson, 2007). The United States government for example provided *evidence* of weapons of mass destruction (WMDs) to justify invading Iraq. However, when they could not find WMDs, the politicians used social dissonance by characterising Saddam Hussein as an abuser of human rights (Wedgwood, 2003; Goldstone, 2003; Powell & Koltz, 2012).

Message noise refers to any barrier to or distortion of the communication. Static on a phone line, a hearing impairment, or contradicting body language (e.g. a person directs you verbally to go left, put points to the right) are all examples of message noise (Eunson, 2007; Dow & Taylor, 2008).

Message channels refer to the transportation mode for the message. Examples of message channels are video, formal meetings, email, etc. Another term used for message channels is *channels of communication* (Eunson, 2007; Dow & Taylor, 2008).

2.3.2   Project Management Communication

§2.1.1 discussed the relationship between the Project Management Knowledge Areas and project success (Figure 2.3). Project Management Communication,

which is one of the nine knowledge areas, encompasses all the processes related to the timely dissemination of project information to stakeholders and project team members. According to the PMBOK guide, project management communication is distinctly different from general communication. However, all the components of general communication (refer to Figure 2.4 and §2.2.1) are present in project management communication. To manage a project successfully, a PM should create a communications plan and carry out all project communications according to the plan. A typical communications plan contains communication requirements, information type, reason for the communication, time frame, frequency, sender(s), receiver(s), resources, communications budget, escalation process, information flow charts and any communication constraints (e.g. technology or government regulations). Project management communication is a more structured form of general communication (PMBOK, 2008).

Project management communication includes communication planning, the timely distribution of relevant project information and metrics, and the management of the recipient's information. The communication can be verbal, written, visual or any combination thereof. The PM must select the best method (e.g. face-to-face meeting, email) and mode of communication (e.g. telephone, internet) depending on the circumstances and other factors. If a communication plan was setup at the start of the project, then the PM can usually follow the plan to select the proper communication channel (video conferencing, mobile technology, electronic bulletin boards), method and media (e.g. printed paper, webcast) (Dow & Taylor, 2008).

2.3.3   Communication Technology

Eunson (2007) distinguished between communication (singular) and communications (plural). He explained that communication refers to human interaction (verbal or non-verbal) or "the study of the transfer of meaning". Communications refer to "the physics and mechanics of telecommunications systems", e.g. telephones and the internet, or "the study of the transfer of data".

The following sections provide background information on some of the most ubiquitous communication technologies used by IT PMs in the workplace.

Instant Messaging

Instant messaging is available from many suppliers under different names, e.g. Yahoo! Messenger™, Windows Live ™ Messenger, Microsoft® Lync™, Lotus Sametime™ and mobile applications such as WhatsApp™. The basic principle is to provide a near-synchronous computer-based communication service. Instant messaging users type messages in a window and can select the intended recipient from a prepopulated list of contacts. Modern instant messaging systems also display the availability of people on your contact list. In addition, instant messaging systems integration into an email management system such as Microsoft® Outlook™ is possible in the corporate environment. Such integration provides presence information based on a person's Outlook Calendar and Out of Office settings. Most systems also provide status information such as "Active", "Inactive" as well as status duration. Although standard features vary widely among instant messaging systems, they include the ability to save messages to the user's desktop and organise them into folders. The features may also include the ability to initiate or receive phone calls (phone numbers are obtainable automatically from the recipient's Outlook profile). The recipient may choose to read the message and reply immediately or later (Withee & Reed, 2012; Kroenke & Nilson, 2011; Hardison, Byrd, Wood, Speed, Martin, Livingston, Moore, & Kristiansen, 2010).

Tables 2.1, 2.2 and 2.3 show a list of the communication features available on the various versions of Yahoo! Messenger™, grouped by function (communication, productivity, and fun and personalisation).

Table 2.1 Yahoo! Messenger Communication Features

WIN	Mac	iPhone	Web	Communication Features
✓	✓	✓	✓	**Instant Messaging**: Send text messages in real-time to your friends on Yahoo! Messenger.
✓		✓		**Photo Sharing:** Share photos from your desktop or Flickr, then discuss them over instant messaging while you and a friend view them together.
✓	✓	✓	✓	**PC-to-PC Calls:** Make a voice call to another Yahoo! Messenger user for free (microphone and speakers or headset required).
✓	✓			**SMS (Text Messaging)**: Send text messages from Messenger to your friends mobile phones for free.
✓	✓			**Webcam:** Plug in your webcam to share live video with your friends on Yahoo! Messenger.
✓	✓			**IM Conferencing:** Instant message with many friends at once in a conference room (includes voice capabilities, where available).
✓	✓		✓	**IM with Friends on Other Networks**: IM with friends who use Windows Live™ Messenger, Reuters Messaging, and Lotus Sametime — right from Yahoo! Messenger.
✓	✓			**File Transfer**: Send files instantly to a friend while you IM (2 GB limit).
				Obtained from http://messenger.yahoo.com/features/ on Feb 21, 2013

Table 2.2 Yahoo! Messenger Productivity Features

WIN	Mac	iPhone	Web	Productivity Features
✓	✓			**IM Forwarding to Mobile**: When you sign out of Messenger, have new IMs sent to your phone as text messages.
✓	✓	✓	✓	**Contact Search Bar:** Quickly find a contact to IM, call, SMS or more.
✓			✓	**Yahoo! Search:** Start a web search right from your Yahoo! Messenger window.
✓				**Yahoo! Address Book:** View and edit your Yahoo! Address Book information for your contacts right from Messenger.
✓	✓	✓	✓	**Stealth and Privacy Settings:** Make yourself appear online to some friends, and offline to others.
✓	✓			**Call Forwarding:** Have incoming calls to Messenger forwarded to another phone number, even if you are signed out (Phone Out account required).
✓	✓			**Yahoo! Mail alerts:** Get notified when new a new Yahoo! Mail message arrives.
✓	✓			**Voicemail:** When friends call you on Yahoo! Messenger, they can leave you a voicemail if you're unavailable.
✓	✓		✓	**Message Archiving:** Maintain a private archive of your IM conversations.
✓	✓		✓	**Tabbed IM Windows:** Reduce desktop clutter by organizing multiple conversations into a single window.
✓	✓			**Buzz Alert:** Get your friend's attention with a click of the Buzz button.
✓				**Yahoo! Updates:** Get real-time updates in Yahoo! Messenger about what your friends are posting online, reviewing and generally buzzing about
Obtained from http://messenger.yahoo.com/features/ on Feb 21, 2013				

Table 2.3 Yahoo! Messenger Fun & Personalisation Features

WIN	Mac	iPhone	Web	Fun & Personalisation Features
✓				**Plug-ins**: Add content, services and games to Messenger that you can enjoy on your own, or with friends while you IM.
✓				**Audibles:** Send an animated, talking character to a friend to liven up your IM conversation.
✓	✓	✓	✓	**Emoticons**: Express your feelings with these animated, smiling faces.
✓	✓		✓	**Avatars**: Represent yourself with a stylised, graphic image where you can choose the hair, clothing and more.
✓	✓		✓	**Display Images:** Display an image to represent yourself to your friends.
✓				**Skins:** Choose a different skin to give your IM world a new look.
✓				**IMVironments:** Liven things up with interactive, themed backgrounds in the IM window.
✓				**Yahoo! Games:** Play a game of pool, backgammon, checkers and more with a friend while you IM.
✓	✓	✓	✓	**Custom Status Messages:** Tell your friends what you are doing, seeing or feeling by customising your online status message.
✓				**Custom Ringtones:** Assign ringtones to different callers, or upload your own audio files to use.
✓	✓		✓	**Customisable Fonts & Colours:** IM with a font, colour and style that suits your personality.
✓				**Sound Effects & Soundtrack (During Voice Calls):** Throw a sound effect in while you are on a call or upload a music file to play as a soundtrack in the background.
				Obtained from http://messenger.yahoo.com/features/ on Feb 21, 2013

In a corporate environment, instant messaging use is more casual in nature than email. For example, users will communicate by using acronyms now commonly used in cellular phone texting, e.g. "CU" for "see you" as well as emoticons (smiley faces, etc.). Instant messaging is also central to the support of quick

question or answer communication. Examples are obtaining a colleague's availability for perhaps a meeting or phone call and obtaining clarifications on system requirements or verbiage in an email. The biggest advantage of instant messaging over email and telephone conversations is the *immediacy* factor. Email replies can take hours or sometimes even days or weeks. Phone calls often go unanswered because the recipient is out of office or unavailable. Instant messaging provides the ability for the recipient to reply immediately even if busy on a phone call or another activity (Nardi, Whittaker & Bradner, 2000).

Corporations evaluate new and emerging technologies regularly to increase collaboration and at the same time decrease the cost of communication. However, technologies such as instant messaging can also introduce unintended effects. Cameron & Webster (2005) conducted research on the use of instant messaging in organisations by interviewing employees. They concluded that although the employees perceive instant messaging as an interruptive technology, they use it in a polychronic fashion as an extra communication channel. There is also empirical evidence presented by Li & Gupta (2009) that "the frequency and social network characteristic of IM interruptions could interact with an individual's polychronic orientation".

This literature review did not find any research that explored the influence of instant messaging on the productivity of IT PMs, especially when used with other channels of communication in a polychronic fashion.

Virtual Meetings (VMs)

A VM is a gathering of geographically dispersed people to discuss a topic, using software and perhaps other technologies such as a telephone. The meeting participants can be nearby, such as adjacent offices, or on different continents. The software may include audio and video capabilities. The software capabilities may be able to display a user's desktop to share documents, presentations or other relevant material. In addition, a telephone may provide the audio feed while

a webcam provide the video feed (Spielman & Winfeld, 2003; Coleman & Levine, 2008).

There are various software offerings available to facilitate VMs. These offerings include, but are not limited to GoTo Meeting™, HP Virtual Room and Cisco™ WebEx™.

Figure 2.5 is an annotated screenshot of the Cisco WebEx VM software.

In general, VM software includes:

- a window in which you can share your computer desktop or an individual application;

- a window that shows a list of the participants; most software offerings also dynamically highlight the person speaking;

- a chat window, which provides either private one-on-one conversations or group conversations;

- the ability to upload any files that are relevant to your meeting;

- the ability to change presenters;

- sketch tools to highlight parts of the shared material;

- the ability to automatically call back a meeting participant upon first joining;

- the ability to record the proceedings;

- platform independency (i.e. participants can use different computer operating systems, e.g. Windows, Linux or Mac).

VMs are commonplace in the corporate race to increase productivity and collaboration as well as share more information as efficiently as possible among as many employees as possible. VMs have led to huge cost savings (travel,

conference facilities, etc.) for corporations. They have however increased anonymity and privacy for participants. Organisers schedule meetings irrespective of the number of participants, their geographical location, or physical facilities and equipment[1]. The software usually show participants' time zone allowing organisers to schedule meetings at a reasonable hour. Service providers usually provide the software needed for such VM services free (Spielman & Winfeld, 2003; Coleman & Levine, 2008; "Getting Started Guide: Cisco WebEx Meetings", 2014; "Create a Collaborative and Productive Web Meeting Experience", 2012).
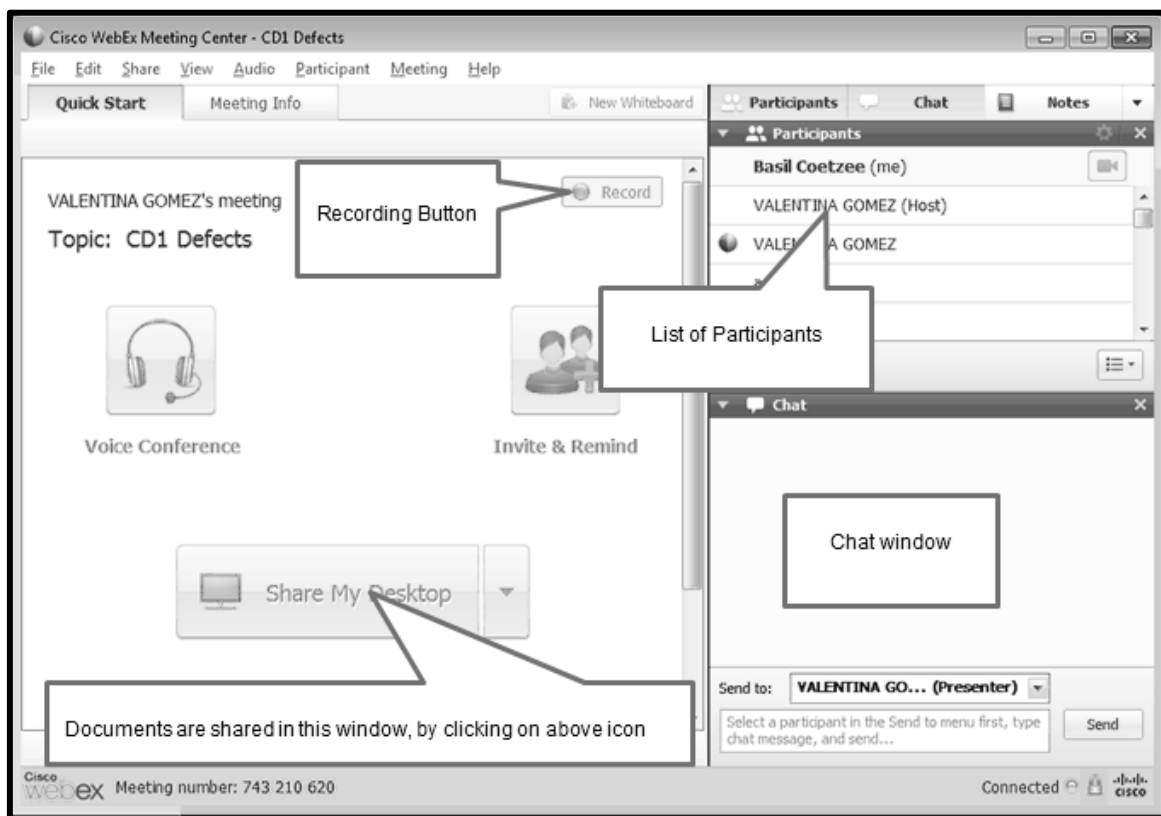
Figure 2.5 Cisco WebEx Screenshot

In a study conducted by the University of North Texas to compare face-to-face meetings and VMs, Lehman makes a distinction between virtual spaces and physical spaces. Lehman notes that a particular challenge of VMs is that participants' physical space distractions frequently overwhelm them. This may

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[1] There are some prerequisites for equipment, such as computers connected to a high speed internet service.

include co-workers showing up to ask questions, email interruptions and IM interruptions (Lehmann, 2003).

Email

Email is a technology used to send a message in a digital format to multiple recipients. Email communication is asynchronous whereas instant messaging is synchronous. Additionally, the format is digital, distinguishing it from conventional mail.

A 1982 study supported by the United States Congress determined that email in combination with the internet is a serious competitor for conventional mail. This is true not only for conventional mail, but for payment systems as well (consider the large number of payments conducted with PayPal™[2]). The study included suggestions for the United States Postal Services (USPS) to provide electronic delivery, at least in geographical areas where the expected service levels were difficult to maintain (Congress of the United States, 1982).

A more recent study conducted by the United States Congressional Research Service (Kosar, 2010), discussed the financial position of the USPS. The study attributed the financial woes of the USPS, among other factors, to the decline in conventional mail handled by the agency.

IT PMs use email extensively for everyday communication with peers, customers, team members and other project stakeholders. In addition, the nature of email lends itself perfectly to PC.

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[2] From www.PayPal-Media.com/About (obtained June 6, 2011): "The service allows members to send money without sharing financial information, with the flexibility to pay using their account balances, bank accounts, credit cards or promotional financing. With nearly 98 million active accounts in 190 markets and 25 currencies around the world, PayPal enables global ecommerce."

2.4. Polychronicity

2.4.1 General Polychronicity

Edward Hall defined the terms polychronicity and monochronicity, with their strengths and weaknesses, from a national culture perspective (Hall, 1983). He defined polychronicity as the ability to perform more than one task simultaneously (i.e. multitasking) and monochronicity as performing tasks sequentially, one at a time. Polychronicity and Monochronicity are at opposite ends of the chronicity continuum (see Figure 1.3).

According to Hall, cultures such as Mediterranean, African and South American are polychronic, whereas cultures such as North American and Northern European are more monochronic. Polychronic cultures concentrate on building relationships and doing tasks concurrently (e.g. talking on the phone while serving a customer). In addition, they concentrate on the current time rather than schedules, resulting in frequent missed or late appointments. Time does not control them; they are in control of time. This description is against at least one of the traits that make a good project manager, i.e. scheduling team members' tasks and keeping the project on schedule. By contrast, Hall described monochronic cultures as relying heavily on schedules, keeping to appointments and performing tasks sequentially (Hall, 1983).

Polychronicity is a relatively new research field and its effects have been the subject of a limited number of studies. However, The Journal of Managerial Psychology (1999) devoted the entire Volume 14 issue 3-4, as well as part of issue 5-6 to polychronicity. This shows that polychronicity has gained the attention of researchers. The 11 articles published in these volumes contributed significantly to both empirical and theoretical research on the topic. The following nine topics summarise the articles that are relevant to this research:

1. **The implications of polychronicity to managers and workgroups** (Cotte & Ratneshwar, 1999)**.**

The authors performed a qualitative study to explore the polychronic behaviour of individuals in two different ethnic groups: mainstream Americans (Anglos) and first generation Latin American immigrants (Hispanics) to the United States. Both groups were living in the United States. The authors chose these two groups in particular because Hall (1983) described them as on opposite ends of the chronicity continuum with Anglos being monochronic and Hispanics being polychronic. The authors did however recognise that individuals within a particular cultural group may not share the dominant temporal perception. They also studied the creation of meaning for polychronic behaviour of the workers. For example, conflict can arise between a worker and a manager if the worker prefers polychronic behaviour, believing that polychronicity influences his or her work positively. However, the worker's supervisor may prefer monochronic behaviour, believing that polychronicity is inefficient.

The authors concluded that:

- Even though a person's culture primarily influences the meanings of polychronic and monochronic behaviour, each individual forms his or her own opinion on the negative and positive effects of the behaviour.

- Workers perform optimally when their individual polychronicity is harmonious with the polychronicity of the workgroup and supervisor.

- Managers should not assume that individuals within a culture have the same polychronicity or that they share the same positive or negative views regarding their polychronic behaviour.

These authors' work establishes the importance of individual polychronicity within the work environment.

2. **Development of an Inventory of Polychronic Values to measure polychronicity as a cultural variable** (Bluedorn, et al. 1999).

The authors argued that a measurement tool is required to research the role of polychronicity in the processes and behaviours of organisations. They therefore performed a series of studies to develop the Inventory of Polychronic Values, which reliably measures polychronicity as an organisational cultural variable.

The authors adapted the four-item PAI scale developed by Kaufman et al. (1991). Although the PAI had a reliability measure of 0.68, considered too low for basic research (Nunnally, 1978), it already had the initial items, which provided a starting point. The development process consisted out of 11 samples for 2190 respondents. The resultant 10-item IPV showed consistent reliability ratings in the 0.80 range as well as strong test-retest reliability.

The IPV was used in this study to measure individual and corporate polychronicity.

3. **Polychronicity as an element of corporate culture and its impact on the organisation's performance** (Onken, 1999).

In this study, Onken considered polychronicity as one of two temporal elements of a corporation's culture, and the relationship to the organisation's performance. The author postulated, "the more polychronic an organisation's culture, the better its performance" (Onken, 1999).

Onken used a questionnaire to collect organisational polychronicity data from two organisations in different industries. She also collected performance data from Compustat (a provider of financial market information) and the United States Securities and Exchange Commission (SEC). She then used the IPV as a polychronicity measuring tool. She also measured the organisations performance with the indicators: Return on assets (ROA), return on equity (ROE), and return on sales (ROS).

Onken concluded that polychronicity and an organisations performance are related. However, she explicitly stated that this research is too early to infer that incorporating polychronicity into an organisations culture will lead to better performance (Onken, 1999).

Onken's conclusion is an important factor in this study's endeavour to establish a relationship between corporate polychronicity and an IT PM's PC.

4. **The effect of group polychronic behaviour on individual group members** (Waller, Giambatista & Zellmer-Bruhn, 1999).

The authors performed an experiment to examine the effect that a "highly time-urgent" (monochronic) group member may have on the overall group. This was an exploratory study and the authors therefore did not present a hypothesis, but rather two propositions. One proposed a negative effect and the other proposed a positive effect. The results of the experiment indicated that a time-urgent individual would have a negative effect on the polychronic behaviour of the group.

This result is important in this study, because an IT PM leads the group of IT team members. The IT PM's polychronicity could therefore influence the overall polychronicity of the project team.

5. **Temporal dimensions of corporate culture in relation to an individual's polychronic tendency** (Benabou, 1999).

Benabou researched the relationship between nine organisational time dimensions (temporal culture) and an individual's polychronicity. Table 2.4 lists the nine time dimensions studied. The table includes an indication of the relationships to polychronicity as hypothesised by the author. In the Relationship column, *positive* suggests a positive relationship and *negative* a negative relationship. The Confirmed column indicates if statistical tests confirmed the author's hypotheses.

The author concluded the research would be most beneficial if used as a guide to create harmony between an organisation or department and its employees. If an organisation has defined or know what its temporal culture is, then they can recruit employees that are compatible by using the polychronicity dimension.

This conclusion forms one of the building blocks to the investigation of hypothesis H11 in this study (§1.3.3).

Table 2.4 Time dimensions and their relationships to individual polychronicity

Time Dimension	Hypothesised Relationship	Confirmed (Yes/No)
Schedules and deadlines	Negative	Yes
Punctuality	Negative	Yes
Time use awareness	Negative	No
Routine	Negative	Yes
Work overload	Positive	No
Time constraints	Negative	No
Coordination and teamwork	Positive	No
Autonomy of time use	Positive	Yes
Separation of work and non-work time	Negative	Yes

6. **Linking polychronicity to performance variables** (Conte, Rizzuto & Steiner, 1999).

Conte, et al. (1999) performed two studies; the first study explored the relationship between an individual's stated polychronicity and the person's polychronicity as observed by peers (peers rated the participants in the study); and the second study explored the relationships between time management and polychronicity. In addition, the study explored if any evidence of relationships to other related variables exists, such as achievement striving, impatience and irritability (II), performance, and stress. The purpose of the studies was to provide construct validity evidence for polychronicity.

The first study provided validity evidence for polychronicity, achievement striving and II through convergent results for both participants and peers. However, the study found polychronicity was unrelated to performance and stress.

The second study confirmed that relationships do exist between polychronicity and other variables, specifically time urgency and time management.

Time management is an important skill for a PM (§2.2.1). This conclusion is therefore important in the investigation of hypothesis H1 in this study (§1.3.3).

7. **An analysis of cultural polychronicity versus individual polychronicity** (Slocombe, 1999).

Slocombe (1999) studied an individual's polychronicity in relation to the person's cultural polychronicity, using the theory of reasoned action as a framework. He referenced the definition of polychronicity (see §1.4.6), and argued that an individual's polychronicity should be measured with three different constructs. The three constructs are:

1. **Belief** - Does the individual believe that a polychronic or monochronic approach is better?

2. **Attitude** - Does the individual feel positive about practising either polychronicity or monochronicity?

3. **Behaviour** - Does the individual schedule two or more activities at the same time?

The author therefore based his choice of framework on the fact that reasoned action provides "explicit attention to beliefs, attitudes and behaviours" as well as an individual's beliefs about the opinions of workgroup members and his or her "motivation to comply with those opinions". Figure 2.6 below depicts the use of the theory of reasoned action to explain individual polychronicity (Slocombe, 1999).

The author concluded that individuals consider:

- Advantages and disadvantages of a polychronic or monochronic style for each activity they need to perform.

- The available time to complete the activity.

- The opinions of the workgroup members on how to operate (polychronic vs. monochronic).

- The importance of the workgroup members' opinions.

The individuals then decide based on the best result in their opinion.

This implies an individual could be switching between polychronic or monochronic behaviour depending on this outcome.
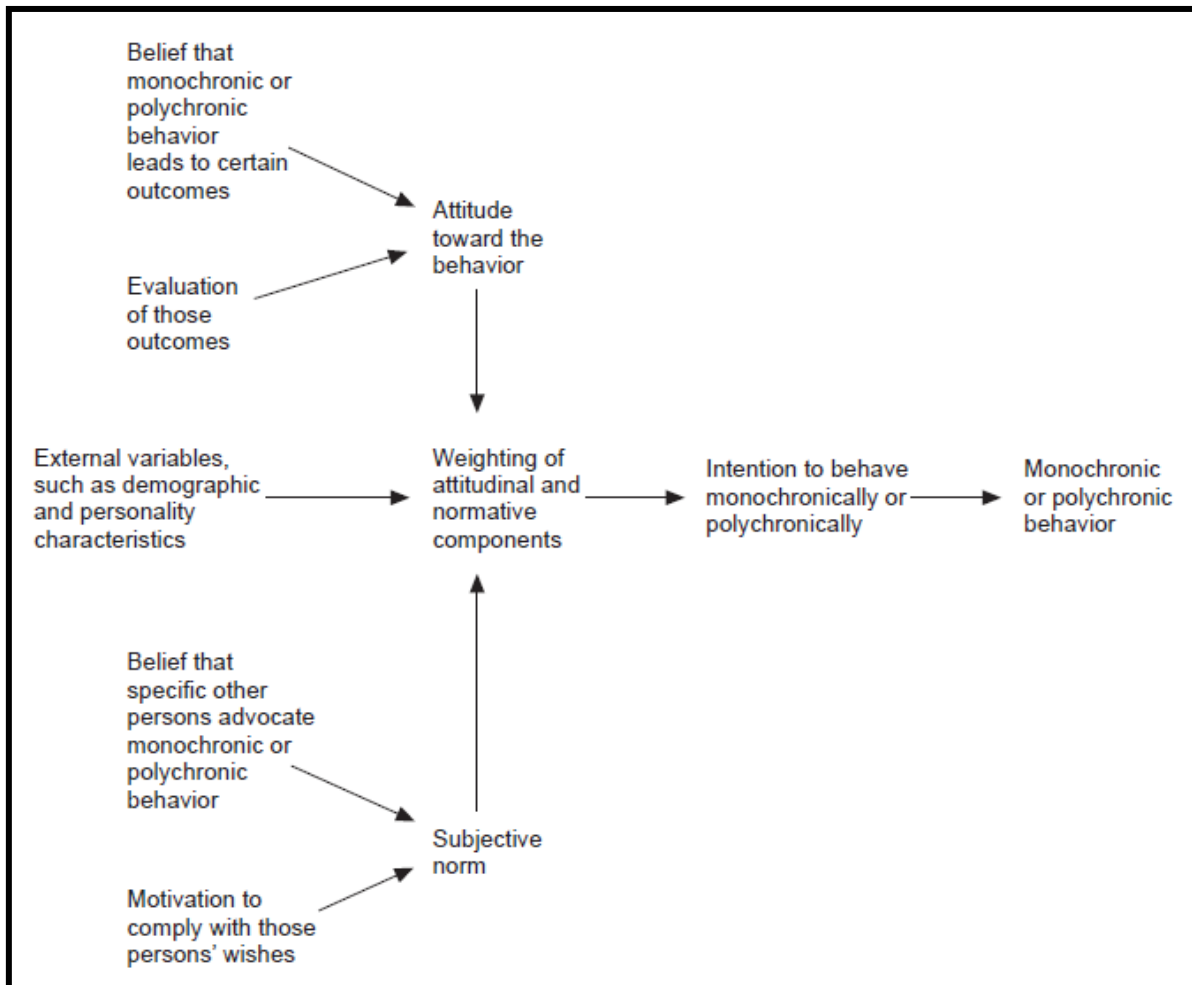
Figure 2.6 Using the theory of reasoned action to explain individual polychronicity
(Slocombe, 1999)

These conclusions touch on various components that are important for an IT PM and project management (e.g. time management). It also establishes the three important factors in determining polychronicity. Individual and corporate polychronicity are the building blocks of this study.

8. **A multidimensional view of polychronicity** (Palmer & Schoorman, 1999).

The authors argued that polychronicity is a multidimensional construct as opposed to the one-dimensional construct that appears in the literature. They described three dimensions: time use preference, context and time tangibility.

They also described a study that they conducted to discover if these three dimensions are independent.

They described the *"*time use preference*"* dimension similarly to the "attitude" dimension described by Slocombe (1999); i.e. it refers to the extent that people prefer to perform multiple tasks simultaneously.

They described the *context* dimension as two opposite ends: low-context and high-context, with high-context being a characteristic of polychronic people and low-context being a characteristic of monochronic people.

They described the *time tangibility* dimension as viewing time either as a tangible resource, or a commodity that can be bought, sold, wasted, saved or spent or an intangible resource, i.e. "only a backdrop against which events unfold".

The authors expressed their concern with researchers assuming time tangibility (sometimes implicitly) when they measure polychronicity, but ignoring context. They continued to describe polychronic individuals as those who "engage in multiple activities simultaneously, are high context communicators and are not time tangible" as opposed to monochronic individuals who "prefer to engage in one activity at a time, are low context communicators and are highly time tangible".

The authors concluded that, based on their research study, one cannot assume the three dimensions are similar or interchangeable.

The authors' conclusions are paramount to this study, because individual and corporate polychronicity are the building blocks of this study.

9. **The relationship between individual creativity and polychronicity**
    (Persing, 1999)

This discussion paper (not empirical research) explored the relationship between creativity and polychronicity. It started from the premise that a paradox exists

between polychronicity and creative workers, specifically those who perform research and development (R & D). Persing (1999) based his argument on the evidence from research showing that a positive relationship exists between individual polychronicity and creativity. However, there is also sufficient research evidence showing that R & D workers are resisting polychronic demands. He provided expanded definitions of both polychronicity and monochronicity, by adding cognitive activities. In other words, a polychronic individual prefers to do more than one thing at a time, including thoughts; and monochronic individuals prefer to sequence tasks one after the other, including thoughts. In addition, Persing introduced the effects of personal agency or volition into the discussion; proposing that volition is playing a moderating role in the relationship between an individual's polychronicity and creativity. The author offered suggestions for empirical study of the relationships as well as measurement instruments (Persing, 1999).

Polychronicity forms an integral part of this study and Persing's study established the 'preference' factor in the polychronicity construct (see §1.4.6).

2.4.2   Corporate Polychronicity

"Corporate culture is the pattern by which a company connects different value orientations—such as rules versus exceptions, people focus versus focus on reaching goals and targets, decisiveness versus consensus, controlling the environment versus adapting to it — in such a way that they work together in a mutually enhancing way. Cultures can learn to reconcile such values at ever-higher levels of attainment, for instance by creating better rules from the study of numerous exceptions. This corporate culture pattern shapes a shared identity which helps to make corporate life meaningful for the members of the organisation, and contributes to their intrinsic motivation for doing the company's work." (Trompenaars & Prud'homme van Reine, 2004).

Polychronicity could be an element of corporate culture and could have an impact on group (team) behaviour (Onken, 1999; Waller, et al., 1999). The implications of polychronicity to managers and workgroups can be evaluated (Bluedorn et al., 1999; Cotte & Ratneshwar, 1999; Benabou, 1999). Additionally, prior research discovered relationships between polychronicity and creativity, polychronicity and time management, as well as polychronicity and performance (Persing, 1999; Conte et al., 1999; Kaufman-Scarborough & Lindquist, 1999; Palmer & Schoorman, 1999).

Onken (1999) described the polychronic culture of an organisation as "one in which members value organising activities by scheduling two or more events at one time". To evaluate the relationship between polychronic corporate culture and IT PMs' PC, it is necessary to measure the polychronicity of the corporation. Bluedorn et al. (1999) developed and tested a measurement for corporate polychronicity referred to as the Inventory of Polychronic Values (IPV). They also provided guidance for adaptation of the IPV to measure individual polychronicity.

Further, Buckley (2003) proposed that employees whose polychronicity is in line with that of their employer may "feel a positive emotional attachment to that organisation". By comparison, employees whose polychronicity conflicts with that of their employer may have lower levels of emotional attachment to that organisation. Buckley's study confirmed the validity of the IPV with a Cronbach alpha co-efficient of 0.77, although this value was lower than the 0.84 achieved by Bluedorn et al. (1999). Buckley followed the guidance provided by Bluedorn et al. (1999) to adapt the IPV for measuring individual polychronicity. Buckley also measured the "Affective Commitment" of the participants using a scale that he described as "widely employed" with "validity and reliability evidence … abound". He defined Affective Commitment as "the emotional attachment an employee may have to their work organisation which also includes the concept of involvement and identification with the organisation". Affective commitment therefore indicates or predicts an individual's congruence with organisational culture. Buckley

inferred that an individual's affective commitment plays a role in the congruence between the individual's polychronicity and the corporate polychronicity.

Polychronicity is a temporal construct that demands attention in today's corporate world where time is an important variable. The competitive advantage of being first-to-market with new products and clauses such as "Time is of the Essence" commonly inserted in business contracts reflect this value and importance of time. Gibson, Zellmer-Bruhn & Aldag (2003) states: "Despite the potentially potent impact time can have on organisational behaviour, and the increasing awareness of the importance of time in organisational behaviour research, surprisingly little direct attention has been paid to temporal elements of organisational culture".

This study explored the relationship between an organisation's polychronicity and IT PMs' PC. Additionally, it researched how the employers' polychronic culture relates to the IT PMs' PC and the eventual success of their projects.

2.4.3   Polychronic Communication

IT PMs commonly engage in two or more of the following polychronic communications (related or unrelated to the topics under discussion):

1. Facilitating a virtual team meeting, using:

    a. A traditional telephone for teleconferencing;

    b. A virtual room equipped with presentation and desktop sharing capabilities.

2. Answering or asking questions from participants or managers via Instant Messenger.

3. Replying to or reading emails.

4. Replying to or sending text messages on a mobile phone, tablet computer or Personal Digital Assistant (PDA).

5. Calling someone else on a mobile phone to obtain more information on the topic or ask someone to join the virtual meeting (VM).

6. Occasionally attend to a colleague who wants to "ask a quick question" in a face-to-face fashion.

Communication channels or methods among project teams have grown over the last few decades to a multitude of different mediums. As more Generation-Y members (also known as Millennials) join the workforce and digital communication technology improves, more communication channels have become acceptable in the corporate environment. Polychronic communication, identified by Albert J Mills as an "emerging phenomenon" (Mills, 2003), is the practise of communication using a polychronic style. The literature also refers to PC as multi-communication (Turner & Reinsch, 2007). This research project viewed PC as a subset of polychronicity. Research in PC is in its infancy, and to the researcher's knowledge, only a few empirical studies exist.

Turner, Grube, Tinsley, Lee, C. & O'Pell (2004) performed a survey, which found that organisational norms might influence employee communication and "even more so when employees have strong polychronic orientations". Additionally, Mills (2003) argued that PC might have specific effects such as having an influence on the practitioner's performance as well as contributing to work overload and stress. The conversation complexity and PC origin (introduced by others or by self) moderate the effects of PC. Additionally, a study by Reinsch, Turner & Tinsley (2008) inferred that PC is an unintended communication technology effect, driven by technology availability and interaction compartmentalisation. This may result in more productivity and efficiency pressures on employees.

2.5.   Summary

The literature review purpose is to provide background to the research problem as stated in §1.3.1 and to present the ideas of other researchers directly related to the research problem.

This literature review started with a discussion on project management in general and continued with a discussion on IT project management. This discussion provided the background to the IT PM profession and their general duties. Additionally, the literature review on communication and polychronic communication provided the background on the importance of communication in the profession as well as the direct relationship to productivity and project success.

The discussion on polychronicity directly relates to the research problem. The existing research review of polychronicity provided the origin of polychronicity and PC, and identified gaps in the existing research.

The next chapter will describe the research strategy, data generation methods, data collection procedures and the data analysis performed during the study.

Chapter 3: Research Design and Methodology

3.1. Introduction

The previous chapter presented a literature review, providing the background to the research problem and described the importance of polychronicity, communication and PC.

Chapter 3 describes the *Prepare* and *Execute* phase of the project, namely the research design and methodology (refer to Figure 1.5) followed during the study.

§3.2 starts with a discussion on the research strategy based on research guidelines provided by Oates (2006) and Olivier (2007). After that, §3.3 provides a description and rationale behind the choice of research instrument and data generation. The chapter ends with a summary (§3.7) of the selected research design and methodology.

3.2. Research Strategy

The study objective is to investigate if IT PMs' PC has any influence on their productivity and project success.

Solving this research problem needed a study of the large population of IT workers (including specifically IT PMs). In such cases, the recommended approach for research is to select a sample and then generalise the findings to the entire population (Olivier, 2007). In addition, there was a need to correlate various characteristics of the population sample, such as IT PMs' PC, corporate polychronicity, etc.

An evaluation of various research strategies proposed by Olivier (2007) and Oates (2006) resulted in a choice between two research methods:

a) A case study

With a case study, data have to be collected from IT workers at a minimum of two corporations to do a meaningful comparison. Finding a large sample in two different organisations can be a challenge.

b) A Survey

By contrast, the researcher already had a large network of IT workers spread over a large geographic area and in multiple industries. Moreover, Olivier recommends the use of surveys when there is a need to show correlations between different characteristics in a study (Olivier 2007).

Therefore, the selected research strategy was a survey.

3.3.   Data Generation Methods and Research Instruments

The data generation methods considered were either interviews or questionnaires. The literature review revealed that a questionnaire to measure individual and corporate polychronicity reliably, known as the Inventory of Polychronic Values (IPV) exists (Bluedorn et al., 1999). Additionally, interviews are expensive, time-consuming and not very practical for this type of project, which needs a representative sample of IT PMs, and IT project team members across the world. Therefore, the data generation method selected was a questionnaire. The questionnaire used the term "multitasking" or some variation of it instead of the possibly unfamiliar terms of "polychronic" or "polychronicity".

The researcher performed a Google® search with the terms "free online survey tool" and selected the top two search results, Survey Monkey® (www.SurveyMonkey.com) and Kwiksurveys (www.kwiksurveys.com), for further evaluation. Survey Monkey® offered only ten questions in their free version,

which immediately disqualified it as a viable option. Kwiksurveys provided the following subset of features that made it an attractive choice as a collection instrument:

1. There was no monetary cost for using the tool.

2. Programming the tool was easy and intuitive. It allowed for page flow control by using answers to prior questions. This was ideal for routing people determined as out of scope for this study (e.g. those who selected "Other" to the job classification question) to the exit page. The questionnaire also routed IT PMs to one section and IT team members to another.

3. It allowed multiple formats for structuring questions (e.g. free-form answers, drop-down selection, radio buttons, etc.).

4. It provided an option to restrict participants to complete the questionnaire only once.

5. Participants could interrupt and continue the questionnaire at a later stage without any loss of previously completed information.

6. An email function was available which created a unique link for each participant. This allowed for tracking of responses by email address. If a participant sent the link to someone else, the tool would still allow only one person to complete the questionnaire. This feature controlled for snowball sampling (i.e. recruiting more participants by having the first population sample forward the invitation to their acquaintances). The email function also provided a follow-up feature for reminding participants to complete the questionnaire. The follow-up feature was used twice.

7. The tool allowed for a start and end date to the questionnaire, with all links expiring at the end date. It also allowed the reset of the end date.

8. The option to export all results into Microsoft Excel format was available.

The online questionnaire consisted of the following sections:

Section 1.   Introduction

This section introduced the research topic and obtained the informed consent of the participant according to Unisa's requirements.

Section 2.   Demographics

This section collected information on the participant's employer, occupation type and country of residence.

Section 3.   Communication Style of the IT PM (completed by IT PMs only)

This section contained a new measurement instrument, consisting out of a 2-question, 6-point Likert scale. The questions were:

a. I like to juggle several communication activities at the same time (e.g. use chatting software and replying to email while talking on the phone).

b. I seldom interrupt one conversation to reply to another conversation (e.g. reply to an email while busy on the telephone).

Additionally, this section contained the following two questions to measure success and productivity of the IT PM:

a. I believe that having several conversations at the same time contributes to the success of the projects that I am managing.

b. I believe that having several conversations at the same time improves my productivity.

Section 4.   Perceived Communication Style of the IT PM (as observed and completed by IT project team members)

This section contained a new measurement instrument, consisting out of a 2-question, 6-point Likert scale. The questions were:

a. The IT PM likes to juggle several communication activities at the same time (e.g. use chatting software and replying to email while talking on the phone).

b. The IT PM seldom interrupted one conversation to reply to another conversation (e.g. reply to an email while busy on the telephone).

Additionally, this section contained the following two questions to measure perceived success and productivity of the IT PM:

a. I believe the fact that the IT PM was having several conversations at the same time contributed to the success of the project.

b. I believe the fact that the IT PM was having several conversations at the same time improved his/her productivity.

Section 5.   Polychronicity of the organisation or department (completed by all respondents)

The ten-question IPV (Bluedorn, Kalliath, Strube & Martin, 1999) was used for this section (see §1.4.10).

Section 6.   Polychronicity of the individual (completed by all respondents)

This section contained an adaptation of the ten-question IPV to measure individual polychronicity instead of corporate polychronicity (see §1.4.10 for a description of the process provided by Bluedorn et al. (1999)).

Section 7.   Contact Information

This section displayed an optional contact information page to participants opting to provide their contact details. The purpose was to provide the ability for contacting respondents in cases where their responses may indicate that they misunderstood a question.

Section 8.   Exit / Thank You

This final page of the questionnaire thanked all the participants.

Appendix A contains a copy of the complete questionnaire. Figure 3.1 depicts the flow of the questionnaire. The online survey tool allowed flow programming based on participant responses.

A description of the flow follows:

1. The first page described the project and obtained the participant's informed consent. On selecting 'I Agree', participants continued to the demographics page. On selecting 'I Disagree', the participants continued to the exit page.

2. The demographics page included 3 job classification choices, programmed as follows:

    a. *IT Project Manager:* Selecting this choice routed the participant to the Communication Style of the IT PM page.

    b. *IT Professional other than a Project Manager:* Selecting this choice routed the participant to the Communication Style of the IT PM (Team Member's Perspective) page.

    c. *Other:* This choice disqualified the participant and routed him to the exit page.

3. All participants continued to the Corporate Orientation towards Multitasking page, followed by the Individual Orientation towards Multitasking page.

4. The next page asked for the participant's permission to contact them. If the participant selected a "Yes" answer, the following page asked for the contact details. A "No" answer took the participants to the end of the questionnaire.

5. After the Contact details screen, participants continued to the end of the questionnaire.
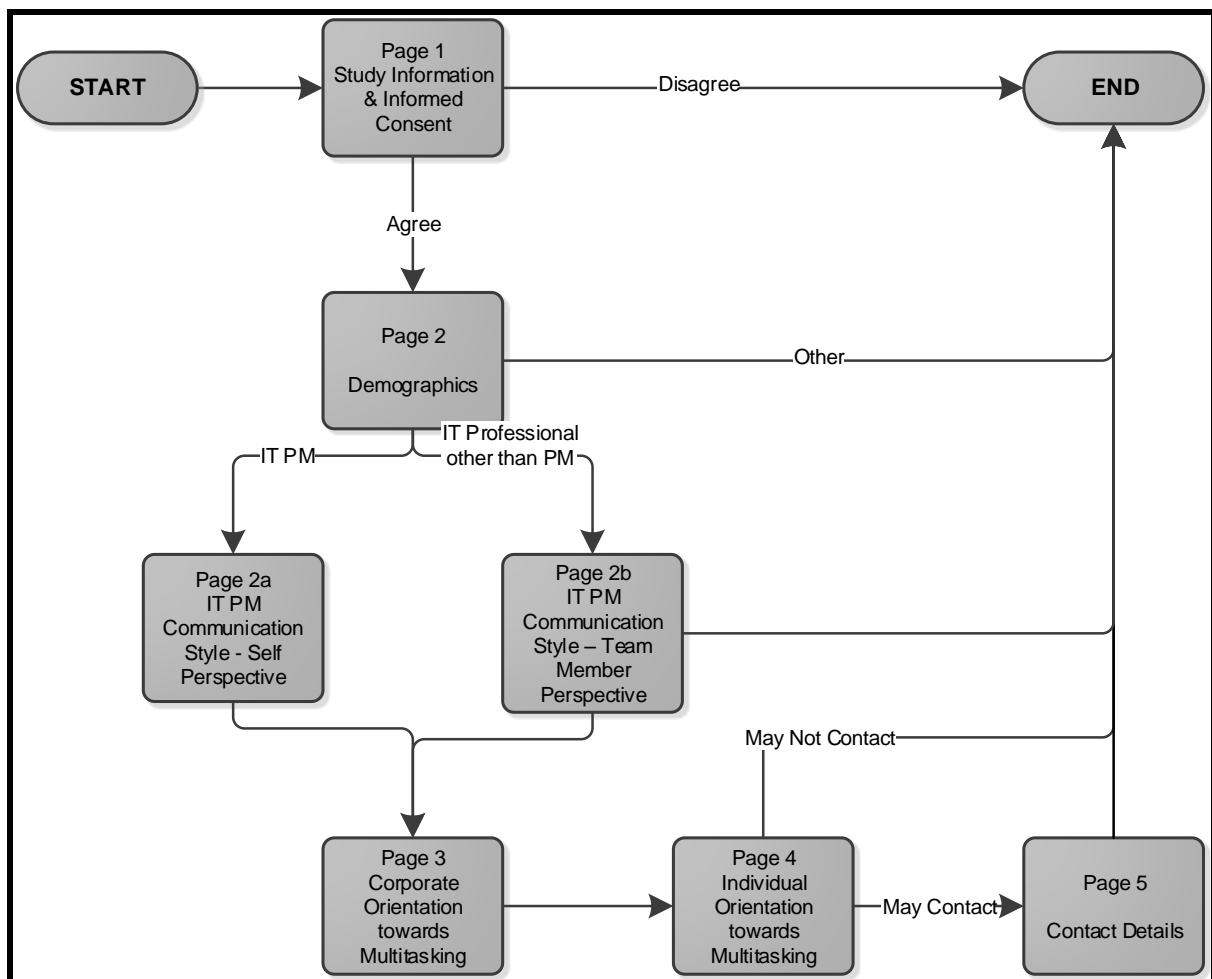
Figure 3.1 Questionnaire Flow

3.4. Data Collection Procedures

The first step in the data collection process was a pilot study using the selected free online survey tool at www.Kwiksurveys.com. The tool displayed potential

distracting advertising messages to the participants on each page. However, the email solicitation asked pilot participants to comment on the distraction.

The pilot participants were all members of the researcher's professional network and included three IT PMs and three other IT professionals. Participation response was 100%.

The pilot study objective was to discover:

1. *The time it took to complete the questionnaire.*

   Participants reported that completing the questionnaire took between 10 and 15 minutes.

2. *If any questions were ambiguous or needed further instructions.*

   All participants reported the questions were easy to understand, but some sections may need clarification, e.g. explain that "project" equates to "project task"; because in practice most projects take more than one day to complete.

3. *If advertising on the pages were perhaps distracting or annoying.*

   Most participants reported that they are so used to advertising on web pages that they hardly noticed it. Other participants provided no comments on the advertising.

4. *Any other relevant observations.*

   No participants offered any other relevant observations.

Feedback from the pilot participants confirmed the same survey tool and questionnaire could successfully collect the final research data. An email sent to potential participants selected from the researcher's worldwide professional network and work associates started the data collection. Each email contained a unique link to the online questionnaire that allowed the built-in email management

system to track responses. The questionnaire parameters allowed only one entry by participant. Participants could save their work and return to the same point. They could also go back to previous pages, log back in to modify or review answers, or just quit the questionnaire without completing it. No participants received any remuneration for completing the questionnaire.

Appendix A contains a copy of the questionnaire and Appendix B contains a copy of the email solicitation.

3.5.　　Data Analysis Procedures

The researcher selected a quantitative data analysis method because:

1. It was easy to extract the data collected from the questionnaire and code it numerically using a predetermined codebook.

2. Numeric data is advantageous. Statistical tools exist that can analyse numeric data using methods that are acceptable by the research community.

3.6.　　Dataset Preparation and Description

The tool selected for analysing the data was IBM® (International Business Machines) SPSS™ (Statistical Package for Social Sciences) version 20 software.

The data preparation for SPSS followed these steps:

1. The online survey tool's export feature extracted the data into Excel.

2. The following process details the steps followed for data collected from each page (refer to the questionnaire in Appendix A):

    Informed Consent page:

    　　The online survey tool excluded the following cases from the dataset:

a. The respondent started the survey, presumably read the disclosure agreement and then selected *I Disagree.*

b. The respondent selected *I Agree*, but failed to complete any of the questions.

Demographics page:

a. The tool extracted *country of residence* and *employer name* into a separate dataset. The next step was to correct misspellings, followed by changing acronyms into the full names for consistency (e.g. change H.P. to Hewlett Packard). The statistical analysis excluded this dataset. However, the dataset provided metrics on the geographic and industry spread of the respondents.

b. An Excel macro excluded all responses that failed the initial selection criteria (Occupation = Other). The scope of the study included IT PMs and IT project members. The latter provided another perspective on the PC, success and productivity of the IT PM.

c. The Excel macro transformed the occupation as follows: An answer of *IT PM* into the number 1 and *IT Other* into the number 2. The macro placed the result into the variable <u>Occupation</u> (Appendix H).

Polychronic Communication Style of the IT PM page and Polychronic Communication Style of the IT PM (Team member's perspective) page:

An Excel macro performed the following calculations and translations:

i. It transformed the replies to the four questions in each section into a numeric equivalent using Table 3.1. The differences in questions for the IT team members are in parenthesis.

    ii.   It divided the sum of the scores from questions 1 and 2 by two and placed the quotient into variable *PC* (Appendix H).

    iii.   It placed the score for question 3 in variable *Success* (Appendix H).

    iv.   It placed the score for question 4 in variable *Productivity* (Appendix H).

Table 3.1 PC of the IT PM translations

Answers / Questions	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
Question 1: I (The IT PM) like to juggle several communication activities at the same time.	1	2	3	4	5	6
Question 2: I (The IT PM) seldom interrupt one conversation to reply to another conversation.	6	5	4	3	2	1
Question 3: I believe that (the fact that the IT PM was) having several conversations at the same time contributes to the success of the projects that I am (The IT PM is) managing.	1	2	3	4	5	6
Question 4: I believe that (the fact that the IT PM was) having several conversations at the same time improves my (The IT PM's) productivity.	1	2	3	4	5	6

Corporate Polychronicity and Individual Polychronicity pages:

An Excel macro performed the following calculations and translations:

    i.   It transformed the replies to the ten questions in each section into a numeric equivalent using Table 3.2. There were slight differences in the questions measuring individual polychronicity compared to

corporate polychronicity. Those differences in questions are in parenthesis.

ii.   It divided the sum of the scores from the ten Corporate Polychronicity questions by ten and placed the quotient into variable *CP* (Appendix H).

iii.   It divided the sum of the scores from the ten Individual Polychronicity questions by ten and placed the quotient into variable *IP* (Appendix H).

Table 3.2 Polychronicity translations

Questions \ Answers	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
Question 1: We (I) like to juggle several activities at the same time	1	2	3	4	5	6	7
Question 2: We (I) would rather complete an entire project every day than complete parts of several projects	7	6	5	4	3	2	1
Question 3: We (I) believe people should try to do many things at once	1	2	3	4	5	6	7
Question 4: When we (I) work by ourselves (myself), we (I) usually work on one project at a time	7	6	5	4	3	2	1
Question 5: We (I) prefer to do one thing at a time	7	6	5	4	3	2	1
Question 6: We (I) believe people do their best work when they (I) have many tasks to complete	1	2	3	4	5	6	7
Question 7: We (I) believe it is best to complete one task before beginning another	7	6	5	4	3	2	1
Question 8: We (I) believe it is best for people to be given several tasks and assignments to perform	1	2	3	4	5	6	7
Question 9: We (I) seldom like to work on more than a single task or assignment at the same time	7	6	5	4	3	2	1
Question 10: We (I) would rather complete parts of several projects every day than complete an entire project	1	2	3	4	5	6	7

<u>Permission to Contact page:</u>

In a few cases, the respondent agreed to contact, but failed to supply the contact information. The Excel macro changed all responses in this category to reflect *No* for the *consent to provide contact details* question. All calculations excluded this variable but it remained saved in the dataset, in case a need to contact a respondent arose, e.g. for follow up questions or to seek clarity on answers. No respondents were however contacted.

3. The final step was to import all the data into SPSS for statistical analysis. Chapter 4 discusses the statistical tests and output.

3.7.   Summary

This chapter detailed the research design and methodology as well as the process followed to clean and prepare the data for statistical analysis.

The research strategy chosen was a survey because surveys are well suited to distinguish between different characteristics; in this case between polychronic or monochronic orientation.

The research instrument chosen was a questionnaire because a reliable and proven questionnaire that measures individual and corporate polychronicity exists.

Translating questionnaire answers into numerical data for statistical analysis is a trivial matter; therefore, a quantitative method of analysis was a logical choice based on the choice of research strategy and research instrument.

The next chapter details the statistical analyses performed on the data.

Chapter 4: Data Analysis

4.1. Introduction

The previous chapter described in detail the first part of the *Analyse* phase of the project, based on the model presented in Figure 1.5. It described the reasoning behind the selected methodology and research design; as well as the process followed to collect, clean-up and prepare the data for statistical analysis.

Chapter 4 describes the second part of the *Analyse* phase by presenting the numeric data analysis performed on the collected dataset. The findings presented in this chapter are the results of manipulating the dataset with IBM® (International Business Machines) SPSS™ (Statistical Package for Social Sciences) version 20 software.

This chapter only presents the calculated output of the various tests, i.e. it does not discuss any inferences. Additionally, the chapter presents observations obtained from looking at either the data or the graphs. Chapter 5 discusses all inferences from the results.

4.2. Presentation of Findings

4.2.1 Case Processing Summaries

The statistical tests examined either a relationship based on the IT PMs' or IT project team members' (represented throughout by "IT Other") perspective, or a comparison between the two groups.

The full dataset contained 324 cases (N=324) as showed in Table 4.1 below. The respondents represent over 34 countries, 6 continents and 27 corporations. Of the 324 respondents, 202 (62.3%) were IT PMs and 122 (37.7%) were other IT project team members. The countries and the corporations metrics only indicates

the geographic and industry spread of the sample. The statistical tests excluded these variables; therefore, Table 4.1 also excluded the variables.

Table 4.1 Case Processing Summary by Occupation

Occupation	Cases	
	N	%
IT PM	202	62.3%
IT Other	122	37.7%
TOTALS	**324**	**100.0%**

4.2.2   Statistical Description of Variables

Appendix C contains all the research variable statistics. Table C.1 is split by occupation and Table C.2 shows the same cases, but without the split.

The *Mean* and *5% Trimmed Mean* for each variable was compared to verify the influence of outliers. SPSS calculates the *5% Trimmed Mean* by removing the top and bottom 5% of the cases and calculating a new mean. If there is a big difference in the two means, then the outliers have a strong influence on the mean. The inspection discovered no large differences in the means.

An inspection of the minimum and maximum values for each variable, to ensure that they all fall within the expected range, discovered no anomalies. The shape of the data was determined from the Skewness and Kurtosis values for each variable. Skewness provides an indication of the symmetry of the data, with a perfectly normal distribution having a value of 0. Kurtosis provides an indication of the peak of the data, with a perfectly normal distribution having a value of 0. Acceptable values for skewness can be calculated with the formula $2\sqrt{(6/n)}$ and for kurtosis $4\sqrt{(6/n)}$ where n is equal to the sample size (Madsen, 2011).

Table 4.2 shows the calculations for all the distributions, with kurtosis or skewness values that fall within the acceptable range **highlighted**.

Table 4.2 Case Processing Summary by Variable

Variable	Occupation	Valid		Missing		Mean	Std. Dev.	Skew-ness	Acceptable Skewness $2\sqrt{(6/n)}$	Kurtosis	Acceptable Kurtosis $2\sqrt{(6/n)}$
		N	%	N	%						
IT PM PC	IT PM	202	100.0%	0	0.0%	3.500	1.231	-0.125	0.345	-0.588	0.689
	IT Other	122	100.0%	0	0.0%	3.861	0.824	-0.016	0.444	-0.043	0.887
IT PM Success	IT PM	202	100.0%	0	0.0%	3.070	1.624	0.140	0.345	-1.232	0.689
	IT Other	122	100.0%	0	0.0%	3.390	1.572	0.038	0.444	-1.135	0.887
IT PM Productivity	IT PM	202	100.0%	0	0.0%	2.770	1.529	0.340	0.345	-1.122	0.689
	IT Other	122	100.0%	0	0.0%	3.060	1.550	0.160	0.444	-1.063	0.887
Polychronicity	IT PM	202	100.0%	0	0.0%	3.939	1.114	0.006	0.345	-0.291	0.689
	IT Other	99	81.1%	23	18.9%	3.863	1.238	0.040	0.492	-0.368	0.985
Corporate Polychronicity	IT PM	192	95%	10	5.0%	4.300	0.974	-0.154	0.354	-0.152	0.707
	IT Other	105	86.1%	17	13.9%	4.054	0.917	-0.060	0.478	0.190	0.956
IT PM PC		324	100.0%	0	0.0%	3.619	1.110	-0.273	0.272	-0.213	0.544
IT PM Success		324	100.0%	0	0.0%	3.190	1.610	0.093	0.272	-1.196	0.544
IT PM Productivity		324	100.0%	0	0.0%	2.880	1.541	0.270	0.272	-1.112	0.544
Polychronicity		301	92.9%	23	7.1%	3.914	1.155	0.010	0.282	-0.315	0.565
Corporate Polychronicity		297	91.7%	27	0.0%	4.213	0.960	-0.101	0.284	-0.086	0.569

4.2.3 Extreme Values

The Extreme Values by occupation (Table D.1) provides a list of the upper and lower extreme cases for each variable. An inspection of the cases confirmed that the data is acceptable.

4.2.4 Boxplots
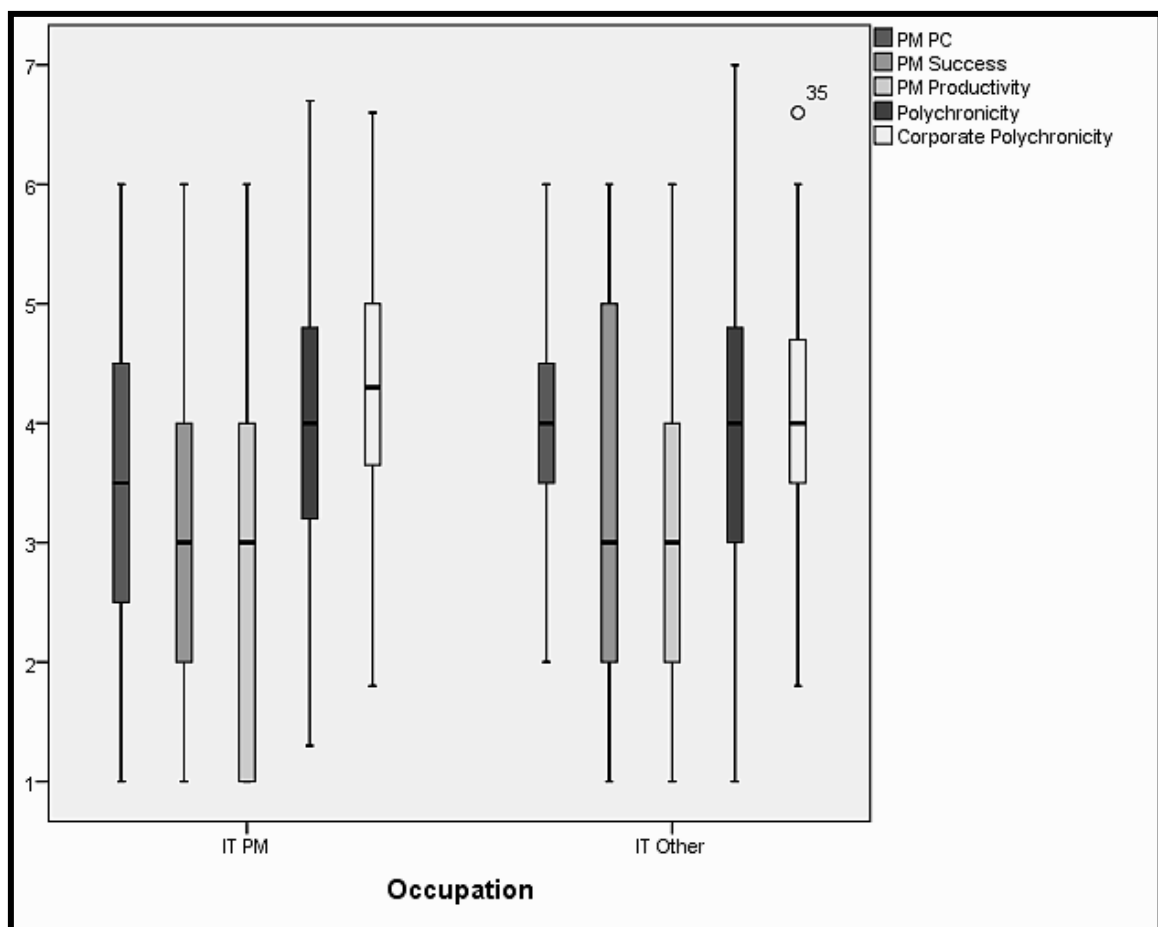
Figure 4.1 Boxplots by Occupation

Figure 4.1 above represents boxplots of the scores distribution for each variable by occupation. For each variable, the box represents 50% of the cases and the whiskers extend to the upper and lower values. The boxplot suggests there are no outliers. The IT PM PC, Individual Polychronicity and Corporate Polychronicity

distributions show the boxes roughly in the middle of the range. In addition, the mean line appears close to the centre of the box. This suggests the distributions are normal. This observation agrees with the calculated values for skewness and kurtosis in Table 4.2.
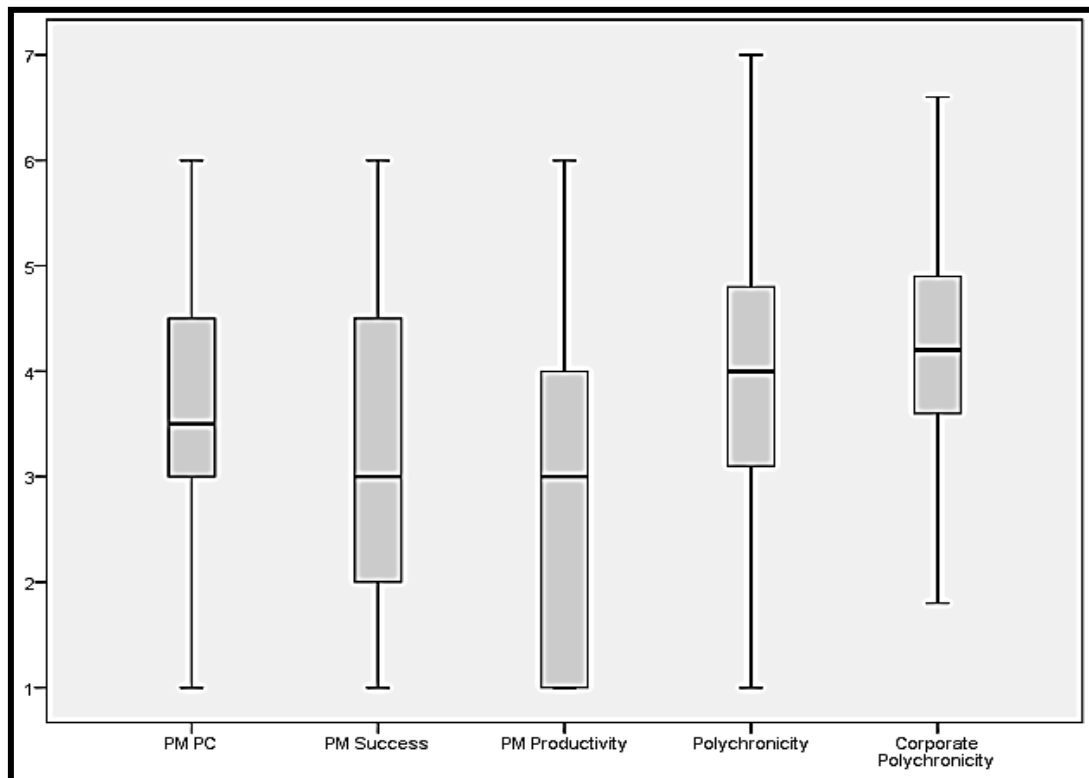
Figure 4.2 Boxplots for All Variables

Figure 4.2 above represents boxplots of the scores distribution for each variable from an overall perspective. The IT PM PC, Polychronicity and Corporate Polychronicity variable distributions appear normal; with the box roughly in the middle of the range and the mean line close to the centre of the box. This observation also agrees with the calculated values for skewness and kurtosis in Table 4.2.

4.2.5   Histograms

Figures 4.3 to 4.12 show the histograms for the variables split by occupation; and Figures 4.13 to 4.17 show the histograms from an overall perspective.

Figure 4.3 IT PM Polychronicity Histogram

Figure 4.4 IT Team Member Polychronicity Histogram

Figure 4.5 Corporate Polychronicity (IT PM Perspective) Histogram

Figure 4.6 Corporate Polychronicity (IT Other perspective) Histogram

Figure 4.7 IT PM PC (IT PM Perspective) Histogram

Figure 4.8 IT PM PC (IT Other perspective) Histogram

Figure 4.9 IT PM Success Histogram

Figure 4.10 IT PM Success (IT Other perspective) Histogram

Figure 4.11 IT PM Productivity Histogram

Figure 4.12 IT PM Productivity (IT Other perspective) Histogram

Figure 4.13 Corporate Polychronicity Histogram

Figure 4.14 IT PM PC Histogram

Figure 4.15 IT PM Success Histogram

Figure 4.16 IT PM Productivity Histogram

Figure 4.17 Individual Polychronicity Histogram

There is a notable difference in the Success variable distribution between IT PMs rating their success themselves, and the rating performed by the IT team members. A discussion of this observation follows in later sections.

4.2.6   Tests of Normality

Tables 4.3 and 4.4 show the results of normality tests performed for each variable. Table 4.3 shows the values obtained when splitting the file by occupation whereas Table 4.4 shows the values obtained from an overall perspective. Data normality was a consideration in all the decisions on the types of tests performed on the data.

Table 4.3 shows individual polychronicity and corporate polychronicity data for *IT PM* and *IT Other* occupations have normal distributions suggested by Shapiro-Wilk Sig. values greater than 0.05. This is consistent with observations obtained by reviewing the box plots (§4.2.4) as well as the skewness and kurtosis values (§4.2.2). However, these previous tests also suggested normal distributions for IT PM PC from both IT PM and IT Project Team member perspectives.

Table 4.3 Tests of Normality by Occupation

Variable	Occupation	Shapiro-Wilk		
		Statistic	df	Sig.
IT PM PC	IT PM	.972	202	.000
	IT Other	.956	122	.001
IT PM Success	IT PM	.897	202	.000
	IT Other	.921	122	.000
IT PM Productivity	IT PM	.885	202	.000
	IT Other	.911	122	.000
Polychronicity	IT PM	.993	202	.421
	IT Other	.991	99	.749
Corporate Polychronicity	IT PM	.991	192	.267
	IT Other	.991	105	.747

Table 4.4 suggests that from an overall perspective, the polychronicity and corporate polychronicity data have normal distributions with Shapiro-Wilk Sig. values greater than 0.05. This is consistent with observations obtained by

reviewing the box plots as well as the skewness and kurtosis values. However, these previous tests also suggested a normal distribution for IT PM PC.

Table 4.4 Tests of Normality: All Variables

Variable	Shapiro-Wilk		
	Statistic	df	Sig.
IT PM PC	.970	324	.000
IT PM Success	.909	324	.000
IT PM Productivity	.896	324	.000
Polychronicity	.994	301	.311
Corporate Polychronicity	.993	297	.147

4.2.7   Reliability of Scales

The purpose of scale reliability tests is to discover how free the scale is from random error. The analysis included Cronbach's coefficient test to discover the internal consistency of the scales, which is a signal of reliability. Higher values suggest greater reliability and according to Nunnally (1978) a score of at least 0.70 (in a possible range of 0 to 1) is acceptable. Cronbach's coefficient is however dependent on the number of items in a scale and cannot test a one-item scale. Additionally, if the item count is fewer than 10, then Cronbach's coefficient may be small (George & Mallery, 2010).

Negative values in inter-item correlation matrices suggest that a scale measures something other than the underlying characteristics (polychronicity, corporate polychronicity and PC). The matrices (Tables E.1, E.3 and E.5) contain only positive values.

Table 4.5 Reliability Statistics

Variable	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
Individual Polychronicity	.863	.864	10
Corporate Polychronicity	.770	.770	10
IT PM PC	.028	.028	2

Individual Polychronicity

Table E.1 in Appendix E displays the Individual Polychronicity Inter-Item Correlation Matrix. Table 4.5 above displays the Individual Polychronicity Reliability Statistics. The Cronbach alpha was 0.86, which is acceptable (Nunnally, 1978). This value matches the 0.86 value obtained by the creators of the scale (Bluedorn et al., 1999).

Individual Polychronicity Item-Total Statistics (Table E.2) are in Appendix E. The Item-Total Statistics table was however not considered because deleting any item would invalidate any comparisons against other research.

Corporate Polychronicity

The Corporate Polychronicity Inter-Item Correlation Matrix (Table E.3) is in Appendix E and the Corporate Polychronicity Reliability Statistics are above in Table 4.5. The Cronbach alpha was 0.77, which is acceptable (Nunnally, 1978).

Corporate Polychronicity Item-Total Statistics (Table E.4) are in Appendix E. The Item-Total Statistics table was however not considered because deleting any item would invalidate any comparisons against other research.

Polychronic Communication

The PC scale was a two-item scale developed by the researcher. Because this scale consisted of only two items, the low Cronbach alpha value of 0.028 was no surprise (George & Mallery, 2010). The PC Inter-Item Correlation Matrix (Table

E.5) and the PC Item-Total Statistics (Table E.6) are in Appendix E and the PC Reliability Statistics are in Table 4.5.

IT PM Success and Productivity

The scales for IT PM success and Productivity were one-item measurements and therefore not tested for reliability using Cronbach's alpha. Reliability testing with a test-retest comparison is possible, but often not practical (including in this case). According to Sacket & Larson (1990), a single-item measurement is sufficient for basic research if it measures a construct that is unambiguous to the respondent. IT PM success and productivity are unambiguous to the respondents of this research questionnaire due to their daily use in the IT industry. For example, stakeholder satisfaction generally measures IT project success. IT PMs also measure and report productivity regularly to their stakeholders using an earned value metric.

Additionally, Wanous & Reichers (1996) performed a study to estimate the reliability of a single-item measurement for a construct considered more complex than a self-reporting fact, but less complex than a psychological construct. They used two test-retest scenarios to measure Overall Job Performance, one using a single-item construct and the other a multi-item construct. They found the *minimum* reliability of the one-item measurement to be significant (about 0.70). Based on their results, their conclusion is that "the unequivocal rejection of single-item measures does not seem warranted" (Wanous & Reichers, 1996).

The use of a single-item measure in the case of IT PM success and IT PM productivity is therefore sufficient for the scope of this research study.

4.3.   Hypothesis Testing

The hypotheses fell into one of the following two groups:

4.3.1   H1 to H5; H9 to H11 Explore relationships between two variables.

Correlation tests provide a numerical value of the strength and direction of a linear relationship between two variables. The value varies from -1 to +1, with the sign suggesting either a positive or a negative correlation (the direction) and the absolute value suggesting the strength. Correlation does not imply causation and one variable cannot predict the other even when the correlation is significant (Pallant, 2011).

The correlation test chosen was Spearman's Rho (r), because:

(a) The shape of the data did not fit a normal distribution for some variables, which ruled out a Pearson correlation test.

(b) All the observations were independent of one another, i.e. each case was a measurement on a unique individual.

(c) The pairs of data were related, e.g. in one single case there was a reading for IT PM PC as well as Polychronicity, both provided by the same person. Missing data were excluded pairwise (Pallant, 2011).

The following guide was used to interpret the Spearman's Rho (r) (Pallant, 2011):

- Small relationship   0.09 $< r <= 0.29$

- Medium relationship   0.29 $< r <= 0.49$

- Large relationship   0.49 $< r <= 1.0$

Further, the manually calculated Coefficient of Determination (CoD) provided the shared variance between each pair of test variables. The CoD formula is as

follows: Calculate the square of Spearman's rho (r) and multiply by 100 to derive a percentage ($CoD \% = 100r^2$). The CoD provides an indication of the practical significance of the relationship as opposed to the statistical significance (Pallant, 2011).

H1: There is a relationship between IT PMs' PC and their polychronicity.

Table 4.6 Hypothesis H1 Correlations

	IT PM PC	Polychronicity
Correlation Coefficient	1.000	.338[**]
Sig. (2-tailed)	.	.000
N	202	202
**. Correlation is significant at the 0.01 level (2-tailed).		

The correlation between IT PMs' PC and their polychronicity was calculated. The results in Table 4.6 above show a significant medium positive correlation between the two variables at a 95% level of confidence ($r = 0.34, N = 202, p < 0.05$). This means that high levels of polychronicity are associated with high levels of PC. The calculated CoD ($0.34^2 \, x \, 100$) suggests there is a shared variance of 12% between the two variables.

H2: There is a relationship between IT PMs' PC and their perception of the influence of PC on their productivity.

Table 4.7 Hypothesis H2 Correlations

	IT PM PC	IT PM Productivity
Correlation Coefficient	1.000	.492[**]
Sig. (2-tailed)	.	.000
N	202	202
**. Correlation is significant at the 0.01 level (2-tailed).		

The correlation between IT PMs' PC and their perception of the influence of PC to their productivity was calculated. The results in Table 4.7 above show a significant large positive correlation between the two variables at a 95% level of confidence ($r = 0.49, N = 202, p < 0.05$). This means that high levels of PC are associated with high levels of perception the IT PMs' PC influences their productivity. The calculated CoD ($0.49^2\ x\ 100$) suggests there is a shared variance of 24% between the two variables.

H3: There is a relationship between how IT project team members perceive IT PMs' PC and their perception of the influence of PC on their productivity.

Table 4.8 Hypothesis H3 Correlations

	Other- IT PM PC	**Other- IT PM Productivity**
Correlation Coefficient	1.000	.025
Sig. (2-tailed)	.	.781
N	122	122

The correlation between how IT project team members perceive IT PMs' PC and their perception of the influence of their PC to their productivity was calculated. The results in Table 4.8 above show no correlation between the two variables ($r = 0.03, N = 122, p < 0.05$).

H4: There is a relationship between IT PMs' PC and their perception of the influence of PC on their project success.

Table 4.9 Hypothesis H4 Correlations

	IT PM PC	**IT PM Success**
Correlation Coefficient	1.000	.516[**]
Sig. (2-tailed)	.	.000
N	202	202
**. Correlation is significant at the 0.01 level (2-tailed).		

The correlation between IT PMs' PC and perception of the influence of PC to project success was calculated. The results in Table 4.9 above show a significant large positive correlation between the two variables at a 95% level of confidence ($r = 0.52, N = 202, p < 0.05$). This means that high levels of PC are associated with high levels of perception the IT PMs' PC influences their project success. The calculated CoD ($0.52^2 \ x \ 100$) suggests there is a shared variance of 27% between the two variables.

H5: There is a relationship between how:

    a) *IT project team members perceive IT PMs' PC and*

    b) *Their perception of the influence of IT PMs' PC on their project success.*

Table 4.10 Hypothesis H5 Correlations

	Other- IT PM PC	Other- IT PM Success
Correlation Coefficient	1.000	.081
Sig. (2-tailed)	.	.374
N	122	122

The correlation between how IT project team members perceive IT PMs' PC and their perception of the influence of PC on project success was calculated. The results in Table 4.10 above show there is no correlation between the two variables ($r = 0.08, N = 122, p < 0.05$).

H9: There is a relationship between IT PMs' PC and the overall perception of the influence of PC on their project success.

The correlation between IT PMs' PC and the overall perception of the influence of PC on their project success was calculated. The results in Table 4.11 below show a significant medium positive correlation between the two variables at a 95% level of confidence ($r = 0.39, N = 324, p < 0.05$). This means that high levels of PC are

associated with high levels of perception overall of how the IT PMs' PC influences their project success. The calculated CoD ($0.39^2 \ x \ 100$) suggests there is a shared variance of 15% between the two variables.

Table 4.11 Hypothesis H9 Correlations

	IT PM PC	IT PM Success
Correlation Coefficient	1.000	.388[**]
Sig. (2-tailed)	.	.000
N	324	324
**. Correlation is significant at the 0.01 level (2-tailed).		

The correlation between IT PMs' PC and the overall perception of the influence of PC on their project success was calculated. The results in Table 4.11 above show a significant medium positive correlation between the two variables at a 95% level of confidence ($r = 0.39, N = 324, p < 0.05$). This means that high levels of PC are associated with high levels of perception overall of how the IT PMs' PC influences their project success. The calculated CoD ($0.39^2 \ x \ 100$) suggests there is a shared variance of 15% between the two variables.

H10: There is a relationship between IT PMs' PC and the overall perception of the influence of PC on their productivity.

Table 4.12 Hypothesis H10 Correlations

	IT PM PC	IT PM Productivity
Correlation Coefficient	1.000	.347[**]
Sig. (2-tailed)	.	.000
N	324	324
**. Correlation is significant at the 0.01 level (2-tailed).		

The correlation between IT PMs' PC and the overall perception of the influence of PC to their productivity was calculated. The results in Table 4.12 above show a

significant medium positive correlation between the two variables at a 95% level of confidence ($r = 0.35, N = 324, p < 0.05$). This means that high levels of PC are associated with high levels of overall perception that the IT PMs' PC influences their productivity. The calculated CoD ($0.35^2 \, x \, 100$) suggests there is a shared variance of 12% between the two variables.

<u>*H11: There is a relationship between IT PMs' PC and the corporate polychronicity of their employers.*</u>

Table 4.13 Hypothesis H11 Correlations

	Corporate Polychronicity	**IT PM PC**
Correlation Coefficient	1.000	.207[**]
Sig. (2-tailed)	.	.000
N	297	297
**. Correlation is significant at the 0.01 level (2-tailed).		

The correlation between IT PMs' PC and the corporate polychronicity of their employers was calculated. The results in Table 4.13 above show a significant weak positive correlation between the two variables ($r = 0.21, N = 297, p < 0.05$). This means that high levels of PC are associated with high levels of corporate polychronicity. The calculated CoD ($0.21^2 \, x \, 100$) suggests there is a shared variance of 4% between the two variables.

4.3.2   H6 to H8 Explore differences between two groups of data.

Testing of hypotheses H6 to H8 were performed using the Mann-Whitney U Test, which is a non-parametric technique used to compare two independent groups for differences. Non-parametric techniques have the following assumptions (Pallant, 2011):

(a) The samples need to be random.

(b) All the observations need to be independent of one another.

Both assumptions verified as true.

The non-parametric Mann-Whitney U Test converts the scores into ranks; therefore, the shape of the data is insignificant (Pallant, 2011). It was therefore the perfect choice for this dataset with some variables not normally distributed.

H6: There is a significant difference between how:

   a) *IT PMs as a group rate their PC compared with how*

   b) *IT project team members as a group rate the IT PMs' PC.*

Table 4.14 Hypothesis H6 Variable Ranks

	Occupation	N	Mean Rank	Sum of Ranks
	IT PM	202	151.16	30534.50
IT PM PC	IT Other	122	181.27	22115.50
	Total	**324**		

Table 4.15 Hypothesis H6 Test Statistics

Test	IT PM PC
Mann-Whitney U	10031.500
Asymp. Sig. (2-tailed)	.005

Table 4.16 Hypothesis H6 Median Values

Occupation	N	Median
IT PM	202	3.500
IT Other	122	4.000
Total	324	3.500

The Mann-Whitney U test revealed there was a statistically significant ($p < 0.05$) difference between how:

   a) IT PMs as a group rate their PC (N = 202, Md = 3.5) compared with how

   b) IT project team members as a group rate the IT PMs' PC (N = 122, Md = 4.0), U = 10031.5, $z = -2.8$, $p < 0.05$.

H7: There is a significant difference between how:

a) *IT PMs as a group rate the influence of PC on their project success compared with how*

b) *IT project team members as a group rate the influence the IT PMs' PC on their project success.*

Table 4.17 Hypothesis H7 Variable Ranks

	Occupation	N	Mean Rank	Sum of Ranks
IT PM Success	IT PM	202	155.54	31420.00
	IT Other	122	174.02	21230.00
	Total	**324**		

Table 4.18 Hypothesis H7 Test Statistics

Test	IT PM Success
Mann-Whitney U	10917.000
Asymp. Sig. (2-tailed)	.080

Table 4.19 Hypothesis H7 Median Values

Occupation	N	Median
IT PM	202	3.00
IT Other	122	3.00
Total	324	3.00

The Mann-Whitney U test revealed there was no statistically significant ($p > 0.05$) difference between how:

a) IT PMs as a group rate the influence of PC (N = 202, Md = 3.0) on their project success compared with how

b) IT project team members as a group rate the influence of the IT PMs' PC on their project success (N = 122, Md = 3.0), U = 10917, z = -1.75, $p > 0.05$.

H8: There is a significant difference between how:

a) *IT PMs as a group rate the influence of PC on their productivity compared with how*

b) *IT project team members as a group rate the influence of the IT PMs' PC on their productivity.*

Table 4.20 Hypothesis H8 Variable Ranks

	Occupation	N	Mean Rank	Sum of Ranks
IT PM Productivity	IT PM	202	156.10	31532.50
	IT Other	122	173.09	21117.50
	Total	**324**		

Table 4.21 Hypothesis 8 Test Statistics

	IT PM Productivity
Mann-Whitney U	11029.500
Asymp. Sig. (2-tailed)	.106

Table 4.22 Hypothesis 8 Median Values

Occupation	N	Median
IT PM	202	3.00
IT Other	122	3.00
Total	324	3.00

The Mann-Whitney U test revealed there was no statistically significant ($p > 0.05$) difference between how:

a) IT PMs as a group rate the influence of PC on their productivity (N = 202, Md = 3.0) compared with how

b) IT project team members as a group rate the influence of the IT PMs' PC on their productivity (N = 122, Md = 3.0), U = 11029.5, $z = -1.62$, $p > 0.05$.

4.4. Summary

This chapter described in detail the process followed in analysing the dataset generated from digitising the questionnaire responses.

The discussion included all the statistical tests performed, the reasons for choosing a particular test, and the output from each test. The chapter omitted any inferences and presented merely the facts, but included the relevance of each test in relation to the hypothesis.

Chapter 5 describes any conclusions and recommendations that flowed out of this analysis.

Chapter 5: Conclusions and Recommendations

5.1. Introduction

Chapter 5 discusses the conclusions and recommendations derived from the analysis performed and discussed in Chapter 4.

The chapter revisits the research hypotheses and discusses them in relation to the analysis performed on the dataset. The chapter continues with a description of conclusions drawn from the analysis, followed by a description of the contribution of this project to the greater body of knowledge. §5.5 provides recommendations and ideas for future research.

5.2. Research Overview

This research project aimed to investigate the influence of PC on the productivity and ultimate project success of IT PMs. A theoretical model, designed to aid in the investigation, provided the complete scope of the project, including the variables and the proposed interrelationships. Eleven hypotheses based on the theoretical model, and a questionnaire to obtain the data needed to test the hypotheses, completed the set of components needed for the study. The survey, conducted amongst IT professionals worldwide using an online survey tool, collected the data sample. The data sample consisted out of 324 respondents, of which 202 (62%) were IT PMs and 122 (38%) were IT project team members (not IT PMs). The sample can be considered as random for research purposes, due to the wide spread of corporations, countries and industries represented. All the participants were invitees to the survey i.e. no snowball sampling techniques were used; neither were links posted in chat rooms, or other social media. Each participant could complete the questionnaire only once, but could go back and review or change answers until the survey expired. Participants could quit at any time.

The first step was to clean the dataset, then code it numerically, followed by importing it into SPSS. A series of statistical tests performed on the dataset either supported or rejected each hypothesis.

Table 5.1 below summarises the data analysis in terms of the hypotheses:

Table 5.1 Summary of Hypotheses

Hypothesis	Test Performed	Test Results	Hypothesis Supported
H1: There is a relationship between IT PMs' PC and their polychronicity.	Spearman's Rho	r = 0.34, N = 202, p < 0.05	✓
H2: There is a relationship between IT PMs' PC and their perception of the influence of PC on their productivity.	Spearman's Rho	r = 0.49, N = 202, p < 0.05	✓
H3: There is a relationship between how IT project team members perceive IT PMs' PC and their perception of the influence of their PC on their productivity.	Spearman's Rho	r = 0.03, N = 122, p > 0.05	✖
H4: There is a relationship between IT PMs' PC and their perception of the influence of PC on their project success.	Spearman's Rho	r = 0.52, N = 202, p < 0.05	✓
H5: There is a relationship between how: a) IT project team members perceive IT PMs' PC and b) Their perception of the influence of IT PMs' PC on their project success.	Spearman's Rho	r = 0.08, N = 122, p > 0.05	✖
H6: There is a significant difference between how: a) IT PMs as a group rate their PC compared with how b) IT project team members as a group rate the IT PMs' PC.	Mann-Whitney U	U = 10031.5, z = -2.8, p < 0.05	✓

Hypothesis	Test Performed	Test Results	Hypothesis Supported
H7: There is a significant difference between how: a) IT PMs as a group rate the influence of PC on their project success compared with how b) IT project team members as a group rate the influence of the IT PMs' PC on their project success.	Mann-Whitney U	$U = 10917$, $z = -1.75$, $p > 0.05$	✘
H8: There is a significant difference between how: a) IT PMs as a group rate the influence of PC on their productivity compared with how b) IT project team members as a group rate the influence of the IT PMs' PC on their productivity.	Mann-Whitney U	$U = 11029.5$, $z = -1.62$, $p > 0.05$	✘
H9: There is a relationship between IT PMs' PC and the overall perception of the influence of PC on their project success.	Spearman's Rho	$r = 0.39$, $N = 324$, $p < 0.05$	✓
H10: There is a relationship between IT PMs' PC and the overall perception of the influence of PC on their productivity.	Spearman's Rho	$r = 0.35$, $N = 324$, $p < 0.05$	✓
H11: There is a relationship between IT PMs' PC and the corporate polychronicity of their employers.	Spearman's Rho	$r = 0.21$, $N = 297$, $p < 0.05$	✓

The following section describes for each hypothesis, the statistical significance, observations and the conclusions reached, followed by an overall conclusion related to the main research problem.

H1: There is a relationship between IT PMs' PC and their polychronicity.

Spearman's rho showed a statistically significant positive correlation of medium strength exists between IT PMs' PC and their polychronicity. This test does not

suggest any causation. The CoD suggested there is a shared variance of 12% between the two variables.

Conclusion:

    a) Reject the null hypothesis that no relationship exists.

    b) The positive relationship suggests one could expect IT PMs ranking higher on the chronicity continuum to be more prone to practising PC.

    c) The relationship direction was as expected.

A discussion of this significant result appears later in this chapter with hypotheses H9, H10 and H11.

H2: There is a relationship between IT PMs' PC and their perception of the influence of PC on their productivity.

H4: There is a relationship between IT PMs' PC and their perception of the influence of PC on their project success.

Spearman's rho for both H2 and H4 showed a significant large positive correlation between the two sets of variables. The CoD suggested there is a large shared variance (24% for productivity and 27% for project success) between the two sets of variables.

Conclusion:

    a) Reject the null hypothesis that no relationship exists.

    b) IT PMs perceive their PC to have a large influence on their productivity and their ultimate project success.

    c) The relationship direction was as expected. As the IT PMs' PC increases or decreases, the IT PMs' productivity and project success increases or decreases similarly. However, one cannot determine causation from this

test (e.g. practising PC causes an increase or decrease in IT PMs' productivity or project success).

A discussion of this significant result appears later in this chapter with hypotheses H9, H10 and H11.

H3: There is a relationship between how IT project team members perceive IT PMs' PC and their perception of the influence of PC on their productivity.

H5: There is a relationship between how:

  a) *IT project team members perceive IT PMs' PC and*

  b) *Their perception of the influence of IT PMs' PC on their project success.*

Spearman's rho for these two sets of variables suggested that no relationship exists between them.

Conclusion:

Reject the null hypothesis that a relationship exists in both cases.

Other observations:

  a) Interestingly, from the IT PMs' perspective a strong relationship existed in both cases, but from the team members' perspective there was no relationship.

  b) This result is diverging from the results obtained in testing hypotheses H2 and H4. It is possible that IT team members do not realise the importance of communication to the general success of an IT project and therefore downplay the significance of IT PM PC.

This research project did not include in its scope any way for the participants to substantiate their scoring. However, the results from testing the hypotheses H7

and H8 shed some light on this divergence and a discussion follows in later sections.

H6: There is a significant difference between how:

a) *IT PMs as a group rate their PC compared to how*

b) *IT project team members as a group rate the IT PMs' PC.*

The Mann-Whitney U test performed against the two variables suggested a statistically significant difference in the ratings described in the hypothesis.

Conclusion:

Reject the null hypothesis that there were no significant differences in the ratings.

Other observations:

The median values for each variable suggested IT PMs rate their PC lower than the IT team members would rate it. A possible reason could be that IT PMs practise PC in situations where the two groups share the same space. For example, the IT PM could facilitate a project meeting, at the same time take meeting notes, and communicate by instant message or VM collaboration tools with team members that are not physically present. To the IT project team members, such a scenario playing out regularly may suggest a higher PC than the IT PM realises.

Another reason could be the IT PMs were referencing themselves when they answered the questionnaire. IT project team members, however, rated the IT PM on their most recent project; which more than likely referred to a very different person. In other words, the two sets of data were unpaired.

H7: There is a significant difference between how:

    a) *IT PMs as a group rate the influence of PC on their project success compared with how*

    b) *IT project team members as a group rate the influence of the IT PMs' PC on their project success.*

H8: There is a significant difference between how:

    a) *IT PMs as a group rate the influence of PC on their productivity compared with how*

    b) *IT project team members as a group rate the influence of the IT PMs' PC on their productivity.*

In both cases, the Mann-Whitney U test suggested no statistically significant differences.

Conclusion:

Reject both hypotheses.

Other observations:

In combining this result with the results for H6, one could argue that both groups attach the same value to the IT PMs' PC in terms of their productivity and project success rate. The only difference between the groups was in their perception of the IT PMs' PC (refer to H3 and H5).

H9: There is a relationship between IT PMs' PC and the overall perception of the influence of PC on their project success.

H10: There is a relationship between IT PMs' PC and the overall perception of the influence of PC on their productivity.

Spearman's rho for both H9 and H10 showed a significant medium positive correlation between the two sets of variables.

Conclusion:

a) Reject the null hypothesis that no relationship exists between the two sets of variables.

b) An IT project team (IT PM and IT project members) perceive the IT PMs' PC to have a significant influence on their productivity and their ultimate project success.

c) The relationship direction was as expected. As the IT PMs' PC increases or decreases the IT PMs' project success rate and perceived productivity increases or decreases similarly. However, one cannot determine causation from this test (e.g. practising PC causes an increase or decrease in IT PMs' productivity or project success).

Other observations:

a) The CoD suggests a shared variance of 15% for productivity and 12% for project success between the two sets of variables.

b) The CoD for both hypotheses were lower than the CoD for hypotheses H2 and H4 (15% vs. 24% and 12% vs. 27%). This result could be because the lack of support of hypotheses H3 and H5 is causing a diminishing effect for hypotheses H9 and H10.

H11: There is a relationship between IT PMs' PC and the corporate polychronicity of their employers.

Spearman's rho showed a statistically significant positive relationship of low strength between IT PMs' PC and the corporate polychronicity of their employers.

Conclusion:

   a) Reject the null hypothesis that no relationship exists.

   b) The relationship direction was as expected.

Other observations:

   a) The CoD suggests a shared variance of 4% between the two variables.

   b) This test does not suggest any causation.

5.3.   Conclusions

This section revisits the research questions and attempts to answer them based an interpretation of the empirical evidence.

1. **Is there a relationship between IT PMs' PC and their polychronicity?**

Polychronicity is a predictor of multitasking (refer to the discussion on polychronicity in §2.3). PC is the practise of communication using a polychronic style (§2.3.3). Kleinman (2007) found that job roles influences multitasking during organisational meetings and people in managerial roles multitask significantly more than people in non-managerial roles do. Additionally, the use of electronic communication tools is preferable to other tools when multitasking during organisational meetings. IT PMs have a managerial role; the empirical evidence that suggests a positive correlation exists between polychronicity and PC in the domain of IT PMs is therefore no surprise.

IT PMs have to manage multiple disparate projects concurrently in a challenging, fast pace environment. The literature review suggests corporations expect polychronic behaviour and therefore the IT PMs have no choice in the matter if they want to remain competitive in this domain. However, the literature also points to the importance of effective and efficient communication in this domain. To the IT PM then, it becomes a natural extension to use communication technology in a polychronic fashion; hence the relationship between PC and individual polychronicity.

The empirical evidence suggested that IT PMs rate their PC different when compared to how the IT project team members rate the IT PMs' PC. (N = 202, Md = 3.5 versus N = 122, Md = 4.0). This anomaly is also visible in the boxplots (Figure 4.1) which shows a much shorter box (suggesting that 50% of the ratings fall in a narrower band) in the ratings by IT team members when compared with the ratings of the IT PMs rating themselves. This anomaly could be because IT PMs consider their PC as the routine behaviour; whereas the IT team members consider it as exceptional and over the top or extreme.

2. **Is there a relationship between IT PMs' PC and their employers' corporate polychronicity?**

Corporate culture plays a big role in the everyday life of the IT worker. Understandably, corporations develop a *time culture*, i.e. they have a preference of how employees spend their time in performing their daily tasks. This preference is measurable, using the IPV (§1.4.10). Corporations also have strategic goals and they spend much time ensuring that employees support the corporate goals and strategies. The corporations logically expect employees to fit into the corporate culture.

IT PMs also have a measureable polychronicity style. In addition, some IT PMs will practice PC to an extend that is measurable. To explore the relationship between IT PMs' PC and the corporate polychronic of their employers, both

measurements were included in the online questionnaire and then analysed with statistical software.

When splitting the results by occupation (IT PMs vs. IT project team members), there was no major difference in the results (mean of 4.3 vs. 4.1). Combining the results produced a mean value of 4.2. This suggests that IT project teams are consistent in how they rate their employers' polychronicity.

The overall correlation test found only a weak relationship between IT PMs' PC and the polychronicity of their employers. The CoD suggested the employers' corporate polychronicity only explains about 4% of the IT PMs' PC, which is very limited in real life.

3. **Does the PC of IT PMs have an influence on their productivity?**

Various methods to measure the productivity of software engineers currently exist (e.g. counting lines of code, counting function points delivered and other subjective reviews). However, these attempts have focused mainly on the IT team members' productivity and not the productivity of IT PMs. IT PMs usually produce various metrics, such as Earned Value which will suggest the productivity of the IT project team, but not necessarily that of the IT PMs. The scope of this research did not include developing a measurement for IT PM productivity. Since the literature review did not reveal a reliable measurement, the research project included an analysis of the IT project team's perception of the influence of PC on the productivity of the IT PMs. The empirical evidence collected suggests a positive relationship between IT PMs' PC and the IT project team's perception of the influence of PC on their productivity.

The evidence was collected using two distinct groups: IT PMs and IT team members. The group's perceptions were analysed separately as well as combined. The analysis discovered support for hypothesis H2 (IT PMs' perception), but not for hypothesis H3 (IT project team's perception). Additionally, analysis discovered no support for hypothesis H8. This result suggested there is

no statistically significant difference between the two groups in how they rate the influence of PC on the productivity of the IT PMs. However, the analysis found support for hypothesis H10, even though the relationship was not as strong as H2 (H10: $r = 0.35$, $N = 324$, $p < 0.05$ versus H2: $r = 0.49$, $N = 202$, $p < 0.05$).

4. **Does the PC of IT PMs have an influence on the success of their projects?**

The literature suggested the overall success of an IT project hinges on:

a) How well can the IT PMs balance the triple constraint throughout the duration of the project;

b) How satisfied the stakeholders are with the end-result (product, service or result).

The IT PMs balance these factors with the help of project management tools and need to communicate the process, status and results to the project stakeholders according to the communication plan. If the IT PMs' communication is unsuccessful, then the stakeholders are dissatisfied, leading to an unsuccessful project. Effective communication is therefore an important skill for the IT PMs. Since IT PMs are required to manage multiple projects concurrently, the need exists to communicate concurrently to the stakeholders, i.e. practise PC.

Hypotheses H4, H5 and H9 address the IT PMs' PC as well as its relationship to project success. The process followed for project success was the same as productivity (i.e. data was collected using two distinct groups which were analysed separately and together). The analysis discovered support for hypothesis H4 (IT PMs' perception), but not for hypothesis H5 (IT project team's perception). Additionally, analysis discovered no support for hypothesis H7. This result suggested there is no statistically significant difference between the two groups in how they rate the influence of PC on the project success of the IT PMs. Nevertheless, the analysis discovered support for hypothesis H9 as well. The

relationship however was not as strong as H4 (H9: r = 0.39, N = 324, p < 0.05 versus H4: r = 0.52, N = 202, p < 0.05).

5.3.1   Summary

Overall, the conclusion is IT PMs' individual polychronicity has a direct relationship to their PC. Moreover, IT PMs' PC has a direct relationship to their productivity and the success of projects that they manage.

Additionally, there is a weak relationship between IT PMs' PC and their employers' corporate polychronicity.

5.4.   Research Contribution

This research study showed a direct relationship between IT PMs' polychronicity and their PC (H1). It also showed a relationship between IT PMs' PC and their employers' corporate polychronicity (H11). The higher IT PMs' polychronicity, the more they practise PC. Further, the study showed there is a direct relationship between IT PMs' PC and their productivity and project success.

The above result has major implications for corporations that employ IT PMs. The test for polychronicity is simple. Testing new IT PM applicants and currently employed IT PMs is an easy task. Hiring decisions can factor in the IT PMs' score. If the IT PM is highly polychronic, then chances are that he or she is practising PC (H1). Higher PC is correlated to higher productivity and project success (H2, H3, H4, H5, H9 and H10). Highly monochronic employees can be trained in efficient communication or possibly in PC specifically. This research study did not include training methods; therefore, it is unknown if training in polychronicity or PC exists or if they are indeed acquirable skills.

5.5.   Recommendations for Future Research

This research study included a set of assumptions and certain limitations. Future research can remove some of the limitations, for example:

1. Expand the research to include PMs from all industries. Such an approach would be more in line with the principles provided by the PMI and documented in the PMBOK, i.e. the PMBOK principles apply to PMs in <u>all</u> industries.

2. Include national origin in the research to allow comparisons with Hall's polychronicity results (Hall classified polychrons by their national origin). It could however present difficulty in today's global delivery model, because communicating, working and socialising with other cultures influences polychronicity. For example, Hall observed the Japanese, although being polychronic when dealing with one another, would adapt a monochronic style when dealing with other cultures such as Americans (Hall, 1983).

3. Develop a multi-item construct to measure productivity and project success. Although the research community in general agree that a one-item construct can reliably measure a non-complex variable, there is no definition complex and non-complex. Cronbach's alpha coefficient can test a multi-item construct for reliability and would be more acceptable in the research community.

Moreover, the project management community in general would benefit from a study that would explore the polychronicity contradiction described in §1.2. The question that remains is if a polychronic PM that practises PC is more successful and/or more productive than a monochronic PM.

This study did not include any research into PC as an acquirable or improvable skill. It would be a major benefit to corporations if the possibility and technology exists to train IT PMs in PC and therefore research in this area would be valuable.

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Appendix A. Questionnaire

Page 1: Informed Consent

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College of Science, Engineering and Technology

University of South Africa

This study is to determine the impact of multi-communicating (i.e. using multiple methods of communication simultaneously) by Information Technology Project Managers on their productivity and project success. Your participation is voluntary and will be limited to this questionnaire. If you so wish, and indicate your willingness to participate in a follow-up interview, the researcher may contact you in to clarify some of your responses. Data collected during the research activity will remain confidential, but it can only be disposed of after five years because of the university rules. After five years all material used in this study will be destroyed.

* I hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project. I understand that I am at liberty to withdraw from the project at any time, should I so desire. I hereby give permission that my responses may be used in the above research project, provided that none of my personal details will be made public in the published research report.

○ I Agree

○ I Disagree

Page 2: Demographics

Please provide the following information about yourself:

I am based in the following Country:

[▼]

* I am employed as an:

○   IT Project Manager

◉   IT Professional other than a Project Manager

○   Other

Please provide the name of your employer (If you are currently unemployed, then provide the name of your last employer)

[   ]

Page 2a: Polychronic Communication Style of the IT PM

Please use the following scale to indicate the extent to which you agree or disagree that each statement is true about yourself:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1. I like to juggle several communication activities at the same time (e.g. use chatting software and replying to email while talking on the phone)	○	○	○	○	○	○
2. I seldom interrupt one conversation to reply to another conversation (e.g. reply to an email while busy on the telephone)	○	○	○	○	○	○
3. I believe that having several conversations at the same time contributes to the success of the projects that I am managing	○	○	○	○	○	○
4. I believe that having several conversations at the same time improves my productivity	○	○	○	○	○	○

Page 2b: Polychronic Communication Style of the IT PM (Team Member's Perspective)

Please use the following scale to indicate the extent to which you agree or disagree that each statement is true about the IT PM on your last project:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1. The IT PM like to juggle several communication activities at the same time(e.g. use chatting software and replying to email while talking on the phone)	○	○	○	○	○	○
2. The IT PM seldom interrupted one conversation to reply to another conversation (e.g. reply to an email while busy on the telephone)	○	○	○	○	○	○
3. I believe the fact that the IT PM was having several conversations at the same time contributed to the success of the project	○	○	○	○	○	○
4. I believe that the fact that the IT PM was having several conversations at the same time improved his/her productivity	○	○	○	○	○	○

Page 3: Corporate Polychronicity

Please use the following scale to indicate the extent to which you agree or disagree that each statement is true about your organization or department:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1. We like to juggle several activities at the same time	○	○	○	○	○	○	○
2. We would rather complete an entire project every day than complete parts of several projects	○	○	○	○	○	○	○
3. We believe people should try to do many things at once	○	○	○	○	○	○	○
4. When we work by ourselves, we usually work on one project at a time	○	○	○	○	○	○	○
5. We prefer to do one thing at a time	○	○	○	○	○	○	○

6.   We believe people do their best work

when they have many tasks to complete   ○   ○   ○   ○   ○   ○   ○

7.   We believe it is best to complete one

task before beginning another   ○   ○   ○   ○   ○   ○   ○

8.   We believe it is best for people to be

given several tasks and assignments to   ○   ○   ○   ○   ○   ○   ○

perform

9.   We seldom like to work on more than

a single task or assignment at the same   ○   ○   ○   ○   ○   ○   ○

time

10.   We would rather complete parts of

several projects every day than complete   ○   ○   ○   ○   ○   ○   ○

an entire project

Page 4: Individual Polychronicity

Please use the following scale to indicate the extent to which you agree or disagree that each statement is true about YOU:

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1. I like to juggle several activities at the same time	○	○	○	○	○	○	○
2. I would rather complete an entire project every day than complete parts of several projects	○	○	○	○	○	○	○
3. I believe that I should try to do many things at once	○	○	○	○	○	○	○
4. When I work by myself, I usually work on one project at a time	○	○	○	○	○	○	○
5. I prefer to do one thing at a time	○	○	○	○	○	○	○

6.   I believe that I do my best work when
   I have many tasks to complete   ○   ○   ○   ○   ○   ○   ○

7.   I believe it is best to complete one
   task before beginning another   ○   ○   ○   ○   ○   ○   ○

8.   I believe it is best for me to be given
   several tasks and assignments to perform   ○   ○   ○   ○   ○   ○   ○

9.   I seldom like to work on more than a
   single task or assignment at the same
   time   ○   ○   ○   ○   ○   ○   ○

10.   I would rather complete parts of
   several projects every day than complete   ○   ○   ○   ○   ○   ○   ○
   an entire project

Page 5: Permission to Contact

* The researcher may contact me

○ Yes

○ No

Contact Details

Please provide the following information about yourself:

My Name is

[   ]

I prefer to be contacted by:

○ Telephone

○ Email

My telephone number is:

[   ]

My email address is:

[   ]

Page 6: Exit Survey

Thank you for your participation!

Appendix B. Letter to Participants

Dear Survey Participant,

Today I am appealing to you for help towards a very worthwhile study; all it will take is a few minutes of your time.

It is to your advantage to assist in this study, as your participation will help you to discover previously unknown characteristics about yourself. The purpose of this study is to assess the influence of multi-communicating (i.e. using more than one method of communication simultaneously) on the success and productivity of IT project managers. In the process you may learn your own orientation towards multi-tasking in general. Your responses will remain completely anonymous and confidential unless you choose to provide your identity and contact information.

The survey will be available at the following link until DAY, MONTH 2012 (www.surveylink.com). Please answer all the questions of the survey. If you have any questions or require further clarification then please do not hesitate to contact me.

If you would like to receive a summary of my research then please include your contact details.

Thank you for the courtesy of your assistance.

Yours sincerely,

Basil Coetzee

Appendix C. Variable Statistics

Table C.1 Statistical Description of Variables by Occupation

Variable	Occupation	Description		Statistic	Std. Error
IT PM PC	IT PM	Mean		3.473	.0866
		95% Confidence Interval for Mean	Lower Bound	3.302	
			Upper Bound	3.644	
		5% Trimmed Mean		3.481	
		Median		3.500	
		Variance		1.515	
		Std. Deviation		1.2310	
		Minimum		1.0	
		Maximum		6.0	
		Range		5.0	
		Interquartile Range		2.0	
		Skewness		-.125	.171
		Kurtosis		-.588	.341
	IT Other	Mean		3.861	.0746
		95% Confidence Interval for Mean	Lower Bound	3.713	
			Upper Bound	4.008	
		5% Trimmed Mean		3.868	
		Median		4.000	
		Variance		.679	
		Std. Deviation		.8239	
		Minimum		2.0	
		Maximum		6.0	
		Range		4.0	
		Interquartile Range		1.0	
		Skewness		-.016	.219
		Kurtosis		-.043	.435
IT PM Success	IT PM	Mean		3.07	.114
		95% Confidence Interval for Mean	Lower Bound	2.85	
			Upper Bound	3.30	
		5% Trimmed Mean		3.03	

Variable	Occupation	Description		Statistic	Std. Error
		Median		3.00	
		Variance		2.636	
		Std. Deviation		1.624	
		Minimum		1	
		Maximum		6	
		Range		5	
		Interquartile Range		2	
		Skewness		.140	.171
		Kurtosis		-1.232	.341
	IT Other	Mean		3.39	.142
		95% Confidence Interval for Mean	Lower Bound	3.11	
			Upper Bound	3.68	
		5% Trimmed Mean		3.38	
		Median		3.00	
		Variance		2.472	
		Std. Deviation		1.572	
		Minimum		1	
		Maximum		6	
		Range		5	
		Interquartile Range		3	
		Skewness		.038	.219
		Kurtosis		-1.135	.435
IT PM Productivity	IT PM	Mean		2.77	.108
		95% Confidence Interval for Mean	Lower Bound	2.56	
			Upper Bound	2.98	
		5% Trimmed Mean		2.71	
		Median		3.00	
		Variance		2.339	
		Std. Deviation		1.529	
		Minimum		1	
		Maximum		6	
		Range		5	
		Interquartile Range		3	
		Skewness		.340	.171
		Kurtosis		-1.122	.341
	IT Other	Mean		3.06	.140

Variable	Occupation	Description		Statistic	Std. Error
		95% Confidence Interval for Mean	Lower Bound	2.78	
			Upper Bound	3.34	
		5% Trimmed Mean		3.01	
		Median		3.00	
		Variance		2.402	
		Std. Deviation		1.550	
		Minimum		1	
		Maximum		6	
		Range		5	
		Interquartile Range		2	
		Skewness		.160	.219
		Kurtosis		-1.063	.435
Polychronicity	IT PM	Mean		3.939	.0784
		95% Confidence Interval for Mean	Lower Bound	3.785	
			Upper Bound	4.094	
		5% Trimmed Mean		3.939	
		Median		4.000	
		Variance		1.242	
		Std. Deviation		1.1143	
		Minimum		1.3	
		Maximum		6.7	
		Range		5.4	
		Interquartile Range		1.7	
		Skewness		.006	.171
		Kurtosis		-.291	.341
	IT Other	Mean		3.863	.1244
		95% Confidence Interval for Mean	Lower Bound	3.616	
			Upper Bound	4.110	
		5% Trimmed Mean		3.854	
		Median		4.000	
		Variance		1.533	
		Std. Deviation		1.2382	
		Minimum		1.0	
		Maximum		7.0	

Variable	Occupation	Description		Statistic	Std. Error
		Range		6.0	
		Interquartile Range		1.8	
		Skewness		.040	.243
		Kurtosis		-.368	.481
Corporate Polychronicity	IT PM	Mean		4.2995	.07028
		95% Confidence Interval for Mean	Lower Bound	4.1609	
			Upper Bound	4.4381	
		5% Trimmed Mean		4.3146	
		Median		4.3000	
		Variance		.948	
		Std. Deviation		.97377	
		Minimum		1.80	
		Maximum		6.60	
		Range		4.80	
		Interquartile Range		1.38	
		Skewness		-.154	.175
		Kurtosis		-.152	.349
	IT Other	Mean		4.0543	.08945
		95% Confidence Interval for Mean	Lower Bound	3.8769	
			Upper Bound	4.2317	
		5% Trimmed Mean		4.0598	
		Median		4.0000	
		Variance		.840	
		Std. Deviation		.91662	
		Minimum		1.80	
		Maximum		6.60	
		Range		4.80	
		Interquartile Range		1.20	
		Skewness		-.060	.236
		Kurtosis		.190	.467

Table C.2 Statistical Description of Variables

Variable	Description		Statistic	Std. Error
IT PM PC	Mean		3.619	.0617
	95% Confidence Interval for Mean	Lower Bound	3.497	
		Upper Bound	3.740	
	5% Trimmed Mean		3.637	
	Median		3.500	
	Variance		1.233	
	Std. Deviation		1.1103	
	Minimum		1.0	
	Maximum		6.0	
	Range		5.0	
	Interquartile Range		1.5	
	Skewness		-.273	.135
	Kurtosis		-.213	.270
IT PM Success	Mean		3.19	.089
	95% Confidence Interval for Mean	Lower Bound	3.02	
		Upper Bound	3.37	
	5% Trimmed Mean		3.16	
	Median		3.00	
	Variance		2.591	
	Std. Deviation		1.610	
	Minimum		1	
	Maximum		6	
	Range		5	
	Interquartile Range		3	
	Skewness		.093	.135
	Kurtosis		-1.196	.270
IT PM Productivity	Mean		2.88	.086
	95% Confidence Interval for Mean	Lower Bound	2.71	
		Upper Bound	3.04	
	5% Trimmed Mean		2.82	
	Median		3.00	
	Variance		2.375	
	Std. Deviation		1.541	
	Minimum		1	
	Maximum		6	

Variable	Description		Statistic	Std. Error
	Range		5	
	Interquartile Range		3	
	Skewness		.270	.135
	Kurtosis		-1.112	.270
Polychronicity	Mean		3.914	.0666
	95% Confidence Interval for Mean	Lower Bound	3.783	
		Upper Bound	4.045	
	5% Trimmed Mean		3.911	
	Median		4.000	
	Variance		1.334	
	Std. Deviation		1.1550	
	Minimum		1.0	
	Maximum		7.0	
	Range		6.0	
	Interquartile Range		1.7	
	Skewness		.010	.140
	Kurtosis		-.315	.280
Corporate Polychronicity	Mean		4.2128	.05568
	95% Confidence Interval for Mean	Lower Bound	4.1032	
		Upper Bound	4.3224	
	5% Trimmed Mean		4.2235	
	Median		4.2000	
	Variance		.921	
	Std. Deviation		.95961	
	Minimum		1.80	
	Maximum		6.60	
	Range		4.80	
	Interquartile Range		1.30	
	Skewness		-.101	.141
	Kurtosis		-.086	.282

Appendix D. Extreme Values

Table D.1 Extreme Values by Occupation

Variable	Occupation			Case Number	Value
IT PM PC	IT PM	Highest	1	12	6.0
			2	42	6.0
			3	170	6.0
			4	236	6.0
			5	318	6.0
		Lowest	1	315	1.0
			2	277	1.0
			3	234	1.0
			4	177	1.0
			5	111	1.0[a]
	IT Other	Highest	1	176	6.0
			2	7	5.5
			3	124	5.5
			4	168	5.5
			5	205	5.5
		Lowest	1	261	2.0
			2	247	2.0
			3	201	2.0
			4	128	2.0
			5	73	2.0
IT PM Success	IT PM	Highest	1	47	6
			2	57	6
			3	70	6
			4	95	6
			5	133	6[b]
		Lowest	1	315	1
			2	307	1
			3	301	1
			4	296	1
			5	290	1[a]
	IT Other	Highest	1	3	6
			2	8	6
			3	22	6
			4	61	6
			5	81	6[b]

Variable	Occupation		Case Number	Value
		1	247	1
		2	197	1
	Lowest	3	185	1
		4	137	1
		5	124	1[a]
IT PM Productivity	IT PM	1	42	6
		2	95	6
	Highest	3	133	6
		4	149	6
		5	178	6[b]
		1	322	1
		2	319	1
	Lowest	3	315	1
		4	309	1
		5	307	1[a]
	IT Other	1	27	6
		2	81	6
	Highest	3	165	6
		4	195	6
		5	257	6[b]
		1	269	1
		2	261	1
	Lowest	3	255	1
		4	252	1
		5	247	1[a]
Polychronicity	IT PM	1	318	6.7
		2	304	6.6
	Highest	3	47	6.5
		4	298	6.3
		5	66	6.1[c]
		1	97	1.3
		2	198	1.5
	Lowest	3	160	1.6
		4	105	1.6
		5	60	1.6
	IT Other	1	35	7.0
		2	185	6.6
	Highest	3	253	6.5
		4	9	6.0
		5	54	5.8[e]

Variable	Occupation			Case Number	Value
Corporate Polychronicity		Lowest	1	88	1.0
			2	121	1.4
			3	168	1.5
			4	112	1.7
			5	19	1.9
	IT PM	Highest	1	136	6.60
			2	194	6.60
			3	163	6.40
			4	198	6.20
			5	47	6.10
		Lowest	1	69	1.80
			2	214	1.90
			3	111	1.90
			4	309	2.10
			5	174	2.10^d
	IT Other	Highest	1	35	6.60
			2	9	6.00
			3	3	5.90
			4	253	5.90
			5	15	5.50
		Lowest	1	203	1.80
			2	142	1.90
			3	24	2.00
			4	247	2.20
			5	295	2.30
a. Only a partial list of cases with the value 1.0 are shown in the table of lower extremes.					
b. Only a partial list of cases with the value 6 are shown in the table of upper extremes.					
c. Only a partial list of cases with the value 6.1 are shown in the table of upper extremes.					
d. Only a partial list of cases with the value 2.10 are shown in the table of lower extremes.					
e. Only a partial list of cases with the value 5.8 are shown in the table of upper extremes.					

Appendix E. Reliability of Scales

Table E.1 Individual Polychronicity Inter-Item Correlation Matrix

	IP Q1	IP Q2	IP Q3	IP Q4	IP Q5	IP Q6	IP Q7	IP Q8	IP Q9	IP Q10
IP Q1	1.00	.341	.565	.294	.507	.627	.465	.521	.302	.460
IP Q2	.341	1.00	.180	.379	.462	.402	.524	.373	.303	.530
IP Q3	.565	.180	1.00	.203	.379	.468	.319	.372	.189	.354
IP Q4	.294	.379	.203	1.00	.587	.216	.447	.225	.344	.328
IP Q5	.507	.462	.379	.587	1.00	.429	.662	.326	.406	.351
IP Q6	.627	.402	.468	.216	.429	1.00	.393	.676	.229	.480
IP Q7	.465	.524	.319	.447	.662	.393	1.00	.372	.421	.348
IP Q8	.521	.373	.372	.225	.326	.676	.372	1.00	.183	.439
IP Q9	.302	.303	.189	.344	.406	.229	.421	.183	1.00	.075
IP Q10	.460	.530	.354	.328	.351	.480	.348	.439	.075	1.00

Key: IP = Individual Polychronicity   **IP QX** = Individual Polychronicity Question X

Table E.2 Individual Polychronicity Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
IP Q1	34.81	105.101	.681	.557	.840
IP Q2	35.39	109.784	.572	.458	.850
IP Q3	35.20	112.162	.492	.366	.857
IP Q4	35.21	110.228	.491	.397	.857
IP Q5	35.91	105.475	.691	.600	.840
IP Q6	35.00	106.760	.647	.595	.844
IP Q7	36.04	108.568	.660	.533	.843
IP Q8	34.39	111.738	.573	.495	.850
IP Q9	35.21	115.781	.395	.265	.864
IP Q10	35.09	111.418	.552	.448	.852

Key: IP = Individual Polychronicity

Table E.3 Corporate Polychronicity Inter-Item Correlation Matrix

	CP Q1	CP Q2	CP Q3	CP Q4	CP Q5	CP Q6	CP Q7	CP Q8	CP Q9	CP Q10
CP Q1	1.00	.073	.501	.175	.317	.330	.258	.291	.107	.222
CP Q2	.073	1.00	.019	.333	.348	.130	.255	.123	.268	.349
CP Q3	.501	.019	1.00	.093	.289	.325	.246	.298	.085	.257
CP Q4	.175	.333	.093	1.00	.515	.089	.362	.181	.266	.160
CP Q5	.317	.348	.289	.515	1.00	.289	.491	.298	.328	.201
CP Q6	.330	.130	.325	.089	.289	1.00	.191	.420	.101	.305
CP Q7	.258	.255	.246	.362	.491	.191	1.00	.214	.327	.229
CP Q8	.291	.123	.298	.181	.298	.420	.214	1.00	.187	.341
CP Q9	.107	.268	.085	.266	.328	.101	.327	.187	1.00	.096
CP Q10	.222	.349	.257	.160	.201	.305	.229	.341	.096	1.00

Key: CP = Corporate Polychronicity   **CP QX** = Corporate Polychronicity Question X

Table E.4 Corporate Polychronicity Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
CP Q1	37.1313	76.770	.434	.314	.751
CP Q2	37.8855	78.230	.366	.270	.760
CP Q3	37.7879	77.607	.398	.325	.756
CP Q4	37.9091	74.590	.424	.318	.753
CP Q5	38.3973	69.396	.619	.461	.723
CP Q6	38.2626	77.201	.407	.273	.755
CP Q7	38.5960	74.802	.508	.310	.741
CP Q8	37.2121	78.512	.450	.278	.750
CP Q9	37.9899	79.490	.339	.180	.763
CP Q10	37.9798	78.337	.408	.267	.754

Key: CP = Corporate Polychronicity

Table E.5 PC Inter-Item Correlation Matrix

	IT PM PC Q1	IT PM PC Q2
IT PM PC Q1	1.000	.014
IT PM PC Q2	.014	1.000

Table E.6 PC Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
IT PM PC Q1	3.34	2.299	.014	.000	.
IT PM PC Q2	3.90	2.562	.014	.000	.

Appendix F. Dataset

Table F.1 Key to Dataset

Key:	
IPXX	Individual Polychronicity Question XX
IP	Individual Polychronicity Calculated Score
CPXX	Corporate Polychronicity Question XX
CP	Corporate Polychronicity Calculated Score
PCX	Polychronic Communication Question X
PC	Polychronic Communication Calculated Score

Table F.2 Dataset

Individual Polychronicity											Corporate Polychronicity											Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
6	4	6	6	3	3	3	5	6	4	4.6	7	4	5	6	7	6	3	6	6	4	5.4	6	6	6	5	5	1
2	5	1	2	2	1	1	2	6	3	2.5	7	3	6	2	2	7	2	7	2	6	4.4	2	5	3.5	1	1	1
5	4	3	3	3	5	3	5	3	4	3.8	5	5	4	6	4	4	3	5	5	5	4.6	4	3	3.5	2	2	1
6	6	5	4	2	6	5	7	6	6	5.3	6	7	7	7	4	5	3	5	6	6	5.6	5	4	4.5	4	5	1

				Individual Polychronicity											Corporate Polychronicity									Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
6	4	5	5	4	6	4	7	5	4	5	7	6	6	4	4	5	4	6	6	6	5.4	6	3	4.5	5	4	1
6	5	4	6	5	5	5	5	5	4	5	6	6	6	6	6	6	6	6	6	6	6	2	5	3.5	2	1	1
6	6	6	7	4	6	5	5	5	6	5.6	6	6	5	6	7	6	3	7	5	6	5.7	3	4	3.5	4	4	1
6	5	6	5	5	6	5	6	5	6	5.5	6	5	6	5	5	3	5	6	5	3	4.9	5	2	3.5	4	4	1
2	2	6	3	1	2	2	4	4	3	2.9	7	5	6	7	7	4	4	6	4	5	5.5	1	5	3	1	1	1
5	5	6	2	2	4	2	3	5	5	3.9	5	4	3	3	3	2	2	2	2	6	3.2	3	3	3	3	3	1
1	2	2	2	1	4	2	5	2	2	2.3	2	2	2	2	2	4	1	6	3	2	2.6	1	2	1.5	1	2	1
5	3	5	2	3	4	5	5	4	3	3.9	6	3	4	6	2	3	3	5	3	3	3.8	5	3	4	2	3	1
5	3	5	3	4	4	3	5	4	4	4	7	1	7	7	7	7	4	7	7	4	5.8	6	6	6	1	6	1
6	1	1	6	4	2	2	2	3	3	3	7	7	2	6	6	2	2	4	1	4	4.1	6	4	5	4	2	1
5	3	3	6	2	4	3	6	5	4	4.1	7	2	6	6	3	4	6	5	6	4	4.9	4	2	3	4	5	1
7	6	7	6	6	7	6	7	6	7	6.5	7	5	7	5	5	7	5	7	6	7	6.1	6	1	3.5	6	2	1
5	4	5	4	5	4	4	5	5	4	4.5	4	5	5	5	4	5	3	5	5	5	4.6	3	5	4	2	1	1
6	5	4	5	6	4	5	4	6	4	4.9	6	4	3	6	6	3	5	4	6	4	4.7	6	5	5.5	5	4	1
6	5	5	1	3	3	2	3	3	3	3.4	7	6	7	1	7	4	7	7	7	7	6	2	5	3.5	1	2	1
2	2	2	2	1	1	1	3	2	2	1.8	6	6	7	6	6	4	6	1	7	1	5	1	5	3	4	2	1
5	4	6	3	3	4	2	5	3	5	4	5	4	5	3	4	3	3	5	3	4	3.9	5	5	5	5	4	1
5	4	5	5	2	5	2	5	4	4	4.1	5	4	2	3	2	6	3	5	4	4	3.8	4	2	3	1	3	1
2	6	2	2	1	6	2	7	1	2	3.1	4	3	5	2	2	4	1	4	6	2	3.3	5	2	3.5	5	4	1
5	1	5	1	1	6	1	5	2	4	3.1	5	2	6	3	3	6	3	6	3	5	4.2	6	3	4.5	6	4	1
6	7	4	7	6	4	7	4	2	7	5.4	4	7	6	7	7	1	4	4	5	6	5.1	5	6	5.5	3	4	1
6	3	4	4	5	5	4	5	5	4	4.5	5	6	5	6	3	5	6	5	3	5	4.9	5	4	4.5	4	4	1
1	4	1	1	1	1	1	1	1	4	1.6												2	1	1.5	1	1	1
3	5	3	3	3	4	3	3	3	5	3.5	4	4	3	5	3	3	3	3	3	4	3.5	4	2	3	3	3	1
3	2	3	2	2	3	2	5	5	3	3	5	5	5	3	3	3	4	5	3	5	4.1	2	3	2.5	2	2	1
5	3	5	6	5	5	3	5	4	4	4.5	4	4	2	5	4	3	3	3	5	4	3.7	4	3	3.5	1	1	1
7	5	6	7	7	7	7	7	1	7	6.1	6	5	3	7	7	3	7	3	5	4	5	5	3	4	4	4	1
2	2	4	3	2	2	1	1	2	1	2	2	2	1	2	2	1	1	2	3	2	1.8	2	2	2	1	1	1

Individual Polychronicity											Corporate Polychronicity											Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
6	6	6	5	6	6	6	6	6	6	5.9	6	6	6	3	4	6	4	6	2	6	4.9	5	5	5	6	5	1
5	2	5	2	3	6	1	6	3	4	3.7	6	2	5	1	3	6	1	6	4	7	4.1	5	4	4.5	5	4	1
5	3	3	3	3	4	2	3	4	4	3.4	5	2	4	1	2	2	1	2	5	4	2.8	3	2	2.5	2	2	1
4	3	4	4	5	5	3	5	4	3	4	5	4	2	4	3	3	3	3	4	3	3.4	4	3	3.5	3	3	1
5	3	5	3	3	6	3	6	5	3	4.2	5	3	5	5	5	5	5	6	5	3	4.7	4	2	3	4	4	1
2	6	2	6	6	2	6	2	6	2	4	3	5	3	3	5	5	5	3	5	3	4	3	1	2	3	2	1
6	3	6	3	2	5	2	5	2	5	3.9	6	2	6	2	4	5	3	4	3	5	4	4	4	4	4	3	1
6	5	6	7	3	6	6	6	6	6	5.7	5	5	6	6	6	5	6	6	3	5	5.3	6	5	5.5	5	5	1
4	4	7	4	4	4	4	4	4	4	4.3	4	4	1	2	4	4	4	4	4	4	3.5	1	1	1	1	1	1
5	5	6	7	6	1	5	3	4	4	4.6	5	5	5	7	7	4	6	3	5	4	5.1	4	1	2.5	1	2	1
3	2	6	7	1	1	1	5	3	4	3.3	7	4	7	7	7	4	4	7	1	4	5.2	1	1	1	1	1	1
3	5	3	7	3	3	3	4	7	4	4.2	6	7	5	6	3	1	6	5	7	5	5.1	6	3	4.5	5	4	1
2	1	1	5	3	1	1	5	2	5	2.6	3	3	2	5	3	2	2	5	5	3	3.3	2	4	3	1	1	1
4	5	4	6	4	3	4	5	5	3	4.3	5	3	3	5	5	3	5	6	6	4	4.5	4	1	2.5	2	1	1
3	5	2	5	2	4	2	6	2	4	3.5	4	4	4	6	5	3	3	5	5	4	4.3	4	2	3	3	1	1
2	1	2	1	2	4	1	4	6	1	2.4	3	1	1	2	2	2	1	4	6	1	2.3	5	1	3	6	6	1
4	2	5	2	2	6	2	6	2	4	3.5	6	3	4	2	4	6	2	6	2	3	3.8	5	2	3.5	3	5	1
1	2	2	1	1	2	1	1	1	1	1.3												1	2	1.5	1	1	1
2	7	1	7	2	4	4	6	4	4	4.1	2	7	3	7	2	1	6	4	4	4	4	1	5	3	1	1	1
4	4	3	5	5	4	5	4	6	3	4.3	3	5	2	5	5	2	3	4	5	3	3.7	2	4	3	1	1	1
5	7	1	5	1	5	3	5	2	6	4	6	7	4	3	6	6	4	7	5	6	5.4	2	2	2	3	2	1
1	1	1	1	1	1	1	1	7	1	1.6												2	3	2.5	2	1	1
6	5	5	5	3	3	3	5	5	5	4.5	5	5	3	3	5	4	4	4	5	3	4.1	3	4	3.5	2	3	1
6	6	3	6	6	6	5	6	6	6	5.6	4	7	5	7	6	2	6	6	6	7	5.6	1	2	1.5	2	2	1
4	3	3	3	1	3	1	4	4	4	3	5	4	4	4	3	4	3	4	3	4	3.8	1	1	1	1	1	1
1	6	4	2	1	4	1	5	1	4	2.9						0		0		0		1	1	1	1	1	1
1	2	2	2	2	2	1	2	4	2	2	1	2	2	2	2	1	2	1	4	2	1.9	1	1	1	2	1	1
2	4	5	3	3	2	2	2	3	2	2.8	7	4	6	7	4	4	4	4	7	4	5.1	6	2	4	5	4	1

Individual Polychronicity											Corporate Polychronicity											Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
4	4	4	3	3	5	3	5	5	4	4	3	4	4	3	2	4	3	4	5	4	3.6	2	4	3	3	3	1
6	5	5	2	7	6	6	5	4	3	4.9	7	3	6	6	6	6	7	7	6	3	5.7	5	4	4.5	4	4	1
5	3	2	7	4	2	2	3	5	4	3.7	6	6	2	7	5	4	3	6	7	4	5	5	5	5	4	2	1
2	6	1	1	1	4	2	4	5	4	3	2	6	1	6	2	2	4	4	4	4	3.5	3	6	4.5	1	1	1
2	4	2	4	1	4	2	6	2	4	3.1	4	4	4	4	4	4	4	4	4	4	4	4	1	2.5	2	2	1
7	6	7	7	5	7	4	7	1	7	5.8	7	7	6	6	2	4	6	4	3	7	5.2	6	4	5	5	5	1
4	4	3	3	2	5	3	5	4	4	3.7	3	4	3	5	2	5	4	4	4	3	3.7	4	2	3	4	3	1
6	1	1	6	3	4	3	6	5	1	3.6	6	2	6	6	4	3	3	5	4	2	4.1	4	5	4.5	4	3	1
6	5	6	5	5	6	5	6	2	6	5.2	6	5	6	6	6	6	6	6	2	6	5.5	5	3	4	5	5	1
2	2	2	2	2	3	2	3	5	3	2.6	2	1	3	2	1	2	1	4	6	3	2.5	4	4	4	3	3	1
5	3	6	2	2	4	3	5	2	5	3.7	4	2	7	2	1	4	3	3	2	5	3.3	6	4	5	6	6	1
5	1	4	1	1	4	2	4	3	1	2.6	5	5	3	2	2	2	2	2	3	2	2.8	4	4	4	3	4	1
4	3	4	2	2	3	3	5	3	3	3.2	7	6	7	7	6	6	7	7	7	6	6.6	6	2	4	3	4	1
5	3	4	5	5	4	5	3	4	4	4.2	4	6	4	4	3	3	3	4	4	3	3.8	3	2	2.5	2	2	1
6	4	5	5	5	4	4	6	5	4	4.8	5	5	4	6	5	4	4	5	5	4	4.7	4	2	3	3	3	1
5	3	3	6	2	5	2	5	3	5	3.9	6	4	5	6	6	5	2	5	2	7	4.8	3	6	4.5	1	1	1
5	3	5	6	7	2	5	3	5	5	4.6	4	5	2	4	3	4	3	5	3	5	3.8	3	4	3.5	4	3	1
7	2	7	1	2	7	1	7	6	5	4.5	7	5	6	6	2	7	3	7	2	2	4.7	6	2	4	5	5	1
2	1	2	2	2	2	2	2	2	2	1.9	3	2	3	4	3	3	2	2	3	2	2.7	2	3	2.5	1	1	1
7	6	6	3	2	7	3	7	2	7	5	7	6	6	6	2	3	2	7	3	7	4.9	6	5	5.5	6	6	1
5	3	5	5	5	3	3	5	3	3	4	5	5	2	6	6	3	3	6	3	5	4.4	6	4	5	5	4	1
7	5	4	3	6	5	5	6	2	6	4.9	3	6	4	7	6	3	7	5	5	6	5.2	6	4	5	6	4	1
6	4	6	5	5	6	4	6	3	4	4.9	7	3	5	4	7	5	4	6	2	2	4.5	5	1	3	4	5	1
5	5	5	5	5	6	5	5	5	3	4.9	5	5	5	5	3	6	3	6	5	3	4.6	5	4	4.5	5	5	1
3	3	3	3	3	3	3	4	3	5	3.3	3	3	3	3	3	3	3	4	3	5	3.3	2	2	2	2	2	1
2	2	4	2	2	2	2	2	2	2	2.2	3	2	2	2	2	1	3	2	2	2	2.1	3	5	4	4	2	1
4	4	4	4	4	4	4	4	4	4	4						0		0		0		3	1	2	2	2	1
3	6	3	5	3	4	5	3	5	3	4						0		0		0		1	3	2	1	1	1

			Individual Polychronicity													Corporate Polychronicity								Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC	Success	Productivity	Occupation
6	3	6	5	5	6	4	5	5	4	4.9	5	2	5	6	6	5	4	5	2	4	4.4	4	4	4	4	4	1
1	1	1	1	1	1	1	1	1	7	1.6	7	7	6	4	2	7	3	7	3	6	5.2	1	6	3.5	1	1	1
3	5	2	5	2	3	2	3	5	6	3.6	3	6	4	5	2	2	2	3	5	6	3.8	3	1	2	2	1	1
6	3	6	6	4	4	5	7	5	3	4.9	4	3	6	3	2	5	3	5	3	2	3.6	3	2	2.5	5	3	1
2	1	6	7	2	1	1	1	6	1	2.8	7	7	1	7	7	7	7	7	7	7	6.4	1	2	1.5	1	1	1
2	4	3	3	3	3	2	5	2	2	2.9	2	6	2	3	5	2	5	4	3	2	3.4	2	2	2	2	2	1
6	4	3	5	5	6	4	6	6	6	5.1	6	2	7	3	7	3	6	6	6	3	4.9	4	4	4	4	3	1
5	2	3	7	2	2	1	2	4	3	3.1	5	1	7	2	1	7	2	6	2	6	3.9	5	5	5	5	3	1
3	2	6	1	2	2	1	5	2	1	2.5	6	2	6	4	2	2	2	6	6	2	3.8	6	6	6	2	1	1
5	4	3	1	1	5	3	3	3	4	3.2						0		0		0		1	6	3.5	3	3	1
2	2	1	5	2	2	2	6	7	2	3.1	2	2	1	2	1	1	1	6	3	2	2.1	5	3	4	2	1	1
5	5	6	5	2	6	2	6	6	5	4.8	6	6	6	4	5	3	3	6	4	4	4.7	4	1	2.5	4	2	1
4	3	4	2	2	6	1	2	6	2	3.2	3	6	4	3	5	6	1	2	6	2	3.8	1	1	1	2	5	1
6	5	5	5	6	6	5	6	6	2	5.2	6	6	5	6	5	4	6	6	6	3	5.3	6	5	5.5	6	6	1
2	3	2	3	2	2	3	3	3	5	2.8						0		0		0		2	4	3	2	1	1
7	6	7	6	5	7	5	6	6	6	6.1	7	4	7	7	4	4	5	4	6	6	5.4	6	2	4	5	5	1
6	2	5	3	2	5	3	5	2	6	3.9	6	2	6	2	2	6	2	6	2	6	4	3	5	4	2	2	1
7	7	4	7	6	5	7	6	7	1	5.7	6	4	4	7	7	5	7	6	7	3	5.6	4	3	3.5	3	3	1
6	6	5	7	6	7	6	7	2	5	5.7	7	6	5	6	7	5	4	6	6	3	5.5	5	5	5	4	5	1
4	6	6	6	7	4	3	4	3	6	4.9	4	4	4	6	3	3	3	4	4	6	4.1	3	4	3.5	6	5	1
5	3	6	5	6	6	3	6	6	5	5.1	6	2	5	6	5	5	3	5	6	3	4.6	5	6	5.5	4	5	1
6	4	5	3	5	5	3	5	6	4	4.6	5	5	4	4	5	5	3	4	5	5	4.5	4	3	3.5	5	4	1
6	4	6	5	7	1	7	3	7	4	5	6	7	5	5	6	1	5	6	6	5	5.2	4	1	2.5	4	3	1
6	1	5	1	1	6	2	7	3	1	3.3	6	4	6	1	1	6	2	6	6	4	4.2	2	2	2	1	4	1
2	6	3	5	3	5	1	5	5	5	4	3	6	3	6	5	2	1	6	3	5	4	3	5	4	2	1	1
5	2	5	2	2	5	2	6	2	6	3.7	6	3	6	2	2	5	3	6	2	6	4.1	5	3	4	5	5	1
3	5	2	6	1	3	3	3	2	4	3.2	7	7	7	7	7	7	6	6	6	6	6.6	4	5	4.5	4	2	1
2	1	2	6	2	3	2	5	7	2	3.2	6	6	6	7	2	2	6	6	6	5	5.2	5	6	5.5	2	2	1

IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC	Success	Productivity	Occupation
1	1	1	1	1	1	1	6	1	1	1.5	7	7	7	3	7	6	6	7	6	6	6.2	1	5	3	1	1	1
5	6	2	5	5	5	5	5	6	2	4.6	6	5	4	7	6	5	6	6	7	6	5.8	2	1	1.5	1	1	1
1	1	1	6	1	1	3	6	1	5	2.6	5	2	5	1	1	2	5	5	2	5	3.3	2	6	4	2	2	1
6	6	4	5	5	3	5	5	3	5	4.7	5	5	5	3	5	4	4	3	1	1	3.6	5	3	4	4	3	1
3	2	3	2	2	3	5	3	5	3	3.1	3	5	6	2	5	3	5	6	5	6	4.6	5	3	4	5	4	1
7	6	6	7	7	7	5	7	2	7	6.1	6	6	4	6	5	2	5	3	2	6	4.5	6	5	5.5	5	3	1
1	7	2	2	1	1	1	4	2	7	2.8	1	7	2	2	1	6	1	4	5	7	3.6	5	1	3	1	1	1
2	2	4	2	2	3	4	4	5	4	3.2	3	4	3	2	3	4	3	5	5	4	3.6	2	1	1.5	2	1	1
5	3	2	2	2	3	3	5	2	3	3	5	5	2	2	3	2	6	5	3	3	3.6	2	5	3.5	1	3	1
5	3	3	5	2	3	2	3	4	2	3.2	3	3	3	5	2	2	2	5	5	3	3.3	5	5	5	1	1	1
5	4	5	3	5	5	2	2	5	2	3.8	5	4	3	6	3	6	2	7	5	5	4.6	4	3	3.5	3	4	1
3	1	1	1	1	1	1	4	1	4	1.8	4	1	1	1	1	1	1	6	2	1	1.9	3	3	3	1	1	1
2	4	5	3	2	3	3	5	5	4	3.6	5	4	5	3	4	3	5	5	5	4	4.3	3	2	2.5	3	2	1
4	4	4	4	4	4	4	4	4	4	4	5	5	4	3	3	4	3	6	6	5	4.4	5	3	4	5	5	1
5	3	5	4	2	3	2	6	5	3	3.8	3	3	4	7	2	3	1	7	3	3	3.6	5	2	3.5	5	3	1
3	5	1	7	3	5	3	3	7	4	4.1	7	7	7	7	7	4	7	7	1	6	6	3	6	4.5	1	1	1
5	5	2	2	2	7	3	6	2	3	3.7	5	4	3	4	4	5	4	5	5	5	4.4	3	2	2.5	3	1	1
5	4	6	5	5	5	4	5	5	5	4.9	4	4	5	2	3	5	4	5	3	4	3.9	5	3	4	4	3	1
2	2	1	2	2	1	2	2	6	2	2.2	4	4	4	4	4	4	4	4	4	4	4	4	5	4.5	3	2	1
3	2	5	1	2	5	2	7	3	2	3.2	3	5	6	7	6	6	3	6	6	5	5.3	5	5	5	4	3	1
6	5	5	5	5	5	5	5	5	5	5.1	7	7	3	6	5	2	2	5	3	5	4.5	3	2	2.5	1	1	1
5	5	5	3	2	2	3	3	4	3	3.5	2	6	6	6	2	1	1	5	4	4	3.7	2	3	2.5	4	5	1
5	4	5	7	3	6	3	7	6	5	5.1	6	2	4	6	4	2	6	5	2	6	4.3	5	5	5	2	2	1
4	1	6	1	1	6	1	7	6	1	3.4	5	6	4	1	1	1	1	7	7	4	3.7	1	5	3	4	1	1
5	5	5	6	3	5	5	5	5	5	4.9	6	7	6	6	7	5	5	5	6	5	5.8	5	3	4	6	4	1
5	3	6	5	3	4	3	5	5	4	4.3	6	5	5	5	5	4	3	5	4	3	4.5	3	2	2.5	4	3	1
6	2	6	6	6	6	6	6	6	6	5.6						0		0		0		6	4	5	5	2	1
1	6	2	6	6	2	6	6	3	2	4	1	6	2	2	2	2	2	6	1	2	2.6	1	2	1.5	1	1	1

	Individual Polychronicity											Corporate Polychronicity											Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC	Success	Productivity	Occupation
6	2	2	2	1	4	2	4	2	2	2.7	5	2	6	2	1	6	6	6	4	7	4.5	1	2	1.5	1	1	1
3	7	4	2	4	6	4	7	7	7	5.1	1	6	3	5	2	2	5	6	6	6	4.2	1	1	1	1	1	1
5	5	4	3	3	3	3	3	3	3	3.5	6	5	5	6	6	3	2	4	3	5	4.5	5	5	5	3	4	1
6	4	5	5	5	6	4	5	5	4	4.9	7	6	6	6	6	5	4	5	3	5	5.3	6	6	6	4	4	1
5	4	3	3	3	5	3	5	5	5	4.1	2	5	2	3	3	4	3	5	3	3	3.3	4	5	4.5	2	3	1
6	6	6	6	6	5	6	6	6	6	5.9	6	4	6	4	5	6	6	6	6	2	5.1	6	4	5	6	5	1
1	6	2	6	6	7	7	7	6	2	5	3	6	2	2	2	2	2	2	5	7	3.3	5	1	3	6	1	1
4	3	4	3	3	4	3	4	5	3	3.6	5	3	2	5	2	1	1	5	4	3	3.1	4	6	5	3	1	1
4	5	3	6	5	3	4	4	5	3	4.2	2	2	3	7	4	3	4	4	4	2	3.5	2	1	1.5	1	1	1
6	3	5	2	2	5	3	6	5	3	4	7	3	6	1	2	6	5	6	3	3	4.2	5	5	5	4	4	1
6	5	6	2	4	5	5	6	3	5	4.7	7	5	6	5	2	4	6	6	6	2	4.9	3	2	2.5	1	1	1
2	2	1	3	2	5	2	3	2	2	2.4	2	2	2	2	2	2	2	3	6	2	2.5	2	5	3.5	1	1	1
6	1	2	1	1	5	3	6	3	2	3	7	2	6	4	7	4	3	7	1	6	4.7	5	2	3.5	2	1	1
1	1	1	6	1	1	1	1	2	2	1.7	3	4	4	6	4	3	4	2	5	2	3.7	1	3	2	2	1	1
6	6	3	1	4	4	5	5	5	5	4.4	5	6	3	5	4	3	3	4	6	3	4.2	3	3	3	2	3	1
6	3	5	3	4	4	1	5	5	4	4	4	4	3	3	3	3	3	5	3	4	3.5	5	1	3	5	5	1
2	2	2	3	3	3	2	3	2	2	2.4	6	5	4	3	3	3	2	3	3	3	3.5	2	4	3	1	2	1
5	5	3	4	4	3	3	3	3	4	3.7	7	6	5	4	3	5	5	5	5	5	5	4	3	3.5	4	2	1
6	2	6	2	2	6	2	6	2	2	3.6	5	5	5	2	2	6	2	6	2	2	3.7	5	3	4	4	4	1
6	3	5	7	6	7	2	7	1	5	4.9	6	2	7	7	7	2	5	6	6	2	5	5	2	3.5	5	5	1
5	4	3	5	5	4	5	6	5	4	4.6	2	4	2	4	4	2	3	6	6	4	3.7	1	1	1	1	1	1
5	2	3	1	3	5	5	6	3	5	3.8	4	3	5	5	4	5	3	6	4	5	4.4	5	2	3.5	4	3	1
4	4	4	5	4	4	3	2	3	4	3.7	3	5	3	4	2	3	2	3	4	4	3.3	4	4	4	4	3	1
5	3	5	1	1	6	1	5	2	2	3.1	3	3	6	3	1	4	2	3	3	7	3.5	1	6	3.5	1	2	1
6	5	4	6	5	4	4	6	5	6	5.1	5	6	4	5	5	4	4	4	5	3	4.5	6	2	4	4	4	1
4	5	3	4	3	5	4	5	5	3	4.1	3	4	3	5	7	5	2	5	5	2	4.1	2	5	3.5	1	2	1
3	5	6	1	1	6	1	5	3	5	3.6	1	5	6	1	1	1	2	5	3	5	3	1	6	3.5	1	1	1
6	3	6	4	4	4	2	5	6	3	4.3	6	6	6	6	6	4	6	6	5	6	5.7	4	2	3	5	6	1

Individual Polychronicity											Corporate Polychronicity											Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
6	5	5	2	1	2	3	5	5	5	3.9	6	4	5	1	1	1	2	6	5	3	3.4	2	1	1.5	1	1	1
5	5	5	5	5	5	5	5	3	5	4.8	6	5	5	5	5	5	5	5	5	5	5.1	5	3	4	5	5	1
1	4	3	3	3	5	3	5	5	4	3.6	1	4	3	3	3	5	4	3	3	5	3.4	1	4	2.5	4	5	1
1	4	1	4	2	1	3	1	2	1	2	7	4	7	1	7	7	7	7	6	4	5.7	1	2	1.5	1	1	1
6	5	5	5	5	5	3	5	5	5	4.9	7	6	3	6	5	3	2	6	5	5	4.8	5	5	5	4	4	1
7	7	4	6	3	6	6	6	6	7	5.8	4	5	1	4	4	5	4	6	6	5	4.4	2	2	2	1	2	1
3	3	6	2	1	3	2	3	1	6	3	6	5	6	5	3	6	2	3	5	2	4.3	4	2	3	4	5	1
7	6	7	5	6	7	6	7	7	5	6.3	7	6	4	6	6	5	4	6	6	6	5.6	5	6	5.5	4	5	1
5	4	5	3	4	5	2	7	4	4	4.3	6	4	3	5	2	6	4	5	3	4	4.2	4	3	3.5	3	3	1
5	5	5	6	3	4	5	5	5	4	4.7	6	3	4	7	3	3	5	5	5	5	4.6	5	4	4.5	4	3	1
1	3	3	7	7	2	4	5	4	6	4.2	2	5	7	7	7	2	5	6	4	2	4.7	2	6	4	1	2	1
2	5	2	5	2	6	2	7	2	6	3.9	2	6	1	3	3	6	2	7	2	5	3.7	2	5	3.5	2	2	1
7	6	7	7	6	7	6	7	6	7	6.6	7	4	5	2	6	4	5	5	6	5	4.9	6	3	4.5	6	5	1
3	3	5	4	3	3	3	4	4	5	3.7	3	4	4	3	3	3	3	3	4	5	3.5	4	3	3.5	3	3	1
5	6	3	2	1	6	3	5	2	5	3.8	6	4	5	2	5	4	5	6	5	5	4.7	4	2	3	2	1	1
5	6	4	7	6	6	1	7	6	6	5.4	6	4	4	7	6	4	6	6	6	4	5.3	2	5	3.5	1	1	1
5	3	5	5	3	3	3	5	5	3	4	5	2	5	5	3	3	3	5	3	3	3.7	4	5	4.5	4	4	1
2	2	2	2	2	2	3	3	2	2	2.2	3	1	2	2	1	2	3	2	3	2	2.1	2	1	1.5	5	1	1
6	2	6	2	2	6	2	6	2	6	4	6	7	6	7	7	6	3	6	3	6	5.7	6	3	4.5	5	5	1
5	4	5	3	4	5	3	4	4	4	4.1	6	5	4	5	5	4	4	4	4	4	4.5	6	3	4.5	4	4	1
6	6	5	6	5	6	5	6	5	6	5.6	6	6	3	6	5	5	5	6	6	6	5.4	4	5	4.5	3	3	1
6	6	6	6	6	3	3	3	5	6	5						0		0		0		5	4	4.5	4	2	1
4	1	1	1	1	6	1	6	1	1	2.3	5	1	4	1	1	6	1	7	1	1	2.8	4	1	2.5	5	5	1
2	2	5	2	1	2	1	3	6	2	2.6	1	5	6	2	6	5	2	6	6	3	4.2	1	1	1	1	1	1
5	5	3	3	3	3	3	5	5	5	4	5	5	5	2	2	3	3	5	5	5	4	2	2	2	2	2	1
7	7	7	7	7	7	6	7	7	5	6.7	7	1	4	6	7	7	7	7	7	1	5.4	6	6	6	6	3	1
2	6	5	5	3	7	6	7	2	6	4.9	2	4	2	6	1	7	6	6	2	6	4.2	2	5	3.5	3	1	1
4	3	3	3	2	5	2	5	5	4	3.6	5	5	3	5	5	5	3	5	6	5	4.7	4	1	2.5	4	4	1

The Influence of Polychronic Communication

Individual Polychronicity											Corporate Polychronicity											Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
6	2	2	5	3	1	2	5	6	3	3.5	6	1	5	2	2	1	2	2	3	3	2.7	2	2	2	2	1	1
5	1	4	3	3	3	2	5	2	3	3.1	5	1	5	5	3	3	2	5	3	3	3.5	5	4	4.5	3	3	1
3	3	3	3	3	3	3	4	3	3	3.1	6	5	3	3	2	4	2	5	2	3	3.5	5	5	5	1	1	2
3	2	4	2	2	2	2	2	2	2	2.3	5	3	3	2	2	3	2	4	3	2	2.9	5	3	4	4	5	2
6	4	5	3	3	3	2	5	6	5	4.2	7	5	6	6	6	6	3	6	7	7	5.9	5	3	4	6	5	2
2	2	3	1	2	1	4	3	6	3	2.7	3	5	2	3	2	4	4	3	3	4	3.3	5	4	4.5	4	3	2
																0		0		0		6	2	4	5	3	2
3	3	5	5	3	3	6	6	3	3	4	5	2	6	6	3	2	5	2	3	3	3.7	4	2	3	3	3	2
2	2	1	2	1	3	1	4	1	5	2.2	6	4	2	6	1	2	2	4	3	4	3.4	6	5	5.5	4	3	2
6	5	3	1	1	6	6	6	6	7	4.7						0		0		0		5	5	5	6	5	2
6	6	6	6	6	6	6	6	6	6	6	7	5	6	6	6	6	6	6	6	6	6	5	2	3.5	5	5	2
											6	5	6	5	5	6	3	6	5	5	5.2	1	6	3.5	1	1	2
2	6	2	1	1	1	2	4	2	1	2.2	7	4	6	2	5	3	4	4	5	2	4.2	5	5	5	1	1	2
6	2	6	2	2	6	2	6	2	6	4	6	2	6	2	2	6	2	6	2	6	4	5	2	3.5	5	5	2
6	6	6	6	2	6	6	6	6	6	5.6	6	7	6	6	2	2	2	6	6	6	4.9	5	5	5	3	3	2
6	4	5	5	4	6	4	6	5	6	5.1	6	6	6	5	6	6	4	6	4	6	5.5	4	3	3.5	5	4	2
6	7	1	7	2	6	1	6	6	6	4.8	1	7	1	6	6	4	7	7	7	7	5.3	1	4	2.5	1	1	2
											7	5	5	7	7	6	5	4	4	2	5.2	2	5	3.5	3	2	2
5	5	5	3	3	6	2	6	3	5	4.3	6	5	5	5	5	6	2	6	5	3	4.8	4	4	4	3	2	2
1	1	1	6	3	1	1	1	3	1	1.9	2	7	3	7	4	7	1	1	2	2	3.6	6	3	4.5	2	2	2
											3	3	6	6	5	1	3	5	6	2	4	1	6	3.5	6	1	2
1	3	3	1	1	2	1	5	1	2	2	1	3	3	1	1	2	1	5	1	2	2	5	4	4.5	1	1	2
6	4	3	2	1	4	6	6	6	4	4.2	7	4	2	2	1	4	7	4	4	4	3.9	5	3	4	2	3	2
6	3	2	5	3	5	3	6	5	4	4.2	6	6	4	6	2	3	5	6	3	2	4.3	5	2	3.5	5	6	2
3	5	5	3	3	4	1	5	3	5	3.7	6	6	5	3	4	4	5	3	4	6	4.6	5	4	4.5	4	4	2
5	3	4	3	3	5	3	5	4	5	4	6	5	3	2	3	3	3	5	4	4	3.8	3	2	2.5	2	2	2
7	7	7	7	7	7	7	7	7	7	7	6	7	6	7	7	6	7	6	7	7	6.6	4	2	3	3	5	2
2	2	5	2	1	3	2	2	2	2	2.3	6	4	6	3	5	5	3	5	5	5	4.7	2	5	3.5	3	3	2

Individual Polychronicity											Corporate Polychronicity											Poly-chronic Communication			Success	Productivity	Occupation
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
5	4	5	4	4	5	4	5	3	5	4.4	5	2	5	5	5	4	3	5	3	4	4.1	5	3	4	4	5	2
3	5	4	3	3	3	3	5	3	5	3.7	5	5	3	2	3	3	2	6	5	5	3.9	3	4	3.5	3	3	2
																0		0		0		6	1	3.5	5	5	2
																0		0		0		6	2	4	1	1	2
																0		0		0		1	6	3.5	1	1	2
6	7	5	5	5	6	6	6	6	6	5.8	5	6	5	3	4	5	5	6	6	2	4.7	5	4	4.5	2	2	2
3	2	2	5	2	3	2	5	3	3	3	2	2	2	5	2	2	2	5	3	3	2.8	5	4	4.5	2	2	2
																0		0		0		5	2	3.5	6	3	2
2	5	2	5	2	3	2	5	5	5	3.6	3	6	2	3	1	2	1	2	2	5	2.7	4	2	3	2	2	2
3	1	5	1	2	2	3	3	3	2	2.5	7	2	5	1	1	2	2	5	2	2	2.9	5	2	3.5	4	4	2
3	4	2	4	2	4	2	4	2	4	3.1	3	4	4	3	3	3	1	4	2	4	3.1	3	4	3.5	4	2	2
																0		0		0		2	2	2	1	1	2
																0		0		0		5	5	5	1	1	2
5	3	4	5	3	4	3	5	5	4	4.1	5	3	4	6	3	5	3	5	5	4	4.3	4	3	3.5	4	4	2
5	3	3	3	2	2	3	4	3	3	3.1	5	2	5	3	2	1	3	6	6	5	3.8	2	5	3.5	2	1	2
											6	4	5	2	3	6	2	6	2	2	3.8	6	2	4	6	6	2
5	3	3	3	3	2	3	4	3	3	3.2	6	3	6	2	2	2	4	4	4	3	3.6	2	4	3	1	1	2
1	1	1	1	1	1	1	1	1	1	1												4	5	4.5	2	1	2
2	1	4	5	1	1	1	4	2	1	2.2	4	4	4	3	5	3	4	5	4	4	4	4	3	3.5	2	3	2
5	6	1	2	2	2	2	5	2	5	3.2	3	6	2	2	2	2	1	5	5	2	3	2	4	3	2	1	2
5	6	3	6	3	6	2	3	3	7	4.4	6	6	4	3	6	3	2	2	2	2	3.6	6	2	4	5	4	2
5	4	5	3	3	3	3	5	3	5	3.9						0		0		0		5	4	4.5	5	4	2
7	4	6	4	4	7	2	7	1	7	4.9	6	3	5	4	4	5	2	6	2	6	4.3	6	2	4	6	4	2
2	2	4	3	1	2	2	2	6	2	2.6	6	3	5	5	2	2	2	3	5	3	3.6	5	4	4.5	4	4	2
3	3	3	3	3	3	1	6	2	3	3	4	2	3	2	2	3	1	5	1	4	2.7	5	2	3.5	3	1	2
6	5	5	5	5	6	3	5	5	5	5	6	5	3	5	2	4	3	5	3	3	3.9	4	3	3.5	3	3	2
2	1	1	3	2	2	1	2	2	1	1.7												5	3	4	1	1	2
3	3	4	3	3	7	4	5	5	3	4	6	2	7	2	2	7	3	5	2	3	3.9	5	2	3.5	4	5	2

IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC	Success	Productivity	Occupation
3	6	1	4	3	5	1	6	4	7	4	6	6	5	2	4	5	1	5	6	6	4.6	5	5	5	3	1	2
6	6	4	7	7	6	2	6	4	5	5.3	4	5	2	7	5	3	3	6	2	5	4.2	2	4	3	1	1	2
5	5	5	5	5	5	3	5	5	5	4.8	5	5	7	3	5	3	4	6	5	5	4.8	4	5	4.5	2	2	2
2	2	1	2	1	1	1	2	1	1	1.4	6	3	2	3	2	2	2	2	2	2	2.6	5	4	4.5	5	3	2
6	6	5	4	5	5	5	6	5	6	5.3	6	6	5	6	3	4	6	6	6	6	5.4	5	3	4	5	3	2
5	4	1	2	2	4	1	5	2	4	3	6	4	2	2	1	5	1	5	4	4	3.4	5	6	5.5	1	1	2
3	3	3	2	1	3	3	5	5	3	3.1	6	6	1	2	2	3	4	4	6	5	3.9	2	3	2.5	3	3	2
											5	5	5	2	2	3	2	3	2	3	3.2	2	2	2	2	3	2
7	6	4	6	6	6	4	6	7	6	5.8	4	3	2	5	3	4	6	4	4	2	3.7	2	4	3	3	2	2
7	1	7	1	1	7	1	1	1	7	3.4	3	7	1	7	1	7	1	4	4	4	3.9	5	4	4.5	1	1	2
6	7	5	6	6	6	2	6	3	6	5.3	6	7	6	3	6	6	2	5	2	6	4.9	5	5	5	5	5	2
7	4	5	5	4	7	3	7	6	5	5.3	7	4	6	7	3	6	3	5	5	4	5	2	4	3	3	3	2
3	4	3	2	2	3	2	6	2	4	3.1	6	4	5	1	1	2	3	2	5	4	3.3	5	2	3.5	3	3	2
2	1	1	4	7	6	2	3	5	1	3.2	4	1	4	1	1	1	2	2	1	2	1.9	4	3	3.5	4	4	2
5	4	5	4	4	5	4	5	4	5	4.5	6	3	5	4	3	4	3	3	4	4	3.9	5	2	3.5	4	4	2
5	1	4	4	4	3	5	3	5	3	3.7	6	2	5	3	2	6	2	6	2	6	4	4	2	3	5	4	2
2	1	5	6	3	6	3	6	3	6	4.1	6	1	4	6	1	1	1	6	2	5	3.3	6	2	4	5	6	2
											7	2	2	2	4	4	4	3	5	2	3.5	5	5	5	6	5	2
1	1	1	1	1	1	1	5	1	2	1.5	6	6	6	2	2	5	4	6	3	5	4.5	6	5	5.5	2	2	2
4	2	5	2	2	3	3	4	3	3	3.1	7	3	6	4	2	1	1	3	3	1	3.1	5	4	4.5	2	3	2
4	3	7	6	3	3	2	3	4	4	3.9	7	4	5	6	3	2	3	2	3	3	3.8	6	2	4	3	3	2
3	2	2	5	2	4	2	4	3	6	3.3	6	4	3	4	3	4	2	4	3	6	3.9	6	6	6	4	3	2
																0		0		0		2	3	2.5	2	3	2
7	7	6	6	6	7	7	7	7	6	6.6	6	6	6	7	7	1	7	7	1	6	5.4	2	5	3.5	1	1	2
6	5	6	6	4	4	2	6	4	6	4.9	6	2	6	2	2	4	6	2	2	6	3.8	4	3	3.5	2	2	2
4	5	3	6	6	3	6	3	7	3	4.6	7	7	2	6	6	2	5	3	6	3	4.7	4	4	4	6	6	2
6	3	5	7	6	6	6	6	6	3	5.4	6	3	3	7	6	5	5	6	6	5	5.2	6	4	5	1	1	2
5	4	7	2	1	3	2	6	2	4	3.6	5	4	6	3	1	2	2	5	3	4	3.5	5	5	5	4	4	2

	Individual Polychronicity											Corporate Polychronicity											Poly-chronic Communication			Success	Productivity	Occupation
	IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
1	5	2	2	3	3	2	4	6	5	3.3		3	5	5	6	5	3	4	5	7	2	4.5	2	2	2	3	5	2
2	2	2	2	1	2	2	2	3	2	2		1	2	2	2	1	1	3	2	2	2	1.8	2	5	3.5	2	1	2
6	6	2	6	6	6	6	6	5	6	5.5		5	6	6	5	2	2	2	2	6	6	4.2	6	5	5.5	3	3	2
6	2	5	2	3	4	3	6	3	5	3.9		7	1	5	4	3	3	3	6	2	4	3.8	5	3	4	5	4	2
												6	4	7	6	6	6	5	6	2	6	5.4	5	3	4	4	5	2
6	4	2	1	2	5	4	6	6	4	4		7	3	6	1	1	5	3	6	6	4	4.2	5	2	3.5	5	5	2
7	6	3	5	6	6	4	6	3	6	5.2		6	6	4	3	3	5	3	6	4	6	4.6	6	3	4.5	5	5	2
7	1	6	6	5	5	5	4	5	5	5		7	2	6	5	5	4	4	5	4	4	4.6	5	3	4	5	5	2
5	6	5	4	5	5	5	7	6	5	5.3		5	6	4	3	6	3	5	4	5	5	4.6	4	3	3.5	4	5	2
												1	4	1	5	3	4	6	6	4	4	3.8	5	1	3	6	3	2
1	1	1	7	1	1	1	2	1	7	2.3		4	4	2	2	1	2	2	2	1	2	2.2	2	2	2	1	1	2
6	2	6	5	6	6	4	6	6	4	5.1		6	5	3	5	5	6	4	6	3	5	4.8	5	3	4	4	4	2
																	0		0		0		5	1	3	5	1	2
6	6	7	7	6	7	6	7	7	6	6.5		4	6	6	6	6	6	6	7	6	6	5.9	5	2	3.5	4	4	2
1	3	4	3	2	3	2	4	4	4	3							0		0		0		3	4	3.5	4	4	2
5	5	3	6	5	5	3	6	6	5	4.9		7	4	3	6	2	2	5	5	5	3	4.2	5	5	5	2	1	2
6	2	6	3	3	6	2	6	3	6	4.3		6	2	7	2	2	5	2	6	3	6	4.1	6	1	3.5	6	6	2
4	3	3	2	2	4	2	3	4	3	3		4	3	3	2	2	3	2	5	4	3	3.1	5	3	4	4	4	2
7	2	7	6	3	6	1	7	6	2	4.7		5	4	5	5	6	5	2	7	6	4	4.9	5	4	4.5	2	2	2
3	3	1	2	2	2	2	3	3	3	2.4		5	5	5	5	5	5	5	5	5	5	5	2	2	2	2	1	2
5	4	4	4	4	4	4	5	4	4	4.2		4	4	4	4	4	4	4	5	4	4	4.1	3	4	3.5	3	3	2
3	5	4	5	1	3	2	6	4	5	3.8		7	1	5	5	5	4	2	6	2	6	4.3	6	1	3.5	3	4	2
												3	3	4	4	3	2	3	5	3	3	3.3	3	2	2.5	3	3	2
3	2	3	3	3	3	3	2	3	3	2.8		5	1	1	3	1	2	2	3	3	3	2.4	6	2	4	5	4	2
6	4	7	6	4	6	4	7	1	7	5.2		6	1	6	2	4	6	4	6	6	6	4.7	4	6	5	5	1	2
												7	4	6	5	3	7	3	6	3	4	4.8	6	2	4	5	6	2
3	5	4	5	3	3	3	4	5	3	3.8		4	4	3	5	4	3	3	5	4	3	3.8	5	2	3.5	2	2	2
6	2	6	2	2	6	2	6	2	6	4		6	2	6	2	3	5	3	5	3	4	3.9	5	2	3.5	5	5	2

| | Individual Polychronicity | | | | | | | | | | | Corporate Polychronicity | | | | | | | | | | | Poly-chronic Commu-nication | | | Success | Productivity | Occupation |
IP01	IP02	IP03	IP04	IP05	IP06	IP07	IP08	IP09	IP10	IP	CP01	CP02	CP03	CP04	CP05	CP06	CP07	CP08	CP09	CP10	CP	PC1	PC2	PC			
																0		0		0		5	2	3.5	6	5	2
																0		0		0		2	5	3.5	2	2	2
											6	6	4	7	5	4	4	5	3	5	4.9	5	4	4.5	4	4	2
2	2	3	1	2	2	2	4	2	2	2.2	5	7	6	2	2	7	5	6	6	5	5.1	3	6	4.5	2	2	2
6	2	3	3	5	6	2	6	5	3	4.1	5	3	5	2	3	5	3	6	2	6	4	5	3	4	5	4	2
5	6	3	2	5	5	3	5	5	5	4.4	5	3	4	2	3	2	4	5	6	4	3.8	5	2	3.5	5	4	2
5	2	2	6	2	3	2	4	2	2	3	3	2	3	7	2	2	2	5	6	1	3.3	3	5	4	4	3	2
1	1	6	7	1	1	1	1	1	1	2.1	2	1	5	2	2	1	7	1	1	1	2.3	6	4	5	6	6	2
																0		0		0		5	5	5	3	3	2
4	5	6	3	6	7	4	7	1	7	5	4	2	5	3	4	6	5	6	3	7	4.5	5	1	3	2	2	2
5	5	3	3	3	2	3	6	3	5	3.8	7	6	6	3	6	3	4	6	4	4	4.9	6	3	4.5	3	3	2
5	5	1	6	3	4	6	6	4	5	4.5	4	5	1	6	3	3	5	7	6	5	4.5	3	6	4.5	3	2	2