THE EFFECT OF INFLUENCE TACTICS ON E-PROCUREMENT ADOPTION COGNITIONS

PROEFSCHRIFT

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Preface

Writing a dissertation is an evolutionary process of exploration and empirical inquiry. This process should lead to a dissertation in which some advancement of knowledge is detailed. I believe that I have satisfied this aspiration, showing a novel linkage between influence tactics and the cognitions leading to E-Procurement adoption. The research results can assist organizations in their challenge of achieving adoption of their E-Procurement systems, a prerequisite for realizing the value potential of these systems.

Besides the actual research results, the process has led to more profound personal impact. The process has been a catalyst for personal development in sharpening analytical reasoning, conceptual thinking and research acumen. I had the privilege of working in an inspiring environment of intellectual individuals with an entrepreneurial spirit. The academic and not so academic discussions with colleagues and students were a true pleasure.

There are several people I would like to thank for their contribution towards the PhD and personal development. First and foremost, I would like to express my gratitude to my promoters, Sicco Santema and Jeroen Harink, for their guidance and support. I enjoyed our deliberations and their motivating way of supervision. In the same breath, I would like to thank Erik van Raaij for his scrutiny and support.

I am grateful to the NEVI Research Stichting (NRS), who provided the financial support for this research as well as a gateway to the Dutch purchasing community. I would like to thank the organizations for opening up their doors for my research. In particular, I would like to thank the 100+ interviewees and 700+ survey respondents within these organizations for sharing their experiences. The assistance of several MSc students, especially Willem de Groot and Erik-Jan Beerlage, proved to be invaluable in conducting research amongst these companies. In addition, the feedback of students, that I had the pleasure of supervising in their MSc work or who attended my lectures, helped sharpen this dissertation.

Finally, I am much indebted to my friends, family and Imke for their continuing support, patience, and reminding me that there is more to life than pursuing a PhD!

Marc Reunis
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Abstract

This dissertation deals with the effect of influence tactics on Electronic Procurement (EP) adoption cognitions. When an EP system is introduced in an organization, adoption of that system by its intended users is not self-evident. The study identifies factors from literature that have an effect on EP adoption cognitions. Subsequently, the study identifies influence tactics amongst these factors. The effect of seven influence tactics on the EP adoption cognitions were studied in a sample of 446 EP users across six organizations. The effect of the tactics on the EP adoption cognitions is the prime interest of this dissertation. It provides a novel theoretical contribution by linking broader concepts from social influence to EP adoption cognitions. Managers can use the findings to choose their influence tactics and increase their effectiveness towards potential users of EP.

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Key Definitions

Adoption	a process to make full use of an innovation as the best course of action available (adapted from Rogers, 1995)
Cognition	an instance of cognitive content, i.e. the opinion formed as a result of cognitive processing (Jasperson et al., 2005)
Cognitive Mechanism	the mechanism through which cognitions collectively lead towards behavior
E-Ordering	the use of Internet to facilitate operational purchasing processes, including the ordering (requisitioning), order approval, order receipt and payment process (adaptated from Harink, 2003)
E-Sourcing	the use of Internet in the supplier selection process, from prequalification of suppliers through the construction of a comprehensive request for proposal to the selection of the final supplier (William & Presutti, 2002)
E-Procurement	the use of internet technology in purchasing processes (adapted from De Boer et al., 2002)
External Factor	all factors affecting user adoption cognitions (Davis, 1989)
Influence Tactic	an influence tactic is a proactive, targeted way to alter cognitions and behavior
Purchasing	obtaining from external sources all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company's primary and support activities (adapted from Van Weele, 2005)
Procurement	In this dissertation purchasing and procurement will be used inter-changeably.

List of Abbreviations

A&C	Appraisal & Control (*)
AP	Accounts Payable
B	Behavior (UTAUT & TAM)
BI	Behavioral Intention (UTAUT & TAM)
COLL	Collaboration (*)
CPM	Category Procurement Manager
CPC	Collaborative Product Commerce
CPO	Chief Purchasing Officer
CSE	Computer Self-Efficacy
DOI	Diffusion of Innovation
EE	Effort Expectancy (UTAUT)
ERP	Enterprise Resource Planning
EO	E-Ordering
EP	E-Procurement
ES	E-Sourcing
FC	Facilitating Conditions
FGD	Focus Group Discussion
IBQ	Influence Behavior Questionnaire (Yukl et al.)
IP	Information Push (*)
IT	Information Technology
ITQ	Influence Tactics Questionnaire (Kipnis et al.)
LEGP	Legitimate Pressure (*)
MR	Management Request (*)
PE	Performance Expectancy (UTAUT)
PEOU	Perceived Ease of Use (TAM)
PLS	Partial Least Squares
PM	Procurement Manager
POIS	Profiles of Organizational Influence Strategies (Kipnis et al.)
PREC	Persuasive Recommendation (*)
PU	Perceived Usefulness (TAM)
REC	Recommendations
REW	Reward (*)
RFI, RFP, RFQ	Request for Information, Proposal, Quotation
SEM	Structural Equation Modeling
SI	Social Influence (UTAUT)
SN	Subjective Norm (TAM)
TAM	Technology Acceptance Model
TTF	Task-Technology Fit
UTAUT	Unified Theory of Acceptance and Use of Technology

(*) Newly defined influence tactic in this dissertation

Chapter 1 Introduction

1.1 Introduction

This dissertation deals with the effect of influence tactics on Electronic Procurement (EP) adoption cognitions. It comprises a study of

a.) the identification of external factors, all factors affecting the EP adoption cognitions,
b.) the identification of influence tactics amongst these external factors and
c.) the effect of influence tactics on the EP adoption cognitions.

The effect of influence tactics on EP adoption cognitions is the prime interest of this dissertation. It provides a novel theoretical contribution by linking broader social influence to IT adoption theory. Managers can use the findings to increase the effectiveness and choice of their influence tactics, when they want to persuade potential user population to adopt EP.

This chapter serves as an overall introduction to this dissertation. All concepts which are introduced in this chapter will be explained in subsequent chapters of this dissertation. This chapter starts with the research motivation in section 1.2. The overall research problem is introduced in section 1.3. Subsequently, the theoretical contribution is dealt with in section 1.4 and the practical contribution in section 1.5. Finally, the structure of this dissertation is presented in section 1.6.

1.2 Research Motivation

EP has the potential to improve purchasing processes
EP is defined as the use of Internet technology in purchasing processes (De Boer et al., 2002). This broad definition encompasses tools for a wide range of purchasing processes, e.g. sourcing, tendering, auctioning, contracting, calling-off orders, supply or supplier evaluation, and purchasing management processes (e.g. purchasing intelligence). Internet applications have opened up the possibility for higher efficiency and effectiveness of purchasing and supply management in a business-to-business (B2B) context. Besides supporting existing processes, the emergence of ‘e’ in purchasing has enabled the redesign of business processes in the purchasing organization. The purchasing function is still gaining momentum in terms of its contribution to business objectives, and electronic tools have boosted this

development (Carter et al., 2000). In addition, network technology has opened up possibilities that were simply not possible in a paper-based traditional environment; especially in spend analysis and driving compliance to contracts and processes. In short, 'e' has contributed to – and has capitalized on – a new way of conducting purchasing processes. The organizational benefits of EP are recognized by practitioners and well documented in literature (Albrecht et al., 2005; Croom 2005, Pushman & Alt, 2005; see Appendix A). Although the benefits have been somewhat touted around the turn of the century, Rai et al. (2006) found empirical support for the relationship between the use of EP and purchasing performance.

Realizing the benefits of EP relies on creating user adoption

EP can have a profound impact on the way people work. The potential benefits of EP can only be achieved when its intended users embrace a new way of working. The key towards realizing the potential value of EP lies in a smooth and speedy adoption by the user population. People are not keen to alter their current habits and are generally reluctant to change, especially where direct personal benefits are not clear or uncertain. Many frontrunners have experienced difficulties in getting individuals in their organization to adopt EP tools and to 'act their part'. Active managerial attention towards changing individual behavior is required. Organizations that have invested heavily in EP systems are looking for ways to unleash the value potential of these systems. When the overall utilization of EP systems lags behind or when it takes a long time to build momentum, attractive business cases can 'evaporate'. If it takes too long for benefits to materialize or additional costs for change management efforts have to be incurred, the Return on Investments (ROI) can plummet rapidly. Many organizations that have experimented with EP around the turn of the century have discovered that organizational change costs can easily be a multiple of the direct investments in systems and infrastructure.

Naturally, many factors and organizational contingencies affect the potential value that an EP system could deliver. However, if the potential user community does not change, none of it will be achieved. Furthermore, when a certain system is chosen for a specific organization, many of the factors that determine the overall value potential are set. This situation is the starting point for this dissertation. The question is not how the concept of EP can deliver value but *how more of the potential value can be achieved through more and better usage from a selected EP system*. In this case, the key lies in understanding specific ways to influence the user population to realize individual adoption.

Achieving user adoption is challenging

Many organizations ran into user adoption issues when implementing EP. Some large organizations, like Dell, America West Airlines, Eastman Kodak, FedEx, IBM, and DuPont, showed initial results (Attaran & Attaran, 2002). Unfortunately, at the same time, many other organizations were disappointed about by actual (quantifiable) results and the efforts required for implementing EP. Even now, many organizations are still struggling to realize the full potential of EP and roll-out efforts are progressing slowly. The 2006 Aberdeen E-Procurement Benchmark report mentions that "[...] user adoption [...] remains the most challenging aspect of an e-procurement deployment. [...] It has become increasingly clear that change management issues related to e-procurement are far from insignificant and remain as a major if not the major hurdle for a broad and successful deployment." (Bartolini & Checketts, 2006). Achieving collective adoption in a user population is a major issue in contemporary business practice (Ward et al., 2005). Industry research shows that the biggest 'headache' during the implementation of EP tools are issues of change management and user adoption (Mitchell and Shaw, 2001). This is also recognized by various purchasing organizations (e.g. Institute of Supply Management) and academia (e.g. Osmonbekov et al., 2002; Hartmann, 2002; Santema & Van de Rijt, 2003). The challenge of adoption issues is recognized by Dutch practitioners in the following additional ways:

1. Four brainstorm sessions in 2003 with purchasing executives from large Dutch purchasing organizations revealed that the 'soft' factors in the implementation of 'e' in purchasing are a major concern. The struggle in realizing intra-organizational adoption is confirmed.[1]
2. A digital survey was constructed and used for data collection during the fifth annual e-procurement seminar in The Netherlands on September 15th 2004[2]. A total of 44 responses from a variety of EP users and suppliers were included in the analysis. The results show that human acceptance within the purchasing function and the rest of the organization is the most important barrier in realizing potential benefits.

[1] Three roundtable discussions were held during the SIGB Erenstein conference in November 2003 with approximately 50 Dutch purchasing executives. The SIGB is a community of Dutch Purchasing Executives to share knowledge and experiences on topics in the field of purchasing & supply management. Every two years a conference is organized.

[2] NEVI, The Dutch Purchasing Association, organizes a yearly seminar for e-procurement practitioners. More information on the seminar and a complete report of the research findings can be found at: http://www.nevi.nl/NEVI753.html (in Dutch).

Creating user EP adoption is only just being explored in EP research
The endeavor for the deployment of EP initiated a stream of researchers focusing on risks and conditions to realize the EP benefits (e.g. Abery, 2002, Min & Galle, 2003; Aisbett et al., 2005). In the beginning, the prime attention was directed towards technical feasibility studies like bandwidth, data handling capacity and software functionalities (Neef, 2001). The 'human' issues of realizing value from EP are only just being explored (Zahay & Handfield, 2004; Reunis et al., 2004, Arbin, 2004, Brandon-Jones & Croom, 2005).

Insights for EP adoption can be extracted from extant IT adoption research
The concept of adoption has been widely studied in different fields. In the field of information technology (IT), work on adoption has been sparked by the seminal work of Davis (1989), who introduced the Technology Acceptance Model (TAM). This model gave rise to research aimed at replicating, refining and extending the TAM. The Unified Theory of Acceptance and Use of Technology (UTAUT) was introduced by Venkatesh et al. (2003) as an effort to integrate TAM and seven other related technology acceptance models. Both TAM and UTAUT build on the notion that a mechanism of *cognitions,* as instances of cognitive content, precedes actual adoption or usage behavior. The core cognitions that make up the cognitive mechanism in both TAM and UTAUT are chosen in this dissertation as dependent variables and are referred to as "EP adoption cognitions". The motivation for this choice and further explanation is provided in Chapter 2.

Studies using TAM and UTAUT have included a wide range of external factors in their attempts to explain or predict one or more of these cognitions. Only a few researchers have focused on the external factors as a managerial toolset, i.e. interventions. Authors tend to 'mix-and-match' various factors and assess the effect on the overall explanatory power of cognitive IT adoption models. In these studies factors that could be used as a managerial toolset like training or support are generally augmented to the core TAM constructs. Studies that systematically unravel the effect of different types of external factors are scarce. Insights in the way different types of *external factors* affect the EP adoption cognitions can assist in creating user adoption. They contain the effect of the managerial toolset, i.e. interventions, and possible contingencies to take into account (see Chapter 3).

Insights for EP adoption can be extracted from extant social influence research
The competence of altering cognition and consequently behavior is the key to effective leadership and management. In order to realize business strategies or organizational change, different stakeholders have to be convinced and behavior of a whole target population has to be manipulated. The effectiveness of shaping perceptions and actions of peers, subordinates, and even superiors determines the effectiveness of a leader / manager. How this should be done, i.e. how to effectively persuade individuals to enact a certain intended behavior, has puzzled people for centuries. In classical times, persuasion was seen as an 'art'; and Aristotle's rhetoric studies proposed three basic routes of logos, pathos and ethos. In contemporary social psychology, a substantial amount of attention has been given towards ways to affect attitudes and behavior of others by researching influence tactics. *Influence tactics* are proactive, targeted ways to alter cognitions and behavior (see Chapter 6). A multitude of taxonomies of influence tactics have been proposed (see 6.3.2). Besides taxonomy studies, research on influence tactics has shown general insights in the incidence and effectiveness of influence tactics on general psychological concepts, e.g. compliance and commitment. The effectiveness of influence tactics for realizing technology adoption or more specifically EP adoption has not previously been researched. Insights in these *influence tactics* can assist managers in creating user adoption (see Chapter 6).

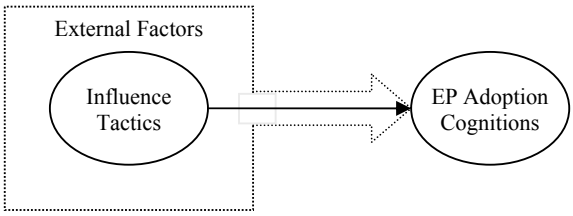
1.3 Initial Research Problem & Framework

Summarizing the preceding discussion, creating individual user adoption is a prerequisite for realizing the benefits of EP but remains challenging in practice. Broader theoretical domains on IT adoption and social influence theory may assist in this challenge but have not been previously reviewed and integrated for this purpose.

The following research problem emerges: what is the effect of influence tactics on EP adoption cognitions? In this dissertation, IT adoption and social influence theory are combined and integrated to address this problem. It provides an insight in the way influence tactics affect EP adoption cognitions.

A research framework is used for this research with influence tactics as independent variables and EP adoption cognitions as dependent variables. Influence tactics are positioned amongst external factors. A schematic overview of the research framework is provided in Figure 1.

Figure 1 Initial Research Framework



The reason for choosing EP adoption cognitions as dependent variables instead of actual usage is based on the widely accepted assumption in IT adoption theory that some level of cognitive processing precedes individual adoption. Factors affecting adoption are assumed to be fully mediated through this cognitive mechanism. Affecting usage, or any other behavior for that matter, therefore, has to go through 'cognitions'. A strong positive relation between cognitions and actual behavior has been established in both IT adoption research (cf. Jasperson et al., 2005) and in psychology and is therefore accepted in this research.

Influence tactics are included as independent variables as a novel contribution of this dissertation. Influence tactics have the objective of affecting cognitions and consequently behavior. The cognitive process is built up of related cognitions, i.e. internal latent constructs within a certain cognitive mechanism.

External factors, like characteristics of the organizational context, the EP system or the individual, form an input for the EP adoption cognitions. Influence tactics are an alternative perspective to a subset of external factors and should therefore be delineated from other external factors. This is done in Chapter 5. In addition, the incidence and effect of external factors can give insight in an initial prediction of the EP adoption cognitions in a certain situation and possible contingencies for the effect of certain influence tactics. In this dissertation only the direct effects of influence tactics on EP adoption cognitions are researched.

1.4 Scientific Contributions

The theme of influence tactics and EP adoption builds on a rich tradition in the fields of IT, sociology and psychology. This section deals with the positioning within and contribution towards the existing knowledge bases on:

- EP
- IT adoption
- influence tactics

Previous EP Research

Research on the topic of EP is continuing to gain momentum. In EP research, the prime questions are focused on how contextual factors stimulate or impede organizational level EP adoption decisions (Osmonbekov et al., 2002; Subramaniam & Shaw, 2004, Arbin, 2003; Davila et al., 2003, Wagner et al., 2003, Aisbett et al., 2005). The characteristics of adopters and non-adopters at the organizational level were further explored by Min & Galle (2003), showing the influence of organizational readiness, user characteristics and IT infrastructure.

Several researchers have taken up an organizational standpoint and developed methods to assess the applicability of certain EP forms or tools in specific situations. Alignment with business strategy (Henderson & Venkatraman, 1999; Knudsen, 2003; Harink, 2003) or the purchasing situation (Hartmann 2002) are the dominant perspectives used to determine the fit of an EP with a given context. Both conceptual (Hartmann, 2002) and practical (Harink, 2003) methods have been developed. In addition, concepts (De Boer et al., 2002), frameworks (Subramaniam & Shaw, 2002) and tools have been developed to identify the ex-ante value of EP. Research has also addressed specific effects associated with adoption, like measuring the readiness of suppliers (Arnold, 2003), business models (Dai & Kauffman, 2002a, 2002b) and successful e-market structure (Dou & Chou, 2002). Topics concerning change management issues, individual adoption issues, interventions or influence tactics have not previously been researched. Notable exceptions include Arbin (2006) and Brandon-Jones & Croom (2005).

This dissertation provides a novel step in the stream of EP research by addressing individual level adoption when a system is already in place. EP research has previously focused on organizational level decision to adopt a system. The subsequent individual adoption processes by indented users have not been researched.

Previous IT Adoption Research

Research on adoption and diffusion has concentrated on identifying determinants of the rate, pattern and extent of diffusion across a population, as well as the general propensity of an entity to adopt and the propensity of an entity to adopt and assimilate a particular innovation. Adoption and (macro) diffusion have developed into two distinct and separated streams of research. Adopter studies are primarily concerned with understanding the innovativeness of the adopter, whereas diffusion researchers are primarily concerned with characterizing the rate and pattern of adoption of a technology across a community of potential adopters. This dissertation fits within the stream of adoption centered research.

Over the past four decades, models have been developed for various adoption situations and the spread of adoption across populations. Some basic notions and well-established generalizations still underlie current innovation adoption research:

- Innovation characteristics as perceived by adopters determine the ultimate rate and pattern of adoption. Rogers (1995), for instance, identifies the following characteristics: relative advantage, compatibility, complexity, trialability, and observability.
- Personal characteristics determine how prone potential adopters are to adopt. Examples of these characteristics include age, gender, education, and more latent characteristics such as anxiety, self-efficacy or predisposition.
- The adoption process unfolds as a series of stages such as persuasion, decision, implementation and confirmation.
- The actions of certain types of individuals, e.g. opinion leaders, can accelerate the adoption process dependent on the characteristics of these actions and the change agents. Potential adopters are also predisposed towards different types of influences.
- Adopters influence each other (peer persuasion). This explains why diffusion processes start out slowly then build up speed and slow down again as the population of potential adopters becomes exhausted.

The research in this dissertation is based upon the aforementioned fundamental generalizations from extant adoption and diffusion studies. Interventions to speed up or achieve adoption have been researched (see Chapter 3). The results, however, are not conclusive on the toolset to achieve adoption. The exploration of influence tactics as a view on such a toolset to achieve adoption is new (see Chapter 5). This dissertation provides a first step in this area.

Previous Influence Tactics Research

Power and influence processes have a substantial research tradition from both a societal and interpersonal perspective. For the latter, issues concentrate primarily on the way in which personal contact and communication influences others (Bruins, 1999). Research has primarily been directed at the choice and incidence of techniques from an agent perspective rather than the receptiveness and effect on a target. This research fits within the research tradition of influence tactics in an interpersonal perspective with an agent and a target. Several studies from Yukl and colleagues have resulted in a classification of influences (e.g. Yukl & Falbe, 1992). Both the classification and measurement scales have been refined for different purposes. For the purpose of this dissertation, a new classification and measurement scale are developed (see Chapter 9). An additional contribution is made by integrating a deductive and inductive perspective on the definition and classification of influence tactics.

By researching the effect of influence tactics on the EP adoption cognitions a novel linkage between the theoretical domains of social influence theory and IT adoption theory is made. As will be shown in Chapter 5, this link between the two domains is neither evident nor logically deducible from previous research: influence tactics have not been previously researched with IT adoption constructs (see Chapter 6), and the wide body of IT adoption research has neglected the role of influence tactics (see Chapter 3).

A conference paper by Chery & Wilkinson (2004) had previously introduced a possible connection between influence tactics and EP adoption. They presented an exploratory examination of the influence tactics by clustering tactics from 11 interviews. This dissertation further develops the proposed connection between the influence tactics and EP adoption.

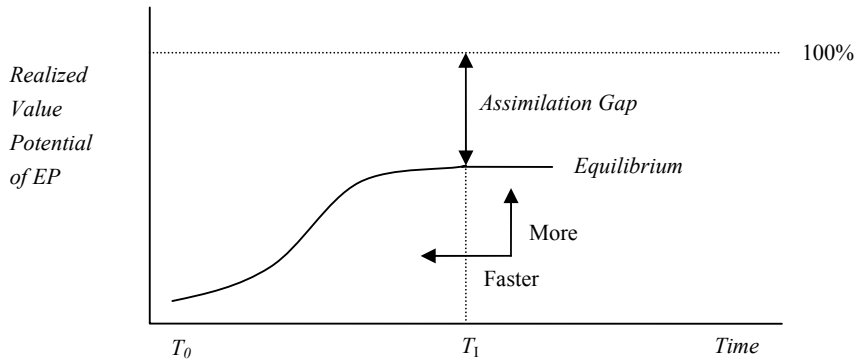
In summary, the study yields insights into the effect of influence tactics on EP adoption cognitions. It thereby builds on cognitive approaches towards individual adoption. Instead of focusing on additional factors to improve the explanatory power of adoption models, the toolset to manipulate cognitions takes up a central position. Influence tactics are chosen as a perspective of this toolset.

1.5 Practical Contributions

Stimulating user adoption of EP is only useful when there is an unrealized value potential of the EP. In this case, the value of an additional adopter or a more in-depth adopter contributes to the overall organizational goals. This implies that the 'right' choice is made for a certain type of system in a specific situation (cf. Hartmann 2002; Harink 2003). As in research, also practitioners have recently started to identify the various situations in which different types of EP systems turn out to be beneficial. Besides suppliers and consultant's research aimed at understanding the contingencies of successful EP utilization, also tools and methods have been developed to assess the applicability of different types of EP systems (cf. CAPS, Ariba learning center).

When the aforementioned condition of the 'right' choice of type of EP system is met, the actual compared to the potential usage intensity and depth of usage collectively determines the realized value of EP. Efforts to raise this realized value take place in organizations during a roll-out of a new EP system or when a project is initiated to leverage existing EP systems. When a dynamic process of technical implementation, process design, organizational change, and redefinition of roles of individuals stabilizes, equilibrium of an aggregated adoption level is established. This is a context specific situation in which a temporary stable level of realized value potential leaves room for further enhancement. In this dissertation such a situation of *unrealized value potential* is assumed. In this situation, the realized value is lower than a theoretical maximum value from the system due to under-utilization in a given organizational setting and user population. More value can be realized from an EP system when user adoption is achieved faster and/or when the overall usage breadth, intensity, and depth are increased. In terms of Meyer & Goes (1988) the assimilation process leaves a 'gap'. Figure 2 shows the graphical interpretation of the assimilation gap.

Figure 2 Assimilation gap



More recently, Rai et al. (2006) specified the concept of assimilation specifically for EP. They developed the following 7 step Guttman scale for the assimilation of EP innovations: awareness, interest, evolution/trial, commitment, limited deployment, partial deployment, and general deployment. In addition, they found that assimilation can be characterized in four patterns: none, focused niche, asymmetric and broad-based. Rai et al. (2006) found support for the relation between the level of EP assimilation and 'purchasing productivity', thereby supporting the notion of unrealized potential of EP in case of an assimilation gap.

In this dissertation, derived insights on ways to affect EP adoption cognitions should ultimately lead towards reducing the assimilation gap or capturing remaining value potential by raising the number of users. This occurs by turning non-users into users and existing user into more advanced or more frequent users.

More insight into the effectiveness of ways to alter EP adoption cognitions can benefit both the effectiveness and efficiency of interventions directed towards raising usage levels. Without knowledge of the effect of different influence tactics, managers apply 'rules-of-thumb' or an intuitive approach to realize behavioral change. Alternatively, managers either try different tactics and assess the effect or apply a wide array of interventions to everybody in order to achieve their objectives. This can lead to 'trial-and-error' approaches or an 'overkill' of interventions wasting scarce time and resources. More focus can be achieved by targeting the ways to affect behavior based on their effectiveness in certain situations. By showing the effect of influence tactics on cognitions, this dissertation contributes to the selection of these influence tactics to achieve EP adoption.

1.6 Structure of the Dissertation

This chapter provided a general introduction to the research. It showed the motivation, the research problem and the contributions to theory and practice. In the next chapter, the research framework is shown, central concepts are defined and research methodology is explained. After a discussion of the research design in Chapter 2, the remainder of the dissertation falls into three parts:

- Part I: Identification of External Factors.
- Part II: Identification of Influence Tactics.
- Part III: Establishing the effect of Influence Tactics.

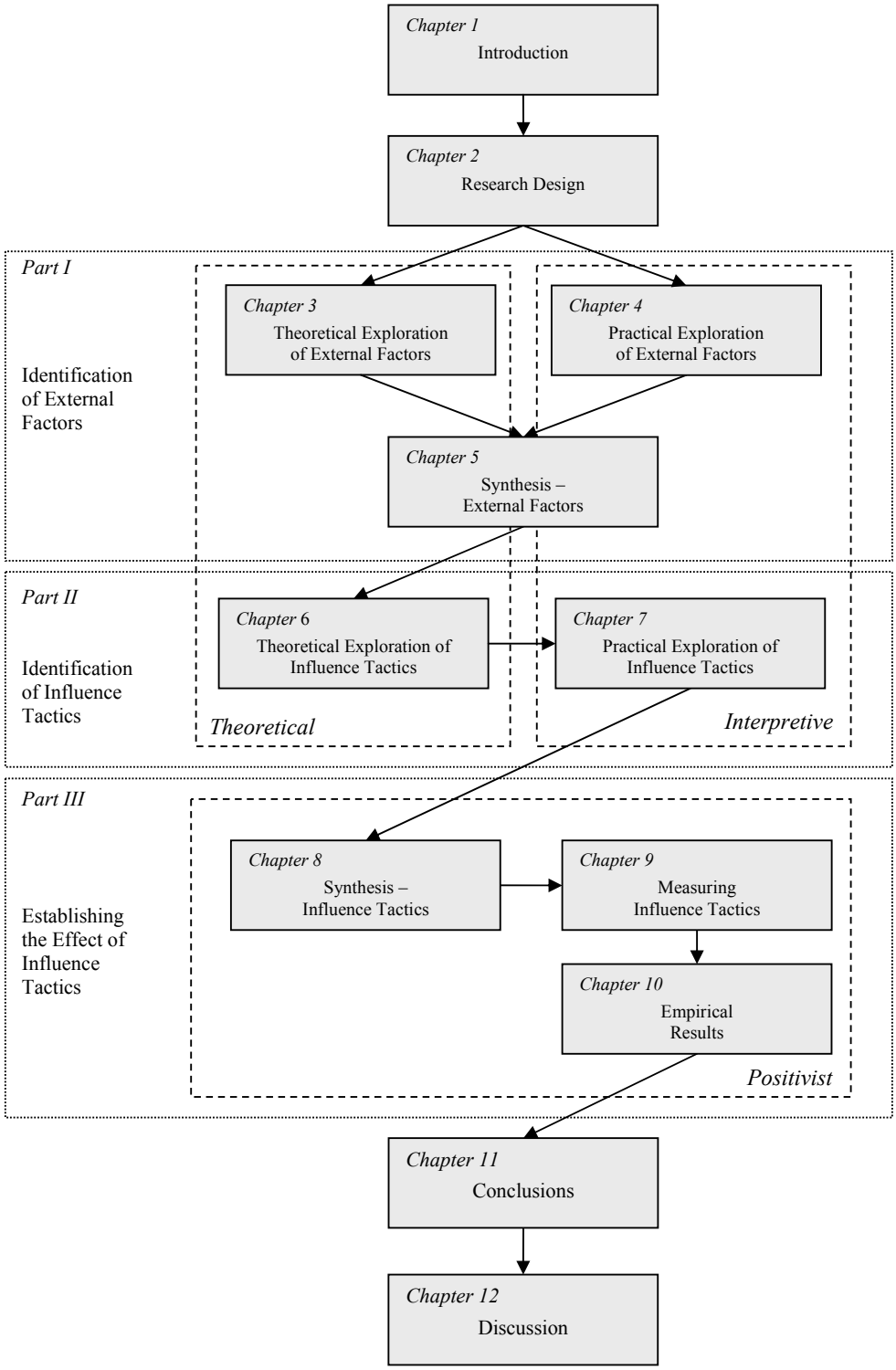
The first part concerning the identification of external factors starts with Chapter 3, in which the external factors are identified from extant IT adoption research and then clustered. In Chapter 4, external factors are explored in four qualitative case studies. A synthesis of findings the theoretical and empirical exploration of external factors is given in Chapter 5. In this chapter influence tactics are delineated from external factors and the need is shown for focusing on influence tactics in the remainder of the dissertation.

Part II is concerned with the identification of influence tactics. It starts with a literature review in Chapter 6. In this chapter, a theoretical classification and initial propositions on the effect of these tactics are determined. The influence tactics from extant theory are used in Chapter 7 to identify the incidence and effectiveness of these influence tactics in practice based on qualitative empirical research. The results lead to a revised set of influence tactics.

In the third part, the effects of influence tactics on EP adoption cognitions are developed and tested. Based on the findings in the theoretical exploration in Chapter 6 and the practical exploration in Chapter 7, a conceptual model is developed in Chapter 8. This model shows the hypotheses of influence tactics and their effect on EP adoption cognitions. In Chapter 9 a measurement instrument for the influence tactics is developed and pre-tested. In Chapter 10 the effects of influence tactics on the EP adoption cognitions are tested with data from seven different organizations.

In Chapter 11 conclusions are drawn on the effect of influence tactics on EP adoption cognitions. Theoretical and practical implications, including suggestions for further research and ways to apply the findings in practice are discussed in Chapter 12. Figure 3 shows the structure of the complete dissertation, including the three parts, the objective of these parts and the theoretical, interpretive, and positivist research perspectives used throughout the dissertation. This methodology will be described in the next Chapter.

Figure 3 Structure of the dissertation



Chapter 2 Research Design

2.1 Introduction

In this chapter, the overall research design is explained. In section 2.2, EP, adoption and cognitions are specified. The initial research framework is expanded to include EP adoption cognitions. In the next section, research questions are formulated. Subsequently, the research approach is explained in section 2.4. This chapter ends with conclusions for this dissertation.

2.2 Research Framework

The initial research framework, as introduced in the first chapter, shows external factors and influence tactics as independent variables and EP adoption cognitions as dependent variables. The conceptualization of the dependent variables are elaborated by defining EP, adoption and cognitions. This section ends with a research framework in which the EP adoption cognitions are specified.

2.2.1 E-Procurement (EP)

Defining EP

The rise of various internet-based applications in the purchasing function resulted in an abundance of terms, meaning different things to different people. The prefix 'e' was generously and freely applied, resulting in a plethora of derivatives of e-commerce and e-business. Within the field of procurement several 'buzz words' emerged, like e-Markets, Web / internet / e-exchanges, reverse / forward / e-auctions, B2B marketplaces, e-hubs, e-RFx, e-tendering, e-ordering and portals. All of these terms can be seen as instances of EP, however, a general consensus on a definition and classification of EP is lacking. Grieger (2003) calls this limited consistency in idiom a 'jargon jungle'. More agreement can be found in the elements comprising the definition of EP: 'e' refers to a certain technology and 'procurement' refers to the processes in and with the purchasing function[3]. The latter can refer to a generic process (Davilla et al., 2003; Harink, 2003; Van Weele, 2005) or functional aspects (Turban et al. 2000). Some authors include a wide view of technology, e.g. as 'systems' (Kim & Shunk, 2004) or 'a technology solution' (Presutti, 2003), while

[3] For a general discussion of procurement, purchasing and the purchasing function, please refer to Van Weele (2005).

others specify the web as medium (Subramaniam & Shaw, 2004), internet technology (Neef, 2001; De Boer et al., 2002; Van Weele, 2005) or using the internet (Kalakota & Robinson 1999; Kaplan & Sawney, 2000). A wider technological perspective could include Electronic Data Interchange (EDI) and Value Added Networks (VAN), however, these are generally seen as a predecessors for EP as the internet redefines the value hypothesis of technology in the purchasing function (e.g. De Boer et al., 2002). Following this premise,

E-Procurement is defined as the use of Internet technology in the purchasing function.

Classifying EP

Harink (2003) suggests a classification of EP using the process as the main criterion and product characteristics as secondary criterion: primary or product related goods and non-product related goods. He builds on the purchasing process model of Van Weele (2005) and extends it with three intermediate steps: after determining specifications, selecting suppliers, contracting for the sourcing part of the process, these same steps are repeated for the transactional part. These steps are followed by ordering, expediting and evaluation, and follow-up and evaluation. Within these steps Harink (2003) identifies eight forms of EP in two categories: e-informing and e-transacting. E-informing is using Internet technology in governing the purchasing process and e-transacting is using Internet technology in the transactional purchasing process. The types of EP are shown in Table 1.

Table 1 Types of EP (Harink 2003)

EP Type	*Category*	*Short Description*
1. E-Intelligence	E-Informing	Management Information System with spend analysis tools
2. E-contract management	E-Informing	Contract database and compliance tools
3. E-Sourcing (old view)	E-Transacting	Supplier search tools
4. Collaborative Product Commerce	E-Transacting	Tools supporting a collaborative effort between supplier(s) and buyer
5. E-Tendering (E-Sourcing new view)	E-Transacting	Tool for the process of gathering and analyzing information, proposals and quotations
6. E-Reverse Auctioning (E-Sourcing new view)	E-Transacting	Tool for the awarding process of a predefined "lot"
7. Web-based ERP	E-Transacting	ERP systems based on Internet technology
8. E-Ordering	E-Transacting	System for calling of orders in a catalogue or 'free format'.

In this dissertation, the Harink classification of EP based on the purchasing process is followed. Two alterations are suggested based on a different usage of the terms in practice since the introduction by Harink in 2003:

- The term *E-Sourcing* is described by Harink (2003) as a supplier search tool. In practice, however, the term is used for the process of (pre)qualifying

suppliers as well as selection of the final supplier(s) using internet tools. This is also supported by Johnson & Klassen (2005), who describe E-Sourcing as the process, which includes forward & reverse electronic auctions and online bidding & tendering, which are also referred to as electronic Requests for quotations or proposals (e-RFx). In this dissertation, the definition of William & Presutti (2002) of E-Sourcing is used: the use of the Internet in the supplier selection process, from prequalification of suppliers through the construction of a comprehensive request for proposal to the selection of the final supplier. The adopter for e-sourcing in this dissertation is a purchasing professional.

- The term *E-Ordering* as defined by Harink (2003) refers to the system which supports the calling off of orders. Since 2003 systems emerged to support the whole transactional process from order to payment, i.e. Purchase-to-Pay Process (P2P). Arguably, the payment can be defined as a separate system (e-invoicing). Here, however, we use a broad definition of E-Ordering for the use of Internet to facilitate operational purchasing processes. This encompasses the ordering, i.e. requisitioning, order approval, order receipt and payment process. The adopter for e-ordering in this dissertation is limited to an end-user who places requisition. This is often not a purchasing professional, but anybody in an organization with requisition rights, e.g. an administrative assistant.

In this dissertation, the focus is on two types of EP as defined above: E-Sourcing and E-Ordering. The reason for choosing these systems is that variance is expected to be found on both the independent and dependent variables for these systems. Variance is expected to be found on the EP adoption cognitions of individuals in a population within an organization that has recently deployed an E-Sourcing or an e-ordering system. This is shown in Chapter 3. While some organization may also be experimenting with other EP systems, they have generally not reached a sufficient level of maturity to make a post-hoc analysis possible of external factors, influence tactics and EP adoption cognitions.

2.2.2 Adoption

Defining Adoption

Adoption research finds its origin in the field of anthropology, sociology, psychology and later spread out to other fields, like marketing and IT. Rogers remains the prime scholar in the field of adoption since his seminal work in 1962 (Rogers, 1962). Based on Rogers (1995), adoption is defined as "the process to make full use of an innovation as the best course of action available". The object is an innovation, i.e. "an

idea, practice or object that is perceived as new by an individual or other unit of adoption". Rogers (1995) recognizes that innovations are communicated among the members of a social system and that each member of the social system faces his/her own innovation adoption. Adoption follows five stages:

1. Knowledge – the actors gain awareness of an innovation and has some idea of how it functions,
2. Persuasion – the actors form a favorable or unfavorable attitude toward the innovation,
3. Decision – the actors engage in activities that lead to a choice to adopt or reject the innovation,
4. Implementation – the actors put an innovation into use,
5. Confirmation – the actors evaluate the results of their innovation usage.

Naturally, the process of the innovation adoption does not necessarily follow such a linear approach, could stagnate at different stages and lead to non-adoption or rejection (cf. Hultman et al., 2005).

In this dissertation, the definition of Rogers (1995) for adoption is used. Also the staged approach is recognized. This implies the focus on an individual *process* to employ a new technology, as a result of knowledge and persuasion *phases* and the role of *communication* in a social system to move from one phase to the next. During this process, individuals form a value (score) on the cognitions leading towards adoption, where the 'influence-ability' is the largest in the earlier stages.

Adoption is defined as a process to make full use of an innovation as the best course of action available

Classifying Adoption

The adoption can be classified according to the object, the view, the conceptualization of adoption as a dependent variable and the subjects. The object of adoption research is the type of innovation. An abundance of different product, process and conceptual innovations have been used as object (cf. Rogers, 1995). Here, we focus on EP as a type of technology enabled work system. Two different views on adoption occur: a factor view, modeling the antecedents of adoption, and a process view, modeling the phases of adoption. This research falls within the factor view.

A two-phased approach to adoption is considered. The two-phased approach was first recognized by Zaltman et al. (1973), who reviewed organizational adoption processes and defined two-stages: primary and secondary adoption. The primary adoption is the organizational level decision to adopt an innovation. Secondary adoption is the

following implementation stage, where members of the organization each decide to adopt the innovation. In an individual context, this could include voluntary or consensus based adoption (cf. Orlikowski, 2000), but can also contain a mandatory component. An individual in the organization who is not part of the primary decision making unit is subjected to *contingent adoption*. Consensus based adoption on a managerial level then makes place for authority based secondary adoption, which could be accompanied by a degree of coercion (Ram & Jung, 1991). This two-step approach has been recognized by various authors (Rogers, 1995; Cooper & Zmud, 1990); however, only limitedly used in research (Frambach & Schillewaert, 2002).

In this dissertation, the focus lies on an intra-organizational situation of *contingent adoption*. Adoption is thereby conceptualized as individual cognitive process with EP as object.

2.2.3 Cognitions

Defining Cognitions

In theory, a profound understanding has been built up on individual cognitive adoption processes. Adoption is probably the most researched topic in the field of information systems and has brought forth several models with a high parsimony[4] and explanatory power (See Appendix B). These models predominantly use cognitive determinants, or internal factors, mediating all external input to model the individual cognitive processing leading towards adoption behavior. Individual cognitions can be conceptualized in two ways: cognitive process and cognitive content (Jasperson et al., 2005). Cognitive processing involves the mechanism of perceiving, learning, remembering, thinking, understanding, and the mental activity of applying those processes (Ashcraft 1998). Cognitive content consists of the collection of opinions formed as a result of cognitive processing. Researchers refer to instances of cognitive content as *cognitions* or internal factors. Several cognitions together make up a cognitive mechanism.

Cognition is defined as an instance of cognitive content, i.e. the opinions formed as a result of cognitive processing.

Classifying Cognitions

Notable approaches to model this cognitive mechanism from the past three decades include the Theory of Reasoned Action (Fishbein & Ajzen, 1975), Social Cognitive

[4] Parsimony is an aim for theoretical models to achieve the same predictive power of a phenomenon with as few factors as possible.

Theory (Bandura, 1986), Theory of Planned Behavior (Ajzen, 1991), Model of PC Utilization (Thompson et al., 1991), Motivational Model (Davis et al., 1992), Technology Acceptance Model (Davis, 1989; Davis et al., 1989; Venkatesh & Davis, 2000) and the most recent contribution: the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003). The TAM model has dominated the empirical studies on IT adoption. Previous work on the TAM has concentrated on validating, replicating, extending and elaborating upon the TAM, resulting in a firmly grounded basic understanding of the determinants (Jeyaraj et al., 2004; Lee et al., 2005, Schepers & Wetzels, 2007). The TAM is widely recognized as one of the core models in information systems research (Lee et al., 2005). Three constructs are central in TAM related work: Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Subjective norm (SN). These constructs collectively determine a Behavioral Intention (BI), which, in turn, predicts actual Behavior (B).

Venkatesh et al. (2003) further advanced the comprehension of the cognitive mechanism by developing the UTAUT. This model integrates eight different IT adoption theories based upon their conceptual and empirical similarities. Venkatesh et al. (2003) confirm the main effects of TAM in their UTAUT as the conceptual basis for the constructs Performance Expectancy (PE), Effort Expectancy (EE) and Social Influence (SI) on BI. BI is thereby determined by PE, defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance, EE, defined as the degree of ease associated with the use of the system, and SI, defined as the degree to which an individual perceives that important others believe he or she should use the system. In turn, Behavior (B) is determined by BI, the degree to which an individual has the Intention to Use the system, and Facilitating Conditions (FC), defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. The UTAUT also includes four moderating factors: experience, voluntariness, gender and age. Following the original premises of TAM, the UTAUT also theorizes that the effects of all external factors on BI and B are fully mediated by PE, EE, SI and FC (Venkatesh et al., 2003). The UTAUT was empirically tested using data from four organizations and then cross-validated using new data from two additional organizations. The empirical data show support for a relatively high explanatory power of behavioral intention. The adjusted R^2 was raised to 0.,70 compared to the previous TAM research with an R^2 varying between the 0,30 and 0,50.

In this dissertation the TAM constructs, later confirmed by the UTAUT model, are chosen as a perspective towards EP adoption cognitions. The TAM also models the cognitive mechanism leading towards adoption and has a large empirical basis.

Findings from previous TAM research are therefore likely to be generalizable to some extent to UTAUT. In addition, the TAM constructs were used as a fundament for defining the UTAUT. A comparison of the original definition of the TAM constructs (Davis, 1989; Davis et al., 1989) and UTAUT (Venkatesh et al., 2003) is given in Table 2.

Table 2 Comparison of comparable TAM and UTAUT cognitions

TAM	*Definitions*	*UTAUT*	*Definitions*
Subjective Norm (SN)	The person's perception that most people who are important to him think he should or should not perform the behavior in question.	Social Influence (SI)	The degree to which an individual perceives that important others believe he or she should use the new system.
Perceived Usefulness (PU)	The degree to which a person believes that using a particular system would enhance his or her job performance	Performance Expectancy (PE)	The degree to which an individual believes that using the system will help him or her to attain gains in job performance.
Perceived Ease of Use (PEOU)	The degree to which a person believes that using a system would be free of effort	Effort Expectancy (EE)	The degree of ease associated with the use of the system.
Behavioral Intention (BI)	the perceived likelihood of performing use behavior	Behavioral Intention (BI)	the perceived likelihood of performing use behavior

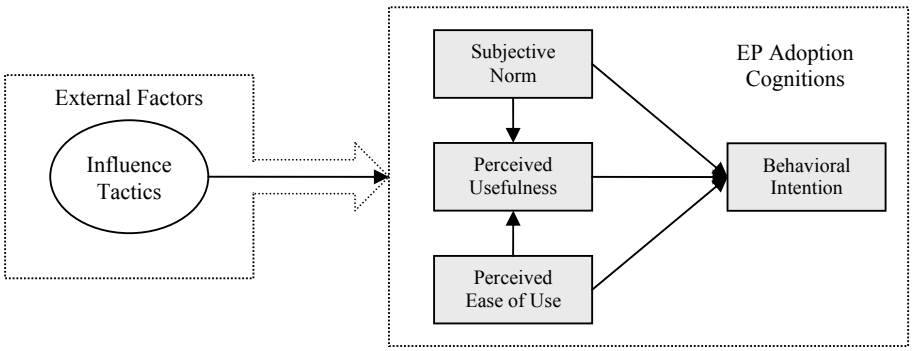
The choice for TAM implies the following choice of EP adoption cognitions:

- Subjective norm (SN)
- Perceived Usefulness (PU)
- Perceived Ease of Use (PEOU)
- Behavioral Intention (BI)

2.2.4 Research Framework with EP Adoption Cognitions

Based on the previous discussion, the initial research framework as introduced in Chapter 1 is specified with the EP adoption cognitions. The research framework is shown in Figure 4.

Figure 4 Research Framework with EP Adoption Cognitions



The research framework is used to formulate research questions in the next section.

2.3 Research Questions

The initial analysis and description of the research problem in the previous sections leads to the following main research question:

Q *What is the effect of influence tactics on EP adoption cognitions?*

Based on the previous discussion of the problem the following additional research questions are formulated:

Q1 *What external factors affect EP adoption cognitions?*
This research question is proposed to increase the understanding of the wider context of factors that have an effect on EP adoption cognitions. An increased understanding of all factors affecting EP adoption cognitions can help position influence tactics amongst them and/or substantiate influence tactics as an alternative view. In addition, the variance explained by influence tactics may be overshadowed by other, non-controllable, factors. An understanding of these factors can improve the interpretation of the effect of influence tactics, including possible contingencies and/or confounding factors.

Q2 *What influence tactics affect EP adoption cognitions?*
Before an effect of influence tactics can be established, the set of influence tactics should be known. The specific application context of EP is accepted as a reason for critically evaluating previously validated general influence tactics and revising them for the purpose of this dissertation.

This research serves a dual objective. The first objective is an epistemological goal to advance the current understanding and deliver theoretical insight. The second objective is a meaningful application in a practical context. This dual objective attracts scientists as well as practitioners as 'clients' of this research, which implies that the utility-criterion of the research output is as important as the classic research criteria. 'Relevance' is thereby added to 'rigor' as a joint goal for this research.

2.4 Research Approach

This section shows the research approach, starting with the philosophical point of departure followed by the general methodology followed in this dissertation.

2.4.1 Philosophical Point of Departure

During the course of this research, the perspective moves from an interpretive towards a positivistic perspective on empirical data collection. Ramsay (1998) discusses the positivistic and interpretive perspectives in purchasing research and shows the difficulty in studying social systems in which meaningful event-regularities are identified that can subsequently be used to formulate predictive generalizations. Studying EP adoption presents the same difficulties as adoption takes place within a social system. Different in-depth interpretive studies can shed a different light on the phenomena of EP adoption. This does not imply different realities. In this dissertation, an underlying external reality that can be approximated by a positivistic approach is assumed. This can only be done successfully after gaining a satisfactory understanding of the phenomenon. The construction of reality is, however, made by both researcher and researched. The interplay between an objective reality and the social construction of it, causes the underlying logic of first striving for an in-depth understanding of the phenomenon in its social context to facilitate interpretation and grounding of the distilling theoretical and empirically tested ‘laws’. The nature of knowledge thereby moves from individual reconstructions towards testable hypotheses. The quality criteria thereby move from trustworthiness and authenticity from the interpretation and construction towards the classical elements of rigor: validity, reliability and objectivity.

The interpretive perspective is adopted for the empirical research to answer the first research question dealing with external factors. The second research question dealing with influence tactics is also dealt with from an interpretive perspective. The empirical research for both questions is preceded by literature research. The main research question is dealt with from a positivistic perspective. A total of five research phases are distinguished. These research phases are shown in Table 3.

Table 3 **Five Phases in the Research Process**

	Theoretical - External factors	*Interpretive - External factors*	*Theoretical - Influence tactics*	*Interpretive - Influence tactics*	*Positivistic - Influence tactics*
Research Method	Theoretical	Qualitative	Theoretical	Qualitative	Quantitative
Activity	Desk research	Case studies	Desk research	Case studies, FGD	Survey
Output	Initial model for the effect of external factors on EP adoption cognitions	Revised model the effect of external factors on EP adoption cognitions	Initial model of the effect of influence tactics on EP adoption cognitions	Revised Model the effect of influence tactics on EP adoption cognitions	Tested model of the effect of influence tactics on EP adoption cognitions
Logic		Inductive		Inductive	Deductive
Researcher role	Detached; value-laden	Involved observer; value-laden	Detached; value-laden	Involved observer; value-laden	Detached, distant, value-free

2.4.2 Methodological Point of Departure

A mixed method approach, combining qualitative and quantitative research methods, is applied. Positivism is generally associated with quantitative research methods, while qualitative research techniques dominate the interpretive perspective (Ramsay, 1998). The combination of research methods is believed to lead to an increased understanding of the research phenomenon and contribute to the overall research quality. In addition, a qualitative grounding of the research model and instrument preceding survey research can increase the reliability and validity of both the model and the measurement instrument. The following methods are used throughout the five research phases:

Theoretical – External factors

A review is conducted of empirical findings in IT adoption literature linking external factors to the EP adoption cognitions. The external factors are clustered in " system & context", "interventions" and "individual" (see Figure 5). In addition, both moderating and predictive effects are identified. See Chapter 3.

Interpretive – External factors

Case studies are performed to analyze the role of external factors. Just like in the theoretical exploration, the cases serve the purpose of gaining a deeper understanding of the effect of external factors in relation to the EP adoption cognitions. There are three additional goals in the case studies: to gain a notion on the occurrence of external factors, to assess the relative importance of external factors and to understand why certain 'scores' are given on EP adoption cognitions. See Chapter 4.

In Chapter 5 the findings of the conceptual and interpretive research on external factors is synthesized to answer the first research question: "*What external factors affect EP adoption cognitions?"*

Theoretical – Influence tactics
A review is conducted of previous research on influence tactics. A selection is made of empirical work on the incidence and effectiveness of different typologies of influence tactics. Results are reviewed and assessed for the applicability for this research. The objective is to choose a theoretical classification of influence tactics that is most suitable for this dissertation and provide a theoretical basis for developing propositions of the effect of influence tactics on EP adoption cognitions. See Chapter 6.

Interpretive – Influence tactics
The theoretical classification of influence tactics is revised in three rounds of empirical inquiry. The incidence and effectiveness of influence tactics are assessed in a case study and two rounds of Focus Group Discussions (FGDs). The empirical enquiry provides the practical basis for revising the theoretical classification of influence tactics specifically for EP and formulating propositions of their effect on EP adoption cognitions. The revised classification provides an answer to the second research question: "*What influence tactics affect EP adoption cognitions?"* See Chapter 7.

Positivistic – Influence tactics
In Chapter 8 the findings of the theoretical and empirical, interpretive research on influence tactics is synthesized to develop hypotheses of their effect on the EP adoption cognitions, thereby forming the research model for the positivistic research. Survey research is conducted to assess the effectiveness of influence tactics. The research model is tested using a large scale survey. A more detailed research design for the quantitative phase is given in Chapter 8.

In short, the following steps are performed:

- *Development of a measurement instrument*. Influence tactics are operationalized using previously published empirical studies and insights from new case studies. An item battery is generated, a selection process is performed and a pre-test of a measurement instrument is conducted to assess the psychometric properties. Additionally, expert pre-test is performed for content validity. See Chapter 9.

- *Data collection*. A sample-frame is selected from individuals who have recently adopted EP within large Dutch-based organizations. A large scale field-survey is conducted using an online tool. The data from the survey research is used for multivariate analysis. Individual relations between influence tactics and cognitions are assessed with regression analysis and a model of all influence tactics and cognitions is estimated with Structural Equation Modeling (SEM). The SEM is preceded by data cleansing, descriptive statistics and factor analyses to establish the validity and reliability of the measurement instrument. Data analysis and findings are presented in Chapter 10.

In Chapter 11 the findings of the positivistic research on influence tactics is synthesized to answer the main research question: "*What is the effect of influence tactics on EP adoption cognitions?"*

To summarize, this research utilizes a mixed perspective and mixed-method approach. The research moves from an interpretive to a positivistic perspective, using literature review, case studies , FGDs and survey research as methods. Literature review and case studies are used twice: the first time to identify and elucidate the effect of external factors; the second time to identify and assess the effectiveness of influence tactics. Survey research is used to establish the effect of the influence tactics on EP adoption cognitions.

The research method is described in more detail at the beginning of each chapter.

2.4 Conclusion

This research focuses on EP adoption cognitions as dependent variables, and external factors, including influence tactics, as independent variables. At this point, the following EP adoption cognitions are recognized: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Subjective Norm (SN), and Behavioral Intention (BI). The main research question links the dependent and independent variables: What is the effect of influence tactics on EP adoption cognitions?

In this dissertation, the focus is on an intra-organizational situation of contingent adoption. Adoption is thereby conceptualized as an individual cognitive process with EP as the object of adoption. EP is defined as the use of Internet technology in the purchasing function. Two types of EP are considered: e-ordering and e-sourcing.

The research approach in this dissertation builds on an evolving perspective from interpretive to a positivist perspective. In terms of methods, literature review and case research are conducted twice: first time to identify and elucidate the effect of external factors; secondly to identify and assess the effectiveness of influence tactics. Survey research is only conducted for the influence tactics.

Part I:

Identification of External Factors

Part I has the objective of answering the first research question:

Q1 *What external factors affect EP adoption cognitions?*

The first part starts with Chapter 3, in which the external factors are identified from extant IT adoption research and then clustered in predefined categories. In Chapter 4, external factors are explored in four case studies. Findings are clustered in a similar manner. This facilitates a synthesis of findings from the theoretical and empirical exploration of external factors in Chapter 5. In this chapter influence tactics are distinguished from external factors and the need is shown to focusing on these influence tactics in part II and III of this dissertation.

Chapter 3 Theoretical Exploration of External Factors

3.1 Introduction

This chapter shows the identification of external factors that affect the EP adoption cognitions in theory. In the first section, the scope of the literature is described. Subsequently, the followed method is described in section 3.2. This includes the choice of the literature sample and analysis framework. The next section shows the result of the literature review[5]. This includes both the identification and clustering of the external factors. Finally, the results are discussed and conclusions for this research are drawn.

3.2 Method

The literature review serves the purpose of identifying external factors and their relationship with the EP adoption cognitions. Specifically for EP adoption, no previous empirical research has been found using TAM, UTAUT or any another adoption model. Therefore, the object of EP is relaxed towards information systems in general. In order to identify and analyze the relationship of external factors with the TAM constructs in previous empirical research, first the sample of articles is determined, and then a clustering approach is chosen. This approach to analyzing literature is based on Cooper (1989), Jeyaraj et al. (2004) and Lee et al. (2005).

3.2.1 Sample of Articles

Due to the sheer amount of articles using or building on TAM (by February 2006, the original Davis (1989) article was cited 656 times) a pre-selection of 11 journals was made. The journal selection is based on the MIS Journal Rankings from the Association of Information Systems[6]. In addition, the timeframe is limited to the last decade (journals published from 1995 till September 2005), resulting in 108 TAM related articles. The following additional selection criteria were used:

a.) the article shows results from one or more empirical studies related to the TAM constructs; and

[5] The literature review is based on De Groot, W., Reunis, M.R.B. (2005) 'Targeting interventions for intra-organizational IT adoption', proceedings of the IADIS e-commerce conference 2005, Porto, Portugal, Dec. 15-17.
[6] The ranking of IT journals can be accessed at: http://www.isworld.org/csaunders/rankings.htm

b.) the research was conducted in an organizational setting (including university); consumer research is excluded.

The pre-selection of journals, timeframe and additional selection criteria yields a sample of 40 articles to be included in the literature analysis. The list of 40 articles is given in Appendix C.

3.2.2 Types of External Factors

External Factors

Based on the original TAM premises, all external factors affecting the acceptance of EP are assumed to be mediated through the cognitive mechanism of internal factors. The external factors can be related to everything in the work system, i.e. organization, processes, technology, individual, and social context. The cognitive mechanism provides 'the route' towards affecting behavior.

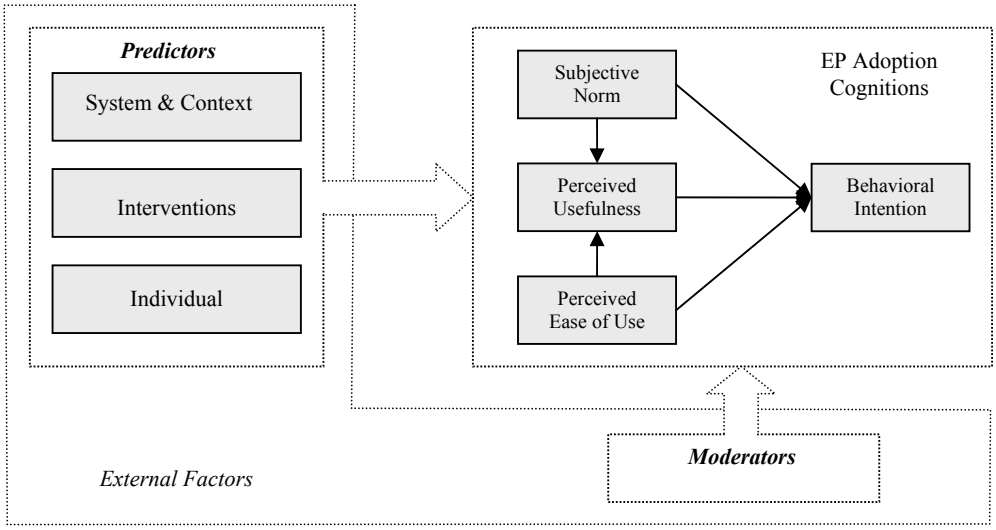
External factors can be either a predictive variable of one of the cognitions or a moderator of the main effects in the cognitive mechanism. A moderating factor enhances or diminishes the effect of a relation between other factors, here the relations between cognitions in the cognitive mechanism. TAM based research has identified different moderators (cf. Sun & Zhang, 2005). For instance, the UTAUT recognizes four external factors as moderators of the main relations between PE, EE, and SI with BI and FC with UB: age, gender, experience and voluntariness (Venkatesh et al., 2003). The other type of external factors, with a predictive effect can be seen as antecedents of the EP adoption cognitions. Summarizing, two types of external factors are recognized based on their effect:

- predictors
- moderators

Besides a classification in moderator or predictor on the basis of the effect of the external factors, they are also classified in this dissertation on the area they relate to. The following categories of external factors are distinguished based classification (Jeyaraj & Lacity, 2004)::

- System & Context: characteristics of the system, the organizational processes and wider organizational context
- Interventions controllable factors that can be manipulated by an agent aimed at increasing adoption
- Individual characteristics of the (potential) adopter, i.e. user

Figure 5 Types of External Factors



The review is structured according to types of external factors based on their effect: predictors and moderators, and based on their area: system & context, interventions, and individual.

3.3 Literature Review

3.3.1 System & Context

The selected studies show the effects of 20 external factors related to system and context. The following subcategories are distinguished: task technology fit / job relevance and system characteristics. The predictive effects of the external factors on PU and PEOU are shown in Table 4. No predictors of SN or moderator effects are found in the selected articles. The findings are discussed briefly below.

Table 4 External Factors - System & Context

Category	*External Factor*	*Source*	*Predictor*	
			PU	*PEOU*
Task Technology Fit	Technology Provider versus User	Agarwal & Prasad, 1999	0	+
	Task Technology Fit	Dishaw & Strong, 1999	0	+
	High Task Structure	McFarland & Hamilton, 2004	+	+
	Task Technology Fit	Wu et al., 2007	0	+
	Staff seniority	Burton-Jones & Hubona, 2005	+	0
Job Relevance	Job	Lucas & Spitler, 1999	+	0
	Job Relevance	Venkatesh & Davis, 2000	+	
	Relevance	Hong et al., 2001	+	+
	Relevance	Thong et al., 2002	+	+
	Job Relevance	Hu et al., 2003	+	
System Characteristics - Quality	System Quality	Igbaria et al., 1995	+	+
	Perceived System Quality	Lucas & Spitler, 1999	+	+
	Quality of Search Engines	Liaw & Huang, 2003		+
	System Quality	McFarland & Hamilton, 2004	+	+
System Characteristics - other	Tool functionality	Dishaw & Strong, 1999	0	+
	Type of application	Doll et al., 1998	+	0
	Interface characteristics	Thong et al., 2002		+
	Screen design	Hong et al., 2001	0	+
	objective usability	Venkatesh & Davis, 1996		+
	objective usability	Venkatesh, 2000		+

+ = positively significant at $p \leq 0.05$; 0 = non-significant; - = negatively significant at $p \leq 0.05$; blank = not studied
SN, BU and UB are omitted due the fact that no predictive effects of external factors were found on these constructs.
No moderator effects were found on the relationships between PU, PEOU, and SN with BI or B.

Task technology fit / job relevance

Task Technology Fit (TTF) has been related to TAM and IT adoption by several different authors. Dishaw & Strong (1999) define TTF as "the degree to which an organization's information systems functionality and services meet the information needs of the task". They showed that PEOU is affected by TTF, when fit between the task and the tool is higher, users perceive the tool to be easier to use for that task. This is confirmed by the research of Agarwal & Prasad (1999), McFarland & Hamilton (2004) and strongly by Wu et al. (2007). Burton-Jones & Hubona (2005) and Lucas & Spitler (1999) take the task or job as surrogate measure for task-technology fit. Burton Jones & Hubona (2005) showed that managers perceive e-mail to be more useful in their work because they rely heavily on communication.

Job relevance is a construct that is conceptually related to TTF and can be defined as the degree to which the system is applicable to the targets' job. Job relevance is a function of the importance within one's job of the set of tasks the system is capable of supporting. Goodhue & Thompson (1995) support the importance of job relevance: "users seem to view their systems as tools which assist or hinder them in the performance of their tasks". Hong et al. (2001) showed that job relevance, is an important predictor of both PU and PEOU of the technology. The five studies that include job relevance, all find significant relations with PU and only two with PEOU. TTF, on the other hand, is primarily found to be related to PEOU. A conceptual difference might therefore be larger than initially stated. Still, concluding from the reviewed articles, TTF and job relevance are predictors of PU and PEOU.

System characteristics

The system is the focal object for user to form their beliefs. The TAM constructs have been studied for a wide range of technologies, e.g. e-mail, internet and ERP systems (see Lee et al., 2005 for an overview). Several characteristics of the system have been proposed as predictors for PU and PEOU. In our sample, quality is used most frequently (five studies). Igbaria et al. (1995) identified five different dimensions of system quality: functionality, equipment performance, interaction, environment, and the quality of the user interface. They found significant positive relations with both PU and PEOU. Other authors have found similar significant relations between system quality and both PU and PEOU (Lucas & Spitler, 1999, McFarland & Hamilton, 2004). System complexity is recognized as an important differentiating factor of the effect of PEOU in previous reviews (e.g. Sun & Zhang, 2005). In this review, Dishaw & Strong (1999) use functionality as a proxy for complexity and demonstrate that it is indeed an important predictor of IT acceptance through PEOU. Many other (utilitarian) system characteristics have been included in earlier TAM research and especially in the wider area of innovation adoption research. Examples in the selected journals include interface characteristics, screen design, and objective usability; all showing predictive effects on PEOU. Concluding from the reviewed articles, system characteristics are a predictor for both PU and PEOU.

Conclusions on external factors related to system & context:

- TTF / job relevance are predictors of PU and PEOU.
- System characteristics are predictors for both PU and PEOU.

3.3.2 Interventions

Interventions are external factors that can be controlled, i.e. manipulated by an agent. The selected studies show the effects of 51 interventions. The following categories are distinguished: Social Influence, Training, Facilitating Conditions & Support, and Roll-out. These interventions only have a predictive effect on PU, PEOU, SN, BI and B. No interventions with a moderating effect have been identified. Table 5 shows the predictive relations between the interventions and the TAM. The findings are discussed briefly below.

Table 5 External Factors - Interventions

Category	*External Factor*	*Source*	*Predictor*				
			PU	*PEOU*	*SN*	*BI*	*B*
Social Influence	Superior's influence	Taylor & Todd, 1995b			+		
	Peer's Influence	Taylor & Todd, 1995b			+		
	Social Influence	Karahanna & Straub, 1999	+				
	Social Presence	Karahanna & Straub, 1999	+				
	Social Presence & Information Richness	Gefen & Straub, 1997	+				
	Image	Venkatesh & Davis, 2000	+				
	Other's use	McFarland & Hamilton, 2004	+	0			
Training	User training	Igbaria et al., 1995	+	+			
	Internal training	Igbaria et al., 1997	+	0			
	Participation in Training	Agarwal & Prasad, 1999	+	0			
	External training	Igbaria et al., 1997	0	+			
	Training intervention	Venkatesh et al., 2002	0				
	Training on ERP	Amoaka-Gympah & Salam, 2004		+			
	Training Effectiveness	Lippert & Forman, 2005		+			
	Pre Training environment	Venkatesh et al., 2002	+	+			
	Training environment	Venkatesh et al., 2002	+	+			
Facilitating conditions	Facilitating conditions	Venkatesh et al., 2003					+
	Perceived external control	Venkatesh, 2000		+			
	Perceived Resources	Mathieson et al., 2001	+	+		+	+
	Perceived Behavioral	Chau & Hu, 2002				+	
	Control	Taylor & Todd, 1995				+	+
	Accessibility	Karahanna & Straub, 1999		+			
	System accessibility	Thong et al., 2002		+			
	Internet response time	Liaw & Huang, 2003		+			
	Compatibility	Chau & Hu, 2001	+				
	Compatibility	Hu et al., 2003	+				
Facilitating conditions - Support	Availability of Training &Support	Karahanna & Straub, 1999	0				
	Internal computing Training &Support	Wu et al., 2007	0	+			
	External computing Training &Support	Wu et al., 2007	0	0			
	internal computing support	Igbaria et al., 1997	0	0			
	End User comp. support	Igbaria et al., 1995	+	+			
	Developer Responsiveness	Gefen & Keil, 1998	+	+			
	External computing support	Igbaria et al., 1997	+	+			
	Organizational Support	McFarland & Hamilton, 2004	+	+			
	Management Support	Igbaria et al., 1995., 1997	+	+			
		Wu et al., 2007	0	0			
Roll-out	Awareness	Agarwal & Prasad, 1998	+	+			
	System Visibility	Thong et al., 2002	+				
	Information accessibility	Teo et al., 2003	+				
	Result demonstrability	Venkatesh & Davis, 2000	+				
	Experimentation	Lippert & Forman, 2005	+	+			
	Job insecurity	Agarwal & Prasad, 2000	+	+			
	Network externality	Wu et al., 2007	0	+			
	Community adaptivity	Teo et al., 2003	+				
	Information quality	Lederer et al., 2000	+				
	Communication Channel	Agarwal & Prasad, 1998	+	0			
	Perceived Credibility	Ong et al. 2004				+	
	Project communication	Amoaka-Gympah & Salam, 2004	0				
	Ease of understand. / finding	Lederer et al., 2000		+			
	Terminology	Hong et al., 2001	0	+			

+ = positively significant at $p \leq 0.05$; 0 = non-significant; - = negatively significant at $p \leq 0.05$; blank = not studied

No moderator effects were found on the relationships between PU, PEOU, and SN with BI or B.

The labels of the categories 'Social Influence' and 'Facilitating Conditions' of external factors are the same as the SI and FC constructs in the UTAUT model. This is due to the fact that in the review factors have been found that a.) have a predictive relationship with the TAM constructs and b) fit within the definition of the UTAUT. In part, this is understandable as the same studies have formed the input for formulating the UTAUT with SI as slightly different construct as SN, and FC as new construct. It should be noticed that UTAUT treats PE, EE, SI, and FC as variables that are independent of each other, while preceding TAM studies several interrelations have been found.

Social Influence

Social influences have the purpose of manipulating the beliefs of people and have a cognitive nature. Some authors include an explicit source of the social influences, for instance a superior or peer (Taylor & Todd, 1995b). Other authors have included non-descript or more general social influences (Karahanna et al.,1999), like social presence (Karahanna et al., 1999) or image (Venkatesh & Davis, 2000). Besides active social influences, passive social influences have also been included like 'other's use' (McFarland & Hamilton, 2004). Taylor & Todd (1995b) found that superior and peer influences have significant effects on SN. Some studies use refinements of social influence, without including the SN construct. In these studies, social presence, social influences, image and shared beliefs in benefits are found to positively affect PU. The latter also significantly affects PEOU. Concluding from the reviewed articles, social influence is a predictor for PU and SN.

Training

The role of training in the field of IT is relatively well understood (Jasperson et al., 2005). It is widely recognized as the means by which potential users acquire the skills and knowledge for actual usage. Training partly provides the prerequisite for usage, but also can serve as extended introduction, shaping both PU and PEOU. The empirical findings on training are fairly consistent and supportive of the relations with PU and PEOU nine studies are identified that include a form of training, e.g. internal, external training (Igbaria et al., 1997), training in general (Agarwal et al., 1999; Venkatesh et al., 2002; Amoaka-Gympah et al., 2004) or the characteristics of the training, e.g. environment (Venkatesh et al., 2002). Training affects PU in six studies and PEOU in five. While these findings provide considerable support for the effect of training, the robustness is tarnished by two studies that find insignificant effects for both PU and PEOU. Surprisingly, social effects of training have not been tested in the

sampled articles. Concluding from the reviewed articles, training is a predictor for PU and PEOU.

Facilitating conditions & Support

Facilitating conditions include constraints on behavior (Taylor & Todd, 1995b), factors in the environment that make an act easy to do (Thompson et al., 1991) and compatibility with existing values, needs, and experiences of potential adopters (Moore & Benbasat, 1991). The latter has been shown to affect PEOU (Chau & Hu, 2001; Hu et al., 2003). Besides support for the mediation of the effect of facilitating conditions on BI through PEOU, also direct effects on BI and B have been found. This may indicate a difference between factors that are pure prerequisites or also enable usage. Facilitating conditions with direct behavioral effects are primarily focused on the mitigation of barriers or impediments for usage. A theoretical overlap exists between facilitating conditions and the perceived behavioral control construct which is primarily constraining (Taylor & Todd, 1995b; Venkatesh et al., 2003). Support is the available assistance when learning and using the system. Support, also combined with training (Karahanna & Straub, 1999; Wu et al., 2007), has been studied extensively. Both internal support (Igbaria et al., 1995, 1997; McFarland et al., 2004), as well as external support have been included (Gefen & Keil, 1998; Igbaria et al., 1997). A special type of internal support is 'management support', which indicate the level of managerial involvement and commitment (Igbaria et al., 1995, 1997; Wu et al., 2007). From the eleven studies that have incorporated various forms of support, six positive significant relations have been found for both PU and PEOU (and insignificant in respectively five and three instances). Again, relations with SN have not been demonstrated. Concluding from the reviewed articles, facilitating conditions & support is a predictor for PEOU.

Roll-out

The remaining external factors that were found in the literature review deal with the roll-out of a system. They are included here based on the premises that they can be manipulated. Examples of the identified factors include awareness, visibility, accessibility, demonstrability, compatibility, information quality and communication channel. Relations have been found with both PU and PEOU. The effects of the roll-out factors primarily have an effect on PU (11 out of the 16 factors; compared to 6 with PEOU). Concluding from the reviewed articles, roll-out is a predictor for PU.

A special aspect of the roll-out is the perceived level of voluntariness. Voluntariness is defined as the extent to which potential adopters perceive the adoption decision to be non-mandatory (Moore & Benbasat, 1991; Venkatesh & Davis, 2000). In prior

research voluntariness has been studied as both explanatory and moderator variable (not mentioned in Table 5). Venkatesh & Davis (2000) and Venkatesh et al. (2003) demonstrate that voluntariness reduces the effect of SN on BI. Agarwal & Prasad (1998) studied the influence of perceived voluntariness on current usage and future use intentions and found a negative significant correlation with usage. These findings support the argument that initial usage of a system may be influenced by perceptions of non-voluntariness (i.e. superior mandate), but that people will continue to use the system only if they find it useful. This is supported by Agarwal & Prasad (1998) and Karahanna & Straub (1999), who argued that "the influence of compliance might become insignificant over time". A high level of coercion does not lead to increased system usage: it is suggested that mandating the use of a system can increase initial system utilization, but that continued use of the system only occurs when users find it useful. The role of non-voluntatiness is likely to lead to an effect on BI that diminishes over time. This is further explored in Chapter 3 and 6. No conclusions are drawn at this point based on the reviewed articles.

Conclusions on external factors related to interventions:

- Social influence is a predictor for PU and SN
- Training is a predictor for PU and PEOU
- Facilitating conditions & support is a predictor for PEOU
- Roll-out is a predictor for PU

3.3.3 Individual

The selected studies show the effects of 55 external factors related to the target population. The following categories are distinguished: age, gender, education, self efficacy & anxiety, experience & knowledge, and personality & culture. The effects of the external factors, both as predictor and moderator of PU, PEOU and SN, are shown in Table 6. The effects on BI and B are not included. Predictive effects on BI are only shown by Ong & Lai (2004) through gender, Hu et al. (2003) by self efficacy, and Liaw et al. (2006) by self efficacy and perceived enjoyment. Moderation of the BI - B relation is only found by Taylor & Todd (1995a) with experience. The findings for PU, PEOU and SN are discussed briefly below.

Table 6 External Factors - Individual

Category	External Factor	Source	Predictor			Moderator		
			PU	PEOU	SN	PU	PEOU	SN
Age	Younger Workers	Agarwal & Prasad, 1999	0	0				
		Agarwal & Prasad, 2000	+	0				
		Venkatesh et al., 2003				+		
	Older Workers	Venkatesh et al., 2003					+	+
		Burton-Jones & Hubona, 2005	0	+				
Gender	Male	Gefen & Straub, 1997		+				
		Doll et al., 1998	0	+				
		Venkatesh & Morris, 2000				+		
		Venkatesh et al., 2003				+		
		Ong & Lai, 2004	+	+				
		Morris et al., 2005				+		
	Female	Gefen & Straub, 1997	+		+			
		Brosnan, 1999	+			+		
		Venkatesh & Morris, 2000					+	+
		Venkatesh et al., 2003					+	+
		Morris et al., 2005						+
Education	Level of education	Venkatesh et al., 2003						
		Agarwal & Prasad, 1999	0	+				
		Burton-Jones & Hubona, 2005	+	0				
Computer Self-efficacy	Computer Self-efficacy	Venkatesh & Davis, 1996		+				
		Venkatesh, 2000		+				
		Hong et al., 2001		+				
		Thong et al., 2002		+				
		Hu et al., 2003	+					
		McFarland & Hamilton, 2004	+	+				
		Wu et al., 2007		+				
		Ong et al., 2004	+	+				
	Application self-efficacy	Yi & Hwang, 2003		+				
		Liaw et al. 2006						
Computer Anxiety	Computer Anxiety	Brosnan, 1999	+					
		Venkatesh, 2000		+				
		McFarland & Hamilton, 2004	-	-				
Experience	Experience: extended	Igbaria et al., 1995	-	+				
		McFarland & Hamilton, 2004	+	+				
	Experience: limited	Venktesh et al., 2003					+	+
		Venkatesh & Davis, 2000						+
		Taylor & Todd, 1995a				+		0
		Venkatesh & Morris, 2000					+	+
		Lippert & Forman, 2005		+				
	Prior similar experiences	Agarwal & Prasad, 1999	0	+				
	OS experience	Liaw & Huang, 2003		+				
	Gen. experience	Doll et al., 1998	+	0				
	Comp.experience	Thong et al., 2002		+				
	Tool experience	Dishaw & Strong, 1999	+	+				
Knowledge		Lippert & Forman, 2005		+				
	Prior technol. knowledge	Agarwal & Prasad, 2000	+	+				
		Hong et al., 2001		+				
	domain Knowledge	Thong et al., 2002		+				
Playfulness	Playfulness	Venkatesh, 2000		+				
	Perceived Enjoyment	Yi & Hwang, 2003	+	+				
		Liaw et al., 2006						
		Liaw & Huang, 2003	+					
Personality	Intrinsic Motiv.	Venkatesh et al., 2002	+	+				
	Personal Innov.	Agarwal & Prasad, 1998				0	0	
Culture	Culture	Straub et al., 1997	+					

+ = positively significant at $p \leq 0.05$; 0 = non-significant; - = negatively significant at $p \leq 0.05$; blank = not studied
BU and B are omitted due the fact that no predictive effects of external factors were found on these constructs.
The identified moderator effects are found on the relationships between PU, PEOU, SN and BI.

Age

Age is one of the individual characteristics that has received relatively limited attention in prior studies. Agarwal & Prasad (2000) found a negative correlation between age and PU. Burton-Jones & Hubona (2005) found that "older workers reported lower PEOU for e-mail and Word". Venkatesh et al. (2003) found that age moderates all of the key relationship in the TAM: younger workers put more emphasis on PU. PEOU and SN are more salient factors for the older generation of workers (Venkatesh et al., 2003). Related proxy constructs for age have also been proposed. For instance, Agarwal & Prasad (1999) included organizational tenure in their research. They, however, did not find a relationship with either PEOU or PU. Concluding from the reviewed articles, age is a moderator for PEOU and SN, where the effect of PEOU and SN are stronger for older people.

Gender

Gender is a more widely studied factor, both as predictive as well as moderating factor of the TAM constructs. Gefen & Straub (1997), Doll et al. (1998), Ong & Lai (2004) demonstrate higher values for PEOU for men. Brosnan (1999) and Gefen & Straub (1997) show higher values for PU for women than for men. Research has also shown that the cognitive adoption mechanism is different for men and women. Other research has identified that PEOU and SN may be particularly salient to females (Venkatesh & Morris, 2000). Ong and Lai (2004) revealed that men's perception of PU was also more significant and more salient than women's in determining BI e-learning. A wide array of explanation is offered by the authors for the effects for gender, e.g. men's relative tendency to feel more at ease with computers or that females tend to wait until technology is perceived to be useful before using. Even though explanations can be debated, still the support for the role of gender in shaping initial and sustained technology adoption is considerable. Concluding from the reviewed articles, gender is a moderator for PU, PEOU and SN, where the effect of PU is stronger for men and PEOU and SN are stronger for women.

Education

The sample of articles does not give a distinct view regarding the relationship between level of education and TAM. However, it can be assumed that people with a higher level of education are likely to have more positive beliefs about new technologies in general. In the research of Burton-Jones & Hubona (2005), educational level is positively correlated to PU, but not with PEOU. On the other hand, Agarwal &Prasad (1999) show that level of education was positively correlated with PEOU but not with PU. Spurious findings might be caused by underlying

concepts as intellectual capability or other competence factors, like “general competence and mental/cognitive capacities” (Chau & Hu, 2002). Explanations for different effects of education are offered using learning theories, as people with higher learning capabilities are better able to recognize benefits and learn new technologies. Agarwal & Prasad (1999), however, contend this. Concluding from the reviewed articles, education is a moderator for PU and PEOU, where the effect of PU and PEOU is stronger for higher educated individuals.

Computer Self-Efficacy & Computer Anxiety

Computer self-efficacy (CSE) is people's beliefs about their capabilities to produce designated levels of performance. In psychological literature the concept of self-efficacy is related to the way in which people behave and motivate themselves. Venkatesh & Davis (1996) found that users base their ease of use perceptions on CSE before hands-one system use, irrespective of the extent of procedural information given to them. This is supported by Venkatesh et al. (2000). While the support for the relation between CSE and PEOU is substantial (Hong et al., 2001; Thong et al., 2002; Yi & Hwang, 2003; McFarland & Hamilton, 2004; Wu et al., 2007; Ong et al., 2004), only few authors have found CSE to be related with PU (Hu et al., 2003; McFarland & Hamilton, 2004; Ong et al., 2004). Concluding from the reviewed articles, CSE is a predictor for PEOU.

The concept of anxiety also finds its origin in psychology and refers to the disproportionate apprehension or dread for a certain behavior (Compeau & Higgins, 1995). Three articles in the sample tested computer anxiety and found inconsistent relations. Brosnan (1999) demonstrated a negative relation with PU, Venkatesh (2000) showed a negative relation with PEOU, and McFarland & Hamilton (2004) showed a negative relation with both PU and PEOU. Due to the inconsistent support for computer anxity, no conclusion is drawn on its effect.

Experience & Knowledge

Experience has been included both as predictor as well as moderator. Experience refers to either using the focal system or having used similar systems. The first is most likely to be easy to measure in organizations using system logs. Related experience or more general experience constructs have been included, like prior similar experiences (Agarwal & Prasad, 1999; McFarland & Hamilton (2004), tool experience (Dishaw & Strong, 1999), computer experience (Igbaria et al., 1995) and experience using operating systems (Liaw & Huang, 2003). The predictive findings are fairly consistent: seven studies support the straightforward relation between experience and PEOU. Three authors also find a positive relation of experience with PU, however

Igbaria et al. (1995) found a negative one. Taylor & Todd (1995a) and Venkatesh et al. (2003) illustrate that PU, PEOU and SN on BI differ between experienced and inexperienced users. Together the studies show that the TAM constructs all attenuate with increasing experience. This corroborates with Jasperson et al. (2005) who propose that initial usage affects extended use directly. The effect of experience is closely related to the findings in studies including knowledge. Knowledge refers to a level of understanding that can be wider than the focal system. All four studies show the effect of knowledge on PEOU (Agarwal & Prasad, 2000; Hong et al., 2001; Thong et al., 2002; Lippert & Forman, 2005). Only Lippert & Forman (2005) also find a relation between prior technological knowledge and PU. Concluding from the reviewed articles, experience and knowledge are jointly seen as a predictor for PEOU and a moderator for PU, PEOU and SN, where all effects diminish with increased experience and knowledge.

Personality & Culture

Personal characteristics have been included by authors referring to underlying drivers of behavior, e.g. intrinsic motivation affecting PU and PEOU (Venkatesh et al., 2002). Personal innovativeness was not found to be a significant predictor (Agarwal & Prasad, 1998). Venkatesh et al. (2000) proposed that computer playfulness serves as a basis for people forming PEOU. Perceived enjoyment has also been found to affect PEOU and PU (Yi & Hwang, 2003; Liaw et al., 2006). Finally, Straub et al. (1997) tested TAM in Japan, Switzerland and the US and found that culture affects PU. Due to dispersed single findings concerning personality and cultural no conclusions are drawn.

Conclusions on external factors related to individual:

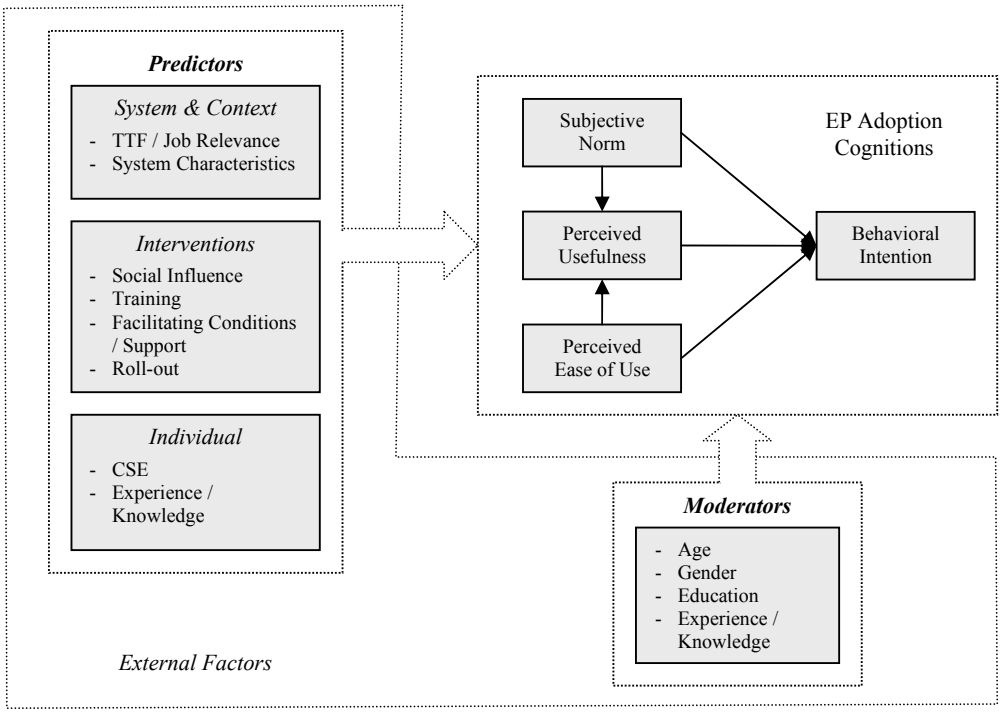
- age is a moderator for PEOU and SN, where the effect of PEOU and SN are stronger for older people.
- gender is a moderator for PU, PEOU and SN, where the effect of PU is stronger for men and PEOU and SN are stronger for women.
- education is a moderator for PU and PEOU, where the effect of PU and PEOU is stronger for higher educated individuals.
- CSE is a predictor for PEOU
- Experience and knowledge are jointly seen as a predictor for PEOU and a moderator for PU, PEOU and SN, where all effects diminish with increased experience and knowledge.

3.4 Discussion

The literature review has resulted in the identification of 190 effects (153 significant and 37 non-significant) of 126 external factors with the TAM constructs extracted from the past decade of 40 empirical studies in 11 top-ranking IT journals. The review shows 58 significant relations with PU, 68 with PEOU, 3 with SN, 4 with BI, and 2 with B. The review shows 6 moderator effects on PU with BI, 5 on PEOU with BI and 7 on SN with BI. Overall, the antecedent effects of PU and PEOU have been explored extensively in the sampled articles. The antecedents of SN, BI and B and moderator effects have only been explored by a few authors. If one accepts that a cognitive mechanism differs per person, it seems that more attention to the moderators is justified.

The ex-ante categorization in 3 types of external factors yielded 20 instances in the category of 'context & system', 55 in 'individual', and 51 in 'interventions'. The instances were assigned to a certain category based on their conceptual fit. In addition the type of effect, i.e. predictor or moderator, has been derived from literature review. The system & context and intervention factors only show the proposed predictive effects. The external factors concerning the individual category, show both predictive and moderating effects. A clustering of factors within the three types of external factors is shown in Figure 6.

Figure 6 External Factors from Theory



The amount of moderators identified in this review only support discriminating approaches based on age, gender, education and experience. The results show that the effect of PU on BI is more pronounced for males and young individuals; PEOU and SN are more salient for female and older individuals; and PU and PEOU are more salient for higher educated individuals. In addition inexperienced users show more effect of PEOU and SN on BI. In practice, using these factors to differentiate interventions might be controversial. Sun & Zhang (2005) make a strong case for including more moderators in TAM research.

The amount of studies including external factors to the SN construct is surprisingly low. Only a few articles in this sample have explored the antecedents or predictive external factors. The review does not include an analysis of the internal structure of the TAM model. The focus was limited to the direct effects of external factors on the constructs, not the relations among the constructs. While PU, PEOU, and SN are often treated as independent factors, support has also been found for SN influencing both PU and PEOU (e.g. Wu et al., 2007, Zweig et al., 2003, Sun & Zhang, 2005). The SN construct has also shown contradictory findings and surrogate constructs, like Shared Beliefs in Benefits (Amoaka-Gympah & Salam, 2004) or norms (Lucas & Spitler, 1999) have been used. Some contingencies on the relevance of SN have been

identified, however, the findings concerning social effects deserve more scrutiny or refinement in future research. This could also contribute towards greater practical relevance as social influences play a crucial role in manipulating others.

The question remains how cognitive factors add up to best model reality. PU, PEOU and BI show fairly consistent results throughout the sampled literature. The TAM variants with additional cognitive construct, like SN and FC, on the other hand, have proven to be idiosyncratic to some extent and show inconsistent findings. The internal structure of TAM has been shown to be robust in all the reviewed studies.

In this review, the external factors are treated as if they were fully independent. However, discriminant validity between the constructs is not guaranteed. Also complex interaction effects might occur between the factors. Some authors have attempted to unravel the complexity of external factors and found two-way or three-way interaction effects, e.g. Venkatesh et al. (2003) or Morris et al. (2005). For instance, the latter showed that the pattern of gender differences in individual technology adoption varies with age such that gender differences were more pronounced with increasing age. This is consistent with Venkatesh et al. (2000) where a more uni-gender pattern emerged for younger workers. Also in discussions of results authors refer to (untested) confounding or interacting factors. For instance, Burton-Jones & Hubona (2005) propose that the level of complexity of the system was sufficient in their research to lead to differences across educations levels. Sun & Zhang (2005) posit that in the inconsistent and potentially spurious effects of PEOU on BI are explained by the varying complexity of system.

The sample of articles is limited to a recent sample within top journals. It excludes older work or relevant studies outside the selected journals. It is by no means an exhaustive overview of external factors and relation with TAM constructs. Still, the sample of articles is expected to cover such a proportion of TAM related empirical research that the most salient factors and effects are included. This is confirmed by the high consistency with other TAM reviews (e.g. Jeyaraj et al., 2004; Lee et al., 2005; Sun & Zhang, 2005).

3.5 Conclusion

This review elucidated which external factors have been found in previous empirical research to affect the EP adoption cognitions. The object of EP was broadened towards IT within an organizational setting, due to the limited EP specific empirical research. The effects of external factors on TAM constructs were identified.

The following external factors have been identified as a predictor:

Context & system:

- Task Technology Fit / Job Relevance — PU, PEOU
- System Characteristics — PU, PEOU

Interventions:

- Social Influences — PU, SN
- Training — PU, PEOU
- Facilitating Conditions / Support — PEOU
- Roll-out — PU

Individual

- CSE — PEOU
- Experience / Knowledge — PEOU

The following external factors have been identified as a moderator:

Individual:

- Age — Effect of PEOU, SN on BI more pronounced for older people
- Gender — Effect of PEOU, SN on BI more pronounced for women
- Education — Effect of PU, PEOU on BI more pronounced for higher education
- Exp./ Knowledge — PU, PEOU, SN on BI more pronounced with less experience / knowledge

The results of the analysis show that external factors of both PU and PEOU have been explored extensively. The identified antecedents of SN, on the contrary, are very limited.

Also contradictory findings can be found for the effect of interventions. More research is justified to the intricate working of social influence processes, especially since this is one of the key elements within the available managerial toolset. This is one of the reasons presented in Chapter 5 to focus on influence tactics from the remainder of the dissertation.

Findings in this chapter show the incidence and clustering of external factors and their effects as they were found in previous research. Although the studies all deal with organizational systems, the research still comprises a wide variety of objects. This could lead to a different relevance of the identified factors. Therefore, in the next chapter, the specific incidence and effects of external factors are explored in practice for EP. Due to the contradicting results for interventions, this receives special attention in the practical exploration of their effect on EP adoption cognitions. Results of the theoretical and practical exploration of external factors are synthesized in Chapter 5.

Chapter 4 Practical Exploration of External Factors

4.1 Introduction

In this chapter, the incidence and effect of external factors affecting the EP adoption cognitions are explored in practice. In section 4.2 the case study method is described for practical exploration of the effect of external factors. In the following section, four case studies are presented. Finally, the results are synthesized and clustered according to the same classification of external factors as used in the previous chapter (see Figure 5). The findings are discussed and conclusions are drawn at the end of this chapter.

4.2 Method

Four case studies were executed to further explore the effects of external factors. The case studies serve the purpose of gaining a more in-depth understanding of the relationship of external factors on the EP adoption cognitions. Yin (2003) states the following three conditions to assess the applicability of case studies as research strategy: the type of research question, the control of the investigator over the actual behavioral events, and the focus on contemporary phenomena. In general, case studies are recommended when 'how' or 'why' questions are being posed, when the investigator has little control, and when the focus is a contemporary phenomenon in a real-life context. This study adheres to all of these criteria. The goal of the case studies is to gain an understanding of a) the occurrence of external factors, b) to assess the relative importance of external factors and c) to understand why certain 'scores' are given on EP adoption cognitions. Specific attention is given to the role of individual characteristics and the role of interventions.

Every case study is set within an organizational context, where an EP system has recently been introduced and a program of interventions has been performed directed at increasing the adoption of the system by multiple individuals. The unit of analysis is the individual end-user. In a sense the case studies follow an embedded design because the consequences on the level of the whole potential user community within an organizational setting are also taken into account. Two types of EP are selected: e-

sourcing or e-ordering (see Chapter 2). Cases are evenly divided across these two EP types:

- Case 1: e-ordering (pilot case)
- Case 2: e-sourcing
- Case 3: e-ordering
- Case 4: e-sourcing

A multiple-case approach is followed where the output of one case guides the selection of the next. The data collection and analyses were completed before the next case to adjust data collection (Eisenhardt, 1989). Information-oriented case selection is used: information about the case is already used in its selection (Flyvbjerg, 2006).

The first case has a more exploratory nature and can be seen as a pilot case. In the three following cases, the method to collect data is refined to include a measurement of the EP adoption cognitions. In all cases, multiple interviews are used to create an understanding of the role of external factors on the EP adoption cognitions.

Data collection in the case studies

The cases are all 'reflective observations'. Interviews are the main source of data collection, however, additional data sources are used to contribute to the case understanding (demo environment, project documentation, etc.). Interviews are held with individuals who were subject to a program of interventions. The objective of the interviews is to conduct an ex-post analysis of the effect of external factors related to system, context and interventions. Lee (1989), Darke et al. (1998), Dubé & Paré (2003) are used to guide the data collection.

Assessing the effect of an external factor or intervention presents some methodological challenges. It is difficult to 'filter' the effect of one intervention on the adoption of the target. Ideally, every single intervention should be assessed in practice in a 'ceteris paribus' fashion. This can only be realized in experimental laboratory settings, but is nearly impossible to achieve in a real-life context. In a real-life context, multiple sequential and parallel interventions take place between various agents and the one target who is interviewed. In addition, the post-hoc fashion of research relies on the recollection of the interviewee, which could cause different types of bias.

The interviews are primarily used to understand the effect that relies on the judgment of both respondent and researcher. Interviewees are thereby not pure 'informants', but are also asked to reflect on what influenced their behavior. The interpretative nature

of the interviews and role of the researcher in preventing sources of bias is thereby apparent. Perceptions of the respondents on the effect of external factors may be biased by their predisposition, post-hoc cognitive distortion or selective selection of memories. The sources of bias can be partially mitigated by using a structured interview protocol that can assist the recalling of interventions and situational dependencies (Stake, 1994). In addition, the emphasis is placed on actual activities or events, rather than recollections of attitudes and opinions. Notes are typed real-time into a fixed interview protocol and confirmed by the interviewees. The interview protocol is shown in Appendix D.

Analysis in the case studies

Each case is analyzed to show the role of external factors. In the analysis the external factors identified in the interviews are clustered. In the pilot case, the findings are clustered according to their association with PU, PEOU, and SN as proposed by the interviewees. In the three following cases, the findings from the cases are clustered according to the same division as introduced in Chapter 3: system & context, interventions, and individual.

The EP adoption cognitions were measured in the last three cases. A 7 point scale (where 1 = negative, 4 = neutral, and 7 = positive) was used for each of the original items on the EP adoption cognitions: PU, PEOU, and SN. Factor scores are derived by averaging the scores on each of the items. The scores provide descriptive data on the way the system is perceived by the interviewees in terms of the EP adoption cognitions. In addition, the scores are used to analyze differences between subgroups. This adds quantitative to qualitative evidence to strengthen findings (Eisenhardt, 1989)

Each case study was structured in a description of the data collection, the case setting, analysis and discussion.

Analysis across the case studies

A cross-case analysis is performed to provide an overview of the findings of the four case studies. In addition, the interview notes across all four case studies are analyzed to identify and cluster external factors. Eisenhardt (1989) and Hamel (1993) advocate clustering of findings to asses within-group similarities and between groups differences in cross-case analysis. The following basis is used to cluster the findings:

- Categories of the external factors: system & context, interventions, and individual

- Type of effect of the external factors: predictors or moderators. The term moderator is used for an external factor that provides a basis distinguishing different subgroups.
- Type of system: e-ordering and e-sourcing
- The relation towards EP adoption cognitions: PU, PEOU, and SN. This is based on the proposed association of the external factors and the EP adoption cognitions as mentioned by the interviewees.

4.3 E-ordering case I

The first case study[7] was selected where different interventions were applied to achieve end-user adoption of an e-ordering application throughout the US during the period of 2001 to 2004. The case was set at an international financial services organization offering banking, insurance and asset management.

4.3.1 Data Collection

A first round of interviews was used to create an understanding of the case context. Then, two rounds of interviews were conducted with various participants in the roll-out and implementation of the e-ordering system (see Table 7). A reflective approach is followed in each interview where the respondent was asked to comment on the effects of interventions on cognitions and adoption behavior of end-users.

Table 7 Data Collection for the First E-Ordering Case

Phase	*Date*	*Interviews*	*N*	*Output*
Preparation	Q1 2005	CPO (1); Head of Strategy & Infrastructure (1); Sr. Executive Purchasing officer USA (1); Head of CPC (1).	4	Set up of reflective research project
Data Collection A	May 2005	Project Manager (1); Administrative assistants (8); Department ID owner; Sourcing / Gatekeepers (3); Communication (1).	14	Initial findings
Data Collection B	May 2005	Head of ERP (1); Marketing Mgr (1); Head of CPC (1); ERP mgr. (1); operations & IT (1).	6	Revised findings
Wrap-up	May 2005	Sr. Exec. Purchasing officer USA (1)	1	Draft case report

4.3.2 Case Description

In 2000 a program was initiated to leverage global procurement and redesign the purchasing governance structure. One of the major outcomes was the initiation of corporate procurement and implementing a ‘center-led’ procurement organization. This means that there is one procurement organization, a CPO reporting to the board,

[7] This section is based on Reunis, M.R.B., Santema, S.C., Harink, J.H.A. (2006) Increasing E-Ordering Adoption: A Case Study, Journal of Purchasing and Supply Management, 12(6), 322-331.

Category Procurement Managers (CPM) responsible for cross-organizational sourcing projects, and de-central / local execution. Besides the restructuring of procurement, an organizational vision also began to emerge on e-business and the potential for enhancing work processes. This vision was also applied to the domain of procurement and resources were assigned to business transformation incorporating various e-initiatives.

By the end of 2000 the decision was taken to start a global EP project in the US. The project was set within an ongoing change effort to integrate different organizations that were recently acquired in North America to form the Executive Center (EC) Americas. Sourcing activities were assigned to a central procurement organization of EC Americas. The business objectives for the EC Americas were to ensure that all personnel buy form preferred suppliers and keep track of all purchases. The use of internet-based procurement software to facilitate these objectives was recognized and the following high-level objectives were formulated for the e-ordering project: enforce compliance with strategic corporate contracts, keep record of historical procurement data, which will serve as input to future contract negotiations, and offer a user friendly, easy to understand user interface to allow purchases to take place on the lowest decentralized organizational level as possible through a controlled standardized process.

This required a purchasing system that facilitates all buying activities through a single portal, uses a workflow engine for approvals, and generates an electronic Purchasing Order (PO) based on approved requisitions. In a later stage, invoice transactions should be delivered electronically (all invoices were paper based), electronic invoices should be automatically matched against the electronic PO and paid electronically. For this case, the focus lies on the first stage of electronic order generation and processing. On an organizational level, this would already greatly improve procurement cycle times, standardize requisitioning and approval policies and processes, enhance the audit trail, generate process and contract control, and generate better information for accounts payable and strategic sourcing. The intended behavior for the end-users is that everybody should issue their own purchasing request in the system and await an approval flow (which could include gatekeepers, budget owners and sourcing professionals) before a digital or traditional PO is issued to the supplier. This is a substantial change on an individual end-user level: they not only have to learn how to operate a new system, but also have to get used to a new way of working and asking permission for their purchasing needs.

Meanwhile, mid 2003 the effort to on-board suppliers was intensified through closer collaboration with sourcing. A standard process was followed and all relevant suppliers were mailed. In 2004 there were 650 suppliers added and the catalogs were increased to 16.

At the time of the case interviews, approximately $ 500 million (30% of the total spend) passed through the system, covering over 60% of all transactions. Ongoing extensions were being made to the system: "we have an ongoing list of wishes and requirements". System usage remains high, although still exceptions are made for the backward processing. Approximately 1800 people used the system. Extensions to the purchasing system were being added on to the system, e.g. electronic invoicing, support for P-cards and a contract management system.

4.3.3 Case Analysis

The EP adoption cognitions are used to analyze the findings of the role of external factors in this case study for end-users.

External Factors for PU:

- Persuading people seemed to be very challenging in this case, due to the limited attractiveness at the user-level. The attention to communication was limited: "we suffer from an information overload." The majority of the potential users only started to pay attention / learn the system as soon as it was mandated. Mandating got the compliance up, but did not facilitate a 'change of mindset'
- Prerequisites for the mandate should have been in place to ensure satisfactory performance. Users stressed the importance of the first experience matching expectations: elaborate approval flows, longer order cycle times and more process steps did not help. 'Fine-tuning' policies and working on the sourcing backlog helped, but the initial attitude was set. Also 'denying' PO's, both soft and hard, was not appreciated at all. The escalation of complaints caused organizational unrest and ways to circumvent the system / policies were abundant, e.g. PO after invoice; finding valid exception reasons.

External Factors for PEOU:

- There were some initial complaints about the speed and about unclear interfaces. Users got frustrated with 'denies' of PO's (especially infrequent users). The (non-catalog) users had to learn additional processes / standards (difference between general ledger, budget, commodity code). Issues

concerning the policies / workflow / sourcing-backlog were attributed to the system. The project attracted a lot of attention and got blamed for other organizational issues.

- Training did *not* lead to adoption, but it 'paved the road'. Training before the mandate hardly invoked any reaction. The motivation for initiating learning behavior seemed to be based on the hard mandate. The following two comments in the interviews are related to this motivation to learn: "There is an interesting difference between work and home situation with respect to IT adoption: at work people expect that they are guided through every step; at home people figure it out themselves. Chances are that 70% of the people order their books online, they *can* learn how to use a comparable system at work." "People hate learning a new system in a working context; they are simply too busy or lack the patience for non-core activities"

External Factors for SN:

- Peer-influence seemed to have been quite strong in this case. Peers had a substantial influence on each other, both in a negative and positive way. Gossip and informal contact kept a negative attitude alive. The gossip that actually surfaced in complaints / calls to the helpdesk are likely to only be a fraction of the unrest that was going on. On the other hand, people helped each other after the mandate: "we couldn't do it without each other".
- The role of 'gatekeepers' (first-line approvers; close to the business) played an important role in feedback-learning. Budget ID owners supported the system but did *not* show any role model behavior. While they were targeted for communication, they did not change their behavior towards requisitioning ("they just dropped invoices and expected us <admin. assist> to get it paid").
- Account Payable (AP) was a strong 'tool' to drive compliance. The hierarchical line was only limitedly involved (there was plenty of awareness, but support was minimal): the power basis for change lay in the joint responsibility of the senior executive officer for Procurement and AP.

4.3.4 Discussion

This case study shows a clear 'benefit imbalance' between organizational level objectives and the perceptions of end-user. The attractiveness of adoption at the user-level is limited, while the organizational benefits are assumed to be evident. It also demonstrates the importance of mandating system usage to overcome this benefit imbalance and achieve higher and/or faster intra-organizational system adoption. The mandate resulted in near instant system compliance, whereas persuasion and 'internal

marketing' turned out to be very challenging. The potential users only really started to pay attention when the mandate was effectuated. This leads to the question of the 'influence-ability' of the EP adoption cognitions and the role of 'pressure'. Targeting 'PU' perceptions of target individuals was apparently not easy to achieve, as the system and change was 'hard to sell'. Hence, the influence-ability of PU was relatively low.

The prerequisites should have been in place before the mandate was initiated. Not only the sourcing organization should have been more prepared, but also the processes could have been better defined. One of the system engineers mentioned that "the system is only as effective as the process around it." The first experience is crucial in matching expectations and a disappointment can lead to a lot of complaints. A high level of unrest had to be endured to solve issues that could have been prevented. While the mandate gave near instant compliance when the facilitating conditions were in place, but additional interventions were needed to achieve 'intended end-user behavior'. Reluctant compliance and complaints had to be changed into commitment to the new way of working. The overshoot in helping people left room for both minimal compliance and ways to circumvent the system. Six end-users commented in the interviews that they "tried to use the old way till it was absolutely impossible." The mandate was relatively effective in shifting end-users to placing their order before the approval flow. The period of moving people to the intended end-user behavior took a long time: "there were so many issues to solve that our clean up took very long: we just tried to survive instead of substantially improving the purchasing processes."

For the purpose of identifying the role of external factors, the following conclusions can be drawn from this case study:

- The effect of interventions depends on the 'influence-ability' of EP adoption cognitions. Organizational pressure seems to be an effective way to overcome the 'benefit imbalance' between organizational and end-user level.
- Social influence plays an important role (e.g. peer influence)
- Interventions can be overdone. This case shows an 'overshoot' on facilitating conditions.
- Training or facilitating conditions may support adoption, but there is no reason to assume a causal effect. In this case, training did not cause adoption.
- Additional measures are required to get 'commitment' instead of 'compliance'.

4.4 E-Sourcing Case I

A second case is selected within a consumer electronics company in which e-sourcing was deployed. A similar approach is followed as in the previous case study, including the attention to sampling and the measurement of EP adoption cognitions. In addition, the EP adoption cognitions are measured.

4.4.1 Data Collection

The interviews took place in April and May 2005. A selection of interviewees was made with the objective of covering as much spread as possible across the following variables: business groups, region, experience level, gender and age. 14 interviews were conducted. The distribution of the 14 respondents across the variables is shown in Table 8.

Table 8 Data Collection for the First E-Sourcing Case

Variable	*Categories*	*Count*	*Perc.*
Gender	male	12	86%
	female	2	14%
Age	<30	3	21%
	30-40	6	43%
	>40	5	36%
Region	Europe	11	79%
	Asia	2	14%
	America	1	7%

Variable	*Categories*	*Count*	*Perc.*
Business Group	Lighting Electronics	2	14%
	Lamps	8	57%
	Luminaires	2	14%
	other	2	14%
Experience	yes	12	86%
	no	2	14%

4.4.2 Case Description

Case Setting

The case company holds a leading position in the global lighting market. It employs 44,000 people worldwide, with manufacturing operations in Europe, the United States, Latin America and Asia. It operates in four lines of business: Lighting Electronics, Lamps, Luminaires and others. The sales were € 4.5 billion in 2004. The purchasing spend related to this number is approximately 55 % of sales: € 5 billion euro in 2004 of which approximately 2/3 is suitable for e-sourcing (based on internal estimation).

Since 2001 the case company has gained experience regarding e-Sourcing to support sourcing processes. The first transactions with suppliers took place in July 2001. The system has been operational till April 2005. In 2004 € 58 million was e-sourced of which € 56 million was e-auctioned.

4.4.3 Case Analysis

Scores were asked on a 7 point scale (where 1 = negative, 4 = neutral, and 7 = positive) for each of the original items on the EP adoption cognitions: PU, PEOU and SN. Factor scores are derived by averaging the scores on each of the items. The results show that the respondents are quite positive about e-sourcing (x = 4,47; on a seven-point Likert scale). Respondents within the case company do score the usefulness of the system relatively low compared to the other cognitions (PU = 3,26). Both the PEOU (4,38) and SN are quite high (4,05). The intention to use the system, however, is quite low. The interviews were mainly focused on discussion why certain scores were given. The following main points were found:

External factors for PU

- The fit between the system and the situation in which it could be employed is mentioned most frequently in the interviews. Often the characteristics of either the supply market or the product or service were mentioned as a limiting factor. For instance, a high level of co-development with a supplier was seen as prerequisite for using a sourcing system. On a more general level, the fit was seen as the degree to which the functionalities of e-sourcing systems could support the strategy a buyer would like to engage in for a certain commodity. Naturally, a perception of what the system can actually do is needed before a sound judgment of the fit can be made. Some respondents seemed to confuse or limit the system functionalities, for instance, only for searching new suppliers. For this purpose, the applicability of the system is limited. Another line of argumentation for limited applicability of the system was only focusing on the auctioning module and excluding the part for supporting RFI, RFP, RFQ processes. Therefore, beside an actual assessment of the fit between system and its potential application, a certain level of a.) misconception or b.) ignorance limited the score on PU.
- The type of commodity was also mentioned as a factor determining PU. The ease of specifying the desired product or service is mentioned as an element of the applicability.
- Another external factor mentioned by the respondents was the supply market conditions. This comprises two distinct elements: a) the availability and b) the readiness of suppliers. The first element builds on a rational that the utility of the sourcing system increase with more suppliers. This rational does apply for a strategy to leverage competition in a RFQ process or an auction. For the traceability of an event the amount of suppliers is irrelevant. The second element, the readiness of the suppliers to submit to a request through the sourcing system, could also limit the utility.
- The result demonstrability was mentioned as an external factor affecting PE. The tangibility of the results of using the e-sourcing tool may be limited for

the end-user. The result demonstrability can be limited by a) unclear results, b) delay in results, or c) measurement issues. For the latter, when savings are realized in an event supported by the system, e.g. compared to the previous price, benchmark, budget or average / 2nd offer, the question arises if comparable results could have been realized with a paper-based process.

External Factors for PEOU

- The 'system quality' is mentioned most frequently by the interviewees. Five respondents who referred to system quality as an important external factor for PEOU. Four respondents literally said that the system has a low 'ease of use'.
- The available time for learning to operate the sourcing system was another external factor, which was mentioned in relation to PEOU. The respondents perceive the usage of the system as additional work which is time consuming.
- Training is mentioned as the main source of gaining knowledge on how to operate the system. One of the respondents explicitly mentioned the importance of following up training with on-site support. This was provided in the system roll-out with an expert who supported nearly all sourcing events.
- The respondents within the case company agree that a specific person was available for assistance with system difficulties. The support was highly appreciated by the respondents. The support covered the whole process of using the sourcing system, with an emphasis on technical know-how, rather than advice on incorporating the usage of the system in a sourcing strategy.

External Factors for SN

- Comments show a mandatory nature of the usage of the system. Some social pressure was experienced by the respondents. Six of them mentioned that the usage of the system was mandatory whether or not they found usage applicable. Two respondents refer to an explicit request by their functional manager to use the system.
- Several respondents mentioned an expert role that was in the vicinity and driving system usage, by actively seeking out possibilities to use the system and provide detailed support. One respondent mentioned the expert asking him to use the system as a personal favor.

4.4.4 Discussion

In the search for the role of external factors in this case study, the respondents primarily commented on the applicability of the system, depending on characteristics of the potential application domain. This includes aspects of the good or services which is being sourced, but also conditions of the supply market. Part of the respondents had disappointing experiences with the system. A secondary source of external factors referred to the ease of use in operating the system. Specific

characteristics of the system were hardly mentioned, only general system quality. A low BI is noticed amongst the respondents.

At least part of the respondents had an unclear idea of the actual expectation they could have for the performance of the system. This uncertainty was partially caused by a misconception of what the system is and can do. The assessment of the suitability of the system was limited by the correct notion of the system. Information about the workings of the system was widely available. Perhaps the interest and actual attention to picking up this information was limited. Jasperson et al. (2005) suggest that attention towards certain interventions, e.g. information about system capabilities, within a population may be missed purely due to a lack of interest on the behalf of the recipient.

The distinction suggested by Cenfetelli (2004) in enabling and prerequisites was quite clear in this case study. The effect of the external factors that were mentioned in the interviews fall into two categories: factors that have both a positive effect and possibly negative effect; and factors that only have a negative effect. The external factors that were mentioned in discussing the training, resources, and on-site expert support, were only seen as a prerequisite for usage. All respondents in this case recall the effect of these external factors as purely as creating favorable conditions, i.e. a prerequisite for being able to use the system.

The 'benefit imbalance', which was found in the first e-ordering case, was also found here in the uncertainty of the respondents about the performance and the higher amount of effort that the e-sourcing process required compared to a paper based process. Time was mentioned as an external factor; both as the time constraint to learn how to operate the system, as well as the time required go through the whole process that is supported by the system. This is supported by Vail (2005) who states that the use of e-sourcing systems costs a lot of time. Vail (2005) presented evidence that one major food company has stopped using an e-sourcing system, imposed by its headquarters because it takes too much time. Vail (2005) stated that "buyers don't want to spend a whole day completing a complex request for quotation when they just want a quick response from their suppliers".

This case study demonstrates the following points:

- There was uncertainty and misunderstanding of the system. Information plays an important role in decreasing ambiguity.
- External factors for PU relate to the applicability of sourcing for a certain product or service in a certain supply market

- External factors for PEOU relate to quality of the system and the required time investment
- Some factors are a prerequisite rather than an enabler for system usage.

4.5 E-Ordering Case II

A second e-ordering case was selected within a utilities company. Several enhancements are made in the approach compared to the previous case study: a) this case is not purely reflective, but consist of two rounds of data collection to assess changes over time, b) more attention is given towards the sampling of interviewees to cover as much spread as possible across several predefined variables, and c) the EP adoption cognitions are measured using the original TAM items.

4.5.1 Data Collection

After several orientation interviews with the project owner, two separate rounds of interviews were conducted. First a selection of interviewees was made, with the objective of covering maximum spread across the background of respondents with as few interviewees as possible. Interviewees were selected to cover the following variables: roles (managers and buyers), spend categories, organizational departments (marketing, operations, support), experience level and age.

The first round of 16 interviews took place in February 2005. The first round had the objective of gaining an insight in the role of the composure of the end-user population, i.e. the role of external factors related to individual characteristics. In addition, similar to the previous case study, the role of external factors on the EP adoption cognitions is assessed by discussing actual interventions and measuring the TAM constructs with the original items during the interview. The second round of interviews took place in June 2005 to asses the stability of the EP adoption cognitions over time and the effect of interventions in the intermediate period. In addition, the previous interviews were supplemented with several new respondents that had just gained experience in working with the new system. A total of 12 interviews were conducted; 6 of them were also included in the first round. Table 9 shows the profiles of the 23 respondents.

Table 9 Data Collection for the Second E-Ordering Case

Variable	*Categories*	*Count*	*%*
Role	Management	3	13%
	Tactical	1	4%
	Operational	19	83%
Department	Marketing	7	30%
	Operations	5	22%
	Project	1	4%
	Support	10	43%
Spend category	IBM	4	17%
	Free text	6	26%
	IBM & Free text	8	35%
Interview Round	First	11	48%
	Second	6	26%
	Both	6	26%
Training	yes	10	43%
	no	9	39%

Variable	*Categories*	*Count*	*%.*
Location	Den Bosch	11	48%
	Other	12	52%
Usage frequency	Low	3	13%
	Medium	8	35%
	High	6	26%
Age	<30	8	35%
	30-40	5	22%
	40-50	7	30%
	>50	1	4%
Gender	male	12	52%
	female	11	48%
Experience	low	6	26%
	Medium	9	39%
	high	7	30%

4.5.2 Case Description

Case Setting

By the end of 2003 a joint purchasing service organization was set up within the case company. Together with the organizational restructuring a redefinition of purchasing processes took place based on the outline set by SAP EBP. A project was initiated to configure and implement the purchasing processes embedded in EBP. At this point, four phases of the ERIS project have been completed. During the first phase, the technical implementation of the SAP EBP 3.5 took place at the Marketing Services & Marketing Communications division. A system upgrade was made in phase two, which enabled approval flows by budget holders, internal clients placing their own orders and invoice matching. In phases three and four, the category of ICT services and temporary labor were added.

In December 2004 an evaluation took place to determine the status-quo of the ERIS project. Users across different disciplines were consulted and the results showed a variety of points obstructing further roll-out of the system and processes in the organization. Points include, but are not limited to, a diminishing growth in compliance levels, difficulties in aligning authorization flows, inadequate process control, limited integration with finance and control and ongoing discussions about the division of tasks and responsibilities. In summary, a considerable room for improvement was identified in order to raise the overall system usage.

In January 2005 the ERIS – phase 5 was initiated to raise the acceptance and adoption of 'Procurator'. Reasons for this project include a diminishing growth in compliance levels, difficulties in aligning authorization flows, inadequate process control, limited integration with finance and control and ongoing discussions about the division of tasks and responsibilities. Objectives included setting-up KPI's, a governance and

reporting structure, improve process support and to ultimately raise the overall system compliance and decrease the 'value leakage'. Finance and control were the main stimulus for initiating this project. The project team consisted of three people, each responsible for one of the following sub-projects: enabling monitoring and process control, maintenance and support, and increasing user acceptance. The project fits within a larger corporate program aimed at further developing purchasing by strategic sourcing, process harmonization, organizational development, and automation.

By the end of May 2005, the ERIS project was aligned with the ongoing corporate project within the 'Buy-in' program. The objectives of this project are to standardize processes, reduce off-contract purchasing (maverick buying), and implement measures for supplier evaluation, purchasing reporting, and contract management.

4.5.3 Case Analysis

Scores were asked on a 7 point scale (where 1 = negative, 4 = neutral, and 7 = positive) for each of the original items on the EP adoption cognitions: PU, PEOU and SN. Factor scores are derived by averaging the scores on each of the items. The overall scores (N=23) are moderately positive: people find the system quite useful (PU = 4,31) and easy to use (PEOU = 4,67). The score of SN is lower that for the other constructs (SN = 3,78). The interviews were mainly focused on discussion why certain scores were given. The following main points are found:

General findings:

- Generally, people seem to be convinced about the notion of such a purchasing system and the need for standardizing processes. However, tension between the 'purchasing' or Financial Control department getting the actual benefit and managements assistants extra work, is not appreciated. On a more general note, at least two other interviewees commented that the system 'pushes back centralized administrative tasks to personnel in the organization." Another respondent mentioned unnecessary extra steps in the overall purchasing process (especially in approval flows): while benefits of control are gained, actual productivity at the end-user level is not. This is a comparable 'benefit imbalance' as described in the previous case study.
- Many of the more experienced and frequent users mention self-learning behavior. They have not experienced a lot of external influence. In a sense, self-learning behavior cannot be 'managed'; it can be stimulated. The feeling of mandate seems to have caused people trying to cope. One of the coping

mechanisms is searching support from peers and the help function to learn to operate the system.

- Users trust the performance of the system; however, people still mention they would call suppliers for a rush order.
- The use of workflows and delegated empowerment can also give false control on processes. Also the distributed responsibility can instigate people relying on others: "people in Finance will solve it"; or the opposite: "we can't always wait for the approval-flow and have to find another way". There is some 'testing' the solidity of the policies and countering of arguments, e.g. time-pressure to hire people vs. gatekeepers denying the order due to incorrect specification.

The role of individual characteristics (N=23; see Appendix E)

- In this sample, young people have substantially higher PU than older people (the split is made at 40 years). The interviews support the different perspectives towards technology between an older and younger generation. For PEOU the difference between age categories becomes smaller. Older people experience a higher SN. A possible explanation for these differences is that the group of older people has a stronger sense of coercion.
- Throughout both measurements, women show a higher score on PU. They also find the system less hard to use (PEOU). The difference between SN is substantial: women experience a higher SN (4,28 as compared to 3,31).
- People in 'operations' are less convinced than their colleagues in 'marketing' and 'support' about PU. The difference is less in the second round of interviews, which could indicate an effect of change management activities between the two measurement points (see next section). The SN in operations is still limited and lower than in marketing and support. Marketing experiences the highest ease of use of the system. This corroborates with the difference in the level of attention for change management at marketing as compared to the other clusters: marketing was the first to use the system and received a lot of on-site assistance. Operations (FO) and support (SSC) had and still have less dedicated resources to facilitate adoption.
- Management is positive about both the performance and the ease of use of the system for budget control and approval. Finding more background information or historical information is more difficult. The interviews show that sometimes the approval flows are not well defined, but this is hardly attributed to the attitudes towards the system.
- A somewhat counter-intuitive effect of experience is found: both the scores on performance and effort decrease with an increasing experience. Already in the

first measurement it was shown that people express the most negative comments on the system with high experience not actual high frequency users: perhaps more is expected from the system in terms of functionality and performance. More experienced users tend to attribute more weight to relatively small issues or wishes in their judgment, e.g. slow system, interface issues, difficulty in specifying a requisition. One specific issue kept reoccurring in nearly all interviews: signing off orders. Both the interface and the process of signing off orders seem to be confusing. Two respondents still felt that they had to maintain their hardcopy administration to know when and what orders they had signed off. In the first review a long 'wish list' of points was mentioned. In the second review only a few significant point surfaced (e.g. a lot of people mentioned the unclear interface for signing off of order (not clear what already has been done), straightening out approval flows, limited search functions). A closer look at the distribution of opinions across experience levels shows that the deviation in scores increases with more experience: less experienced users, who are all from operations, seem to agree in their opinions about the system. More experienced users broadly split up into people who complain more as they progress in their expertise / experience of the system and others who have fully incorporated the system in their way of working. Complaints are not limited to the system. Three people in the second round of interviews commented on the fulfillment processes of one supplier (IBM 'service aanvraag'). Although they distinguished between the system and the processes surrounding is, still it negatively affected their opinions.

- The opinions related to the frequency of usage confirms this effect: frequent (and here experienced) users show a lower score on performance, but find it easier to use. Differences in facilitating conditions are negligible. Infrequent and medium users do experience lower social influence. Infrequent users experience more difficulty with the ease of use of the system. Complaints include the lack of a clear insight in the complete process, a lot of 'tabs' to fill in or the limited intuitiveness of the system.
- Opinions do not differ depending on the actual type of purchase. This is somewhat surprising as the different categories require different processes. The respondents were not asked to specify their experience according to different spend categories, but in the interviews differences were apparent in the comments. For instance, some requisitions of services can require more work in specification, booking orders the on project-codes can be confusing, and some repetitive inputs (e.g. hiring 20 people) can cause annoyances.

The role of Interventions (N=23)

- Individuals that mention a request from their direct manager to use the system show a higher score on performance, effort and social influence (N=13). Respondents, however, did mention the limited involvement of their manager. Role behavior or supporting the usage seems to be quite limited. A tactical purchaser suggested revising the governance structure and making sourcing professionals responsible for the compliance to the contracts they make. The tactical purchasers could then get more closely involved in 'their' category and drive compliance in a joint effort with line management. Interviewees mention that requests to use the system were issued by management, purchasing, ERIS (and later Procurator) project members and especially through the financial control department. They also came back with feedback and request a different usage behavior (e.g. concerning the backward order processing).
- All respondents were influenced by some level of information exchange. A distinction should be made between 'push' and 'pull', directed and undirected, one-way or interactive information exchange. Information that is undirected and pushed to the user community includes (electronic) newsletters, corporate communication and specific ERIS/ Procurator project e-mails. Directed 'push' information exchange includes directed information exchange, like feedback sessions, awareness presentations and interactive training sessions. Communication that was 'pulled' includes passive messaging on the intranet (or log-in screen), help documentation (manual, reference card) or he and individual help (e.g. by project team). The pull information exchange is initiated by the user and plays an important role in coping with mandatory system usage: self-initiated learning behavior is supported by this type of information. People that explicitly mention to be influenced by information (N=17) show a higher score on PU and PEOU. Coincidently, they also show a slightly higher score on SN, possibly indicating the persuasive function of information. Subjective information exchange was mentioned as peers recommending ways to use the system more effectively / easily (this also includes the propagation of 'work-arounds' like keeping an own administration next to the system).
- Employees that received training are less convinced about the performance and ease of use. One interpretation could be that training does not affect the attitude of performance and effort of individuals. On the other hand, it could indicate that training has an opposite effect. Naturally, causal inference cannot be established. Also interaction effects take place: for instance, some non-trained individuals have a good reason to not have attended a training session,

as they have (easily) mastered the system themselves. Trained people also score higher on SN, which could indicate that they have received a higher stimulus (of which the training is one) to use the system. Untrained individuals could have 'discovered' the support more as they have relied more on it to learn the system by experimenting and asking for help. Learning from peers played an important role in self-education.

- Pressure, which was quite evident in the previous case study, was hardly experienced directly by the interviewees. Respondents that did experience some coercion, scored lower on PEOU. A possible interpretation for this is that people who are less convinced of the system and/or have difficulties learning the system will be more susceptible for pressure and feel a higher 'burden' of coercion. 'Reminders' were mentioned explicitly as a 'threatening mechanism'. Examples include, e-mail reminders or a direct manager asking for an explanation why something was not ordered through the system. Surprisingly, e-mails with status reports on compliance were not mentioned in the interviews.
- While a direct pressure was hardly experienced, indirectly the argumentation that systems usage was corporate policy was felt strongly. Nearly all respondents mentioned the non-voluntary nature. This coincides with the findings in the previous case study.

One of the objectives of conducting two rounds of interviews was to assess a) the stability over time of the EP adoption cognitions and b) the effect interventions in the intermediate period. The latter is difficult to asses based on this date collection, due to the fact that only four respondents experienced additional interventions in the intermediate period. The stability over time could be assessed and turned out to be very high for all six respondents that were interviewed twice. The changes in the cognitions were negligible.

4.5.4 Discussion

As in the previous case study, this case study also supports the notion of a 'benefit imbalance' between organizational level objectives and the perceptions of end-user. Similar findings are shown that self-learning behavior cannot be managed directly, but that it can be stimulated. The perception of organizational pressure seems to have contributed to this. The pressure was not as overt as in the previous case, but still noticeable in the responses.

The case shows some of the intricacies of individual adoption in different situations. The object of evaluation is not purely the system, but also the organizational processes and change surrounding it. The presumption that everybody should actually adopt the 'intended role' does not always hold. People do no only have personal issues leading to resistance or reluctance, but can actually have reasons that make real business sense. In addition, the division of work seems to be structured naturally: employees that only occasionally have an internal purchasing request go to someone who is also authorized to use the system and have them place the order. This means that adoption levels can look disappointing on an aggregated level, while in the business, ways are found to employ the system. From a theoretical perspective this phenomenon is studied in IT studies that include adaptive structuration and enactment. Question may rise about ways to control or manage the self-structured use of the system. For the majority of potential users, however, the intended usage role does fit and the getting people in this role remains a major managerial challenge. The wide array of interventions that have been attempted in this case support this notion.

In this case specific attention was given towards the role of individual differences. Besides getting an insight in what drives or inhibits individuals to adopt, the results show several structural differences on the EP adoption cognitions depending on the individual characteristics. Some obvious difference can be seen based on the amount of interventions and level of experience in the different departments. In addition, different roles score differently on the EP adoption cognitions. A possible explanation for this is the different hypothesis of the system for the different roles, e.g. a user has another 'cost-benefit' than a manager. However, also differences can be found for demographic factors, like age and gender. The role of experience and frequency is twofold: on the one hand inexperienced and infrequent users naturally have more difficulty operating the system. On the other hand, frequent and experienced users seem more critical to small issues.

Another focus of this case study was to assess the effect of interventions. The effect of several types of interventions can be seen in this case study, but it is difficult to derive 'hard' statements on their effect. First of all, the role of pressure causes respondents to start learning the system; however, persons that experienced pressure are more critical. Secondly, the role of the manager is ambiguous: on the one hand they conveyed the 'pressure' indirectly, but on the other hand did not show role model behavior or actively cooperate. In general, the possibilities to enhance the control (or 'harder' and director ways of effectuating pressure) were left unused in this case. Thirdly, the role of information and communication in various forms was seen as an important input for the EP adoption cognitions. Fourthly, the role of 'training' is

unclear. The relation between training, EP adoption cognitions and usage could not be established in this case. While, the persuasive and learning function of training is recognized, the actual effect seems to be surrounded with too many confounding factors to make a clear prediction.
The effect of interventions in the intermediate period between the two rounds of interviews was negligible. Only few interventions actually took place. Still the findings have some important implications. First of all, a possible explanation of the minimal effect of the few interventions is the limited 'influence-ability' of the cognitions. The cognitions were 'set' and little room left to manipulate them. In a situation in which target individuals still have more uncertainty about the system, the influence-ability is expected to be larger. Secondly, the stability of cognitions over time seems quite high.

This case study demonstrates the following points:

- This case shows additional support for the 'benefit imbalance'
- Different individuals show a different average score on the EP adoption cognitions. Attention for personal issues is important.
- The stability of the EP adoption cognitions over time is relatively high.
- The influence-ability of the EP adoption cognitions is higher when there is more uncertainty, i.e. when people learn the characteristics of the system. The influence-ability drops as soon as individuals become more experienced.
- The TTF of the users can only partially be predetermined and designed. It is also 'structured' when usage patterns emerge in the user population.
- Conclusions concerning interventions: information exchange plays an important role, the manager is instrumental in creating pressure, and the effect of training is unclear.

4.6 E-Sourcing Case II

A second e-sourcing case is selected set within a financial institution. A similar approach is followed as in the previous case study, including the attention to sampling and the measurement of TAM cognitions.

4.6.1 Data Collection

The data collection for the case took place in March 2005. The main source of data collection was face-to-face interviews. First a selection of interviewees was made with the objective of covering as much spread as possible in the target population of approximately 70 buyers and managers, while minimizing the amount of interviewees. Interviewees were selected to cover roles, spend categories, locations, experience level, gender and age. The distribution of the 13 respondents across the variables is shown in Table 10.

Table 10 Data Collection for the Second E-Sourcing Case

Variable	*Categories*	*Count*	*%*
Gender	male	10	77%
	female	5	38%
Age	<30	3	23%
	30-40	5	38%
	>40	7	54%
Region	Amsterdam	11	85%
	Brussels	2	15%
Spend category	IT infra	9	69%
	FM	3	23%
	HR	1	8%

Variable	*Categories*	*Count*	*%*
Role	Tactical	11	85%
	Management	2	15%
Experience	none	4	33%
	low	5	42%
	medium	1	8%
	high	2	17%
Usage frequency	low	1	8%
	medium	7	54%
	high	5	38%

4.6.2 Case Description

Case Setting

This case is set in an international financial services organization offering banking, insurance and asset management. In 2004 they had a source-able spend of approximately € 4,6 bln, of which ~ € 2,8 bln in Europe. The headcount in sourcing, buying and Accounts Payable (AP) is approximately 500 fte. There are 20 Procurement Units, over 100.000 suppliers, and over 1mln. paper invoices per annum. Purchasing activities follow the organizational cost structure: the majority is temporary labor costs (60-70%), followed by ICT (infrastructure), then facility management, and an increasing proportion of outsourcing.

In 2003, a Procurement Improvement Program (PIP) was initiated to assess and benchmark the procurement maturity. The initial analysis showed a large potential for improvement: large parts of spend did not go trough procurement (estimation of 'escapes' of ~ 40%), dispersed procurement systems (>25), room for improvement in supplier management, variable contract compliance and low standardization and discipline on processes. An ongoing purchasing excellence program aims at addressing these issues. Key areas include 'organization' and 'common processes and systems'.

By the end of 2003 and early 2004, several pilot projects were conducted to gain experience with sourcing and auctioning tools in IT Infra and HR with Procuri, Goodex and Commerce-hub. Based on positive experiences in the Netherlands, a company-wide e-sourcing project was initiated in May 2004. The project is led by a dedicated e-sourcing manager and sponsored by a Category Procurement Managers (CPM). The e-sourcing project had the objective of selecting and implementing a standardized way of conducting sourcing projects, supported by internet-based tools. The project fits in the overall change program towards common processes and systems. Reasons to implement e-sourcing include the facilitation of electronic exchange, processing of information and providing new channels to approach supplier markets (e.g. through e-Auctions). The functional areas include RFx building and execution, supplier interaction, evaluation and possible negotiation using an online reversed auction. The benefits include process standardization and control (transparency), embedding best practices, access to historic project data and knowledge sharing, time- and location independent execution, a supplier independent platform, reduced throughput time of sourcing projects, increased sourcing productivity and effectiveness.

Effective utilization of e-Sourcing requires a change in the way of working for tactical purchasers; they have to make more up-front preparation (event set-up), an effective choice of specific functionalities (e.g. RFx analysis with multiple scores), and they have to cope with an increased level of traceability and control. In general, the people who were involved with the pilot project are positive about their e-sourcing experience and some are quite eager for increased usage or more in-depth usage. The rest of the purchasing organization, however, does not share these feelings. Besides the initial investment in learning how to use the tool, the changed way of working creates some reluctance of tactical purchasers to adopt e-sourcing.

Currently, a system is used for the ‘first wave’ of e-sourcing in Benelux. Now, approximately 20 sourcing projects have been conducted and current efforts are directed towards sustaining and extending the initial adoption. The ‘second wave’ aims at a full implementation of e-Sourcing in the Benelux. In the ‘third wave’ a long-term corporate solution is selected and implemented.

4.6.3 Case Analysis

The results show that the respondents are quite positive about e-sourcing. The overall scores (N=13) are positive: people find the system quite useful, PU (4,57) and easy to use, PEOU (4,51). They experienced a substantial level of SN (4,20). The interviews were mainly focused on discussion why certain scores were given. The following main points are found:

The role of Individual characteristics (N=13; see Appendix E*)*

- Across the tactical purchasing roles, i.e. people that should actually use the system, the most experience is gained on a Buyer level. Sr. buyers and Sr. international buyers are slightly more positive about the system, especially due to the possibility of working collaboratively across time-zones and locations. Their behavioral intentions are the highest, while their actual experience is still very limited. In addition, the higher the tactical purchasing role, the lower the social influence is incurred in forming their attitude. In general, the potential user population was fairly positive about ES. Some buyers mentioned positive issues, like the fact-based approach or the data repository. Others had a more passive perspective and stressed the inevitability: Only a few buyers expressed some concerns, like security issues with external hosting.
- The experience level has a substantial influence on the attitudes on e-sourcing. People that have no experience at all either have a low PE and/or difficulty in making the initial start. Various reasons are mentioned in the interviews for a low PE, for instance, some confusion seems to exist about when e-sourcing should be used. It is not clear what the organizational policy is for spend categories that are hard to specify and/or have a high relational component and/or switching suppliers is not a viable option. For making the first step, people experience difficulty. Naturally, it takes time and initial effort to get started, but occasionally people experience some prerequisite factors. For instance, the lack of internet / system access in the whole project team (externals) or key individuals in the project team can obstruct the initial learning phase for e-sourcing. Also, a clear distinction can be seen between the perception of facilitating conditions between the experienced users and the combined novice and non-users. Apparently, experienced users have incurred more organizational support than novice and non-users. SN shows an interesting distribution across the user experience: the novice users received help from their peers or had previous

adopters in their vicinity. More advanced users do not ascribe a lot of influence to their social environment. More experienced users show a high score on PEOU, i.e. they find the system easy to use. More 'annoyances' are mentioned in the interviews (limited mail functionalities, slow system, system integration with Excel). Some individuals mentioned that they felt like they were helping the system provider develop their system rather implementing a suitable e-sourcing system.

- Managerial roles, both CPM and PM, are highly convinced about the conceptual advantage of ES. They both recognize the advantages of explicit traceability, increased preparation, and the embedding of processes. They both intend to use it as a control mechanism and see e-sourcing as a 'signal' that the purchasing is receiving increased attention from the organization. Specific CPM advantages include the international collaboration.
- The initial experiences with e-sourcing were gained in the categories of facility management and IT Infra. The most positive users can be found in these categories. Surprisingly, the most positive users in the category of IT Infra remain positive about the PEOU ($x = 4,69$), while at facility management actual experiences lead to disappointment in the user interface and user friendliness ($x = 3,67$). In combination with a high performance expectancy ($x = 5,22$), this shows that issues at facility management can be interpreted as a wish for more functionalities and system performance. At HR, a positive attitude has not resulted in actual usage, possibly due to limited 'social influence', i.e. direct hierarchical support and the link with purchasing.
- As the frequency of sourcing projects increases, the effort to use the system is lowered. Buyers that frequently have sourcing projects are more likely to have suitable start-up projects and will have the opportunity to go through the learning curve. Surprisingly, buyers that have a lot of sourcing projects per annum receive less social influence than buyers with fewer projects. From a managerial perspective, buyers with many sourcing projects should be encouraged by their environment to increase their adoption of e-sourcing.
- In the sample, females are more positive than males. The data also shows a clear negative relation between age and the overall attitude towards e-sourcing.

The role of Interventions (N=13)

- Of the previous change instruments employees mainly recall the user training. Nearly all interviewees were trained by the e-sourcing manager and two CH representatives. A clear relation between training and actual usage can not be found: enthusiastic users have not necessarily had a training and non-users have. Training is 'pushed' to potential users (first users were excluded), instead of providing it on a demand basis. In addition, the training seems to be insufficient to support initial usage. First time users highly benefited and appreciated the personal help. Pressure is hardly experienced, at least, not explicitly. Some implicit pressure is felt due to the presentation as a 'corporate project' and the top-down communication pattern. External influence was also mentioned: "when I go to a conference I always hear success stories using internet in purchasing".
- Future change efforts were predominantly suggested by the PM and CPM. The tension between functional and hierarchical lines in the current purchasing organization leads to difficulties with capacity / priority setting. The role of e-sourcing in target setting is not clear (yet) and should be resolved. The current financial structure does not provide adoption incentives. Besides target setting, also better opportunity identification and planning as a joint effort with the business can take place. The managers stressed the possibility to increase pressure by measurement and control mechanisms. Some enthusiastic buyers supported this method and expressed the additional wish for closer control, faster feedback loops and clarity about expected UB. Buyers also would appreciate risk-reduction, time to learn, business line support, and personal assistance for the first-time usage. Finally, the 'wish list' includes points for higher system integration, e.g. with Excel, contract database, financial systems, and small technical issues, e.g. storage capacity; interface issues; exchange functionality.

4.6.4 Discussion

In this case, the concept of e-sourcing is widely supported throughout the interviews, however, usage lags behind. Everybody knows the system, but only half of the sample has actually used it. The depth of the functionalities that is employed is still quite limited. Only one interviewee had conducted an auction. Most buyers were quite hesitant towards auctions. Higher level buyers, however, did recognize an advantage and/or have had a positive experience with previous pilots.

A distinction can be recognized in this case between initial users and more advanced users. Interviewees who commented on interventions to create first-time usage mention the need for a) clarity on when e-sourcing should be applied, i.e. in which purchasing situation, and b) the need for individual help with the first project. Training does not provide a guarantee for first-time usage; it can be provided more on a 'pull' basis. Advanced users mentions different points, e.g. resolving the 'annoyances', include them in feedback sessions, and celebrating their successes. Two buyers adopted an expert or key user role. They were enthusiastic heavy users that were able to assist other buyers in their first-time usage (e.g. from FM) and provide an expert training. These individuals also appreciated being included in the new system selection.
The findings in this case concerning interventions show the difficulty in applying pressure in a matrix organization with a functional and hierarchical line. The functional or business line was (still) underrepresented in the interventions towards potential end-users. The interaction between the hierarchical line and functional line leads to a situation in which an individual buyer has to balance both needs and in which a business line (time constraint) inhibits first-time adoption of e-sourcing. A top-down planning ('pipeline'), supported by the business line, does not currently exist. This could help in showing benefits to the business, proactive identification of potential e-sourcing projects, and a closer control. The latter is hardly used in this case: both objectives and performance measures are currently not applied in this case. Furthermore, the change agents are not clearly defined in this case. Some enthusiastic individuals are willing to help their direct peers. No clear roles are defined for a systematic roll-out: there are no defined key users, e-sourcing experts or internal system experts.

More pressure is likely to yield additional results in this case setting. The decision to use the system was left completely to the individual buyers. The argument that their category is different is still sufficient. Following the belief that e-sourcing can create

benefits for all spend categories, e.g. controllability and data repository, it should also be enforced for all spend categories.

This case study demonstrates the following points:

- Findings concerning interventions show the importance of social influence in this case, were usage is voluntary.
- The variation of EP adoption cognitions and external factors is also demonstrated in this case; especially the difference between initial and more advanced users is shown.

4.7 Cross-case Analysis

Four cases have been presented in which external factors on EP adoption cognitions have been explored. A total of 70 interviews were held throughout the four case settings and different opinions were gathered about the external factors and their role in affecting the EP adoption cognitions. The findings of the four individual cases provide a wealth of descriptive information of the incidence and effect of external factors on the EP adoption cognitions. The following additional analyses are performed across the four cases, in order to synthesize the findings of the practical exploration of external factors:

- A cross-case overview of findings is made
- The actual interview notes are reviewed and re-analyzed for the incidence and effect of external factors for the EP adoption cognitions specifically for a) e-ordering and b) e-sourcing systems.

4.7.1 Cross-case Overview

In order to compare the findings from the fur case studies, an cross-case overview is made. Table 11 shows a cross-case overview.

Table 11 Cross-case Overview

Criteria		*Case 1 (pilot)*	*Case 2*	*Case 3*	*Case 4*
Setting	Object	e-ordering	e-sourcing	e-ordering	e-sourcing
	Organization	Financial institution	Consumer electronics	Energy & Appliances	Financial institution
	Location	USA	NL	NL	Benelux
	Subject(s)	Operational buyers, change agents	Tactical buyers	Operational Buyers	Tactical buyers
	Presure / voluntariness	High pressure: mandatory	Medium pressure	Indirect pressure	Low pressure: voluntary
Method	*Longitudinal*	No	No	Yes: 2 x	No
	Interviews	20	14	23	13
Results	*PU*	Low	3,26	4,31	4,57
	PEOU	Medium	4,38	4,67	4,51
	SN	High	4,05	3,78	4,20
External Factors	*System & Context*	- Role of (technology) push	- Applicability for PE - System quality for EE - Time	- limited importance of type of purchase	- Specific supply market issues
	Interventions	- Pressure caused learning behavior - Training is facilitating	- on-site support	- information exchange - role of manager - 'indirect pressure' - No effect training	- effect training unclear - management line: functional hierarchical line
	Individual	n.a.	n.a.	Gender, age, role, department, experience, usage frequency	Gender, age, job, department, experience, usage frequency
Outcome	*Attitude*	Medium	Medium	Medium	High
	Usage (in sample)	High	High (primarily auctions)	Medium	Low (primarily e-RFx)
General Findings		- Benefit Imbalance - Influence-ability - Overshoot - Compliance vs. Commitment	- Mis-understanding of system - Facilitating conditions are a pre-requisite	- Stability over time - Indended behavior - Influence-ability higher with uncertainty reduction - Importance of moderators	- Importance of social influence - Difference between initial & advanced usage

4.7.2 Analysis of External Factors

The interview notes are re-analyzed for the purpose of identifying external factors related towards the EP adoption cognitions: PU, PEOU, and SN. The same division as in Chapter 3 is used to analyze the findings:

- Predictor - System & context
- Predictor - Interventions
- Predictor - Individual
- Moderators

In addition, a distinction is made between the external factors for a) e-ordering and b) e-sourcing systems.

Predictor - System & Context

The external factors referring to system and context characteristics differ for e-ordering and e-sourcing systems. The findings are clustered into the following categories:

- Fit with individual purchasing role
- Commodity / spend characteristics
- Fit with Supply market (only e-sourcing)
- Incumbent Supplier relationship (only e-sourcing)
- Project team characteristics (only e-sourcing)
- Fit with sourcing strategy (only e-sourcing)
- Order performance (only e-ordering)
- Benefit imbalance (only e-ordering)
- Knowledge management (only e-ordering)
- System quality
- System complexity
- Process complexity

The predictors for e-sourcing and e-ordering are shown in Appendix F.

Predictor - Interventions

In all of the four case studies intervention were recognized by all respondents. While some of them do mention self-learning behavior, they all recognize that the way the system is introduced or has been promoted by an organizational entity. Nearly all of them also recognize that these activities influence the way in which they perceive the system. This fits with the chosen case setting were a system is already selected and 'pushed' in a top-down fashion. The majority of the interviewees in the case studies are the actual users or targeted users and therefore the recipients of interventions.

While the importance of the interventions seems undisputed, the actual effect that individual interventions may have, is more difficult to determine from the data collection. The interventions show contradicting results in the different cases and with the different interviewees. The clearest example is the effect of training. This intervention is recognized by the most interviewees and does not lead to a clear distinction between the scores on the EP adoption cognitions for employees who have and have not received training. Besides training, also the role of manager, peer influence, and supporting resources, do not show a clear effect

Several leads for explaining the spurious effects of interventions can be found in the case studies:

- The potential for interventions to affect the EP adoption cognitions is limited. A limited *influence-ability* of the EP adoption cognitions emerges in the cases in two situations: a) when the EP adoption cognitions of the recipients are 'set' and b) when there is a 'hard case to sell'. The first situation refers to experienced and/or users with high expertise levels who already have a strong preconception of the system. Such users pay less attention to external input, but firmly rely on their own experiences and expertise to guide their perceptions of the system. In the second situation, when there is a 'hard case to sell', there is some level of 'benefit imbalance' between an organizational and end-user level. This occurs when end-users hardly receive any benefit from the system and/or has to put in extra effort, for instance, when an order takes longer to be processed and is more difficult to specify in a complex system. In such situations, the arguments that can be successfully applied to convince end-users may be limited.
- The *attention* for interventions might be limited. In reflective interviews, the interventions and their effect, which are recalled by the respondents, does not necessarily reflect the actual amount of interventions that occurred. Besides possible selective recollection in a reflective research method, the respondents could have missed interventions simply because they did not attract their attention. This was clearly shown in the first case, were an extensive communication program was nearly completely ignored.

While the effect of specific interventions is difficult to establish, still some general insights on the effect emerge from the case studies:

- Throughout all case studies, the role of a *social information exchange* process is apparent. It serves the purpose of reducing uncertainty and preventing or mending a misconception of the system and its objectives. Users or potential users are not only the passive recipients of information about the system, but can actively seek

information to learn about the system and its possible application and pass information on to others.

- *Power* plays a role in interventions. The level of coercion of forcefulness of interventions does show a different effect in the four case studies. A clear example is the mandate that was issued in the first case study. It should be noted that alternative usage or non-usage was made impossible. If we follow the conceptualization of power as a potential, then the actual effect materializes when it is asserted towards a target population.
- The interventions either have an *enabling* or a *prerequisite* effect. Based on the findings of the first and fourth case study, some external factors only show an prerequisite effect. For facilitating conditions there is a saturation point where the conditions are sufficient for usage. At this point, the conditions do not hinder the process of usage intention turning into actual usage. More facilitating conditions does not contribute to usage. It could even harm the way in which the system is used as users start to rely on extra support to take over tasks that they actually were supposed to perform.
- The interventions can result in either *compliance* or *commitment*. There is a difference between users who merely use the system and users who embrace the system in their way of working, i.e. who not only use the system but are also convinced of its PU. The latter category of users seeks out opportunities to improve their usage of the system. The first category tries to find ways to circumvent the system or minimize their usage. They also might revert to alternative ways of using the system, in ways that it was not intended, e.g. bulk processing of approval requests or entering PO's in the system after it was already issued to a supplier in another way.

All of these aspects of interventions are further elaborated in Chapter 5 to support the focus on influence tactics in the remainder of this dissertation.

The discussion above and the identified predictors for e-sourcing and e-ordering (see Appendix F) lead to the following external factors in the category predictor – interventions:

a) Enablers
   - Social information exchange

b) Prerequisites
   - System resources
   - Knowledge resources
   - Support

In Chapter 5 the enabling intervention social information exchange will be argued to be a basis for choosing the perspective of influence tactics.

Predictor - Individual

For both e-ordering and e-sourcing the following predictive external factors were found:

- Time, which refers tot the time and priority to learn to operate the system.
- Enjoyment / motivation, which refers to the level of intrinsic motivation.

The predictors for e-sourcing and e-ordering are shown in Appendix F.

Moderator

As was previously suggested in the theoretical review in Chapter 3, external factors related towards the characteristics of individuals also play a role in both an e-ordering and e-sourcing case. The amount of interviewees does not support statistical analysis of means between groups, but based on the differences that were found, it is plausible that actual difference to in fact exist for:

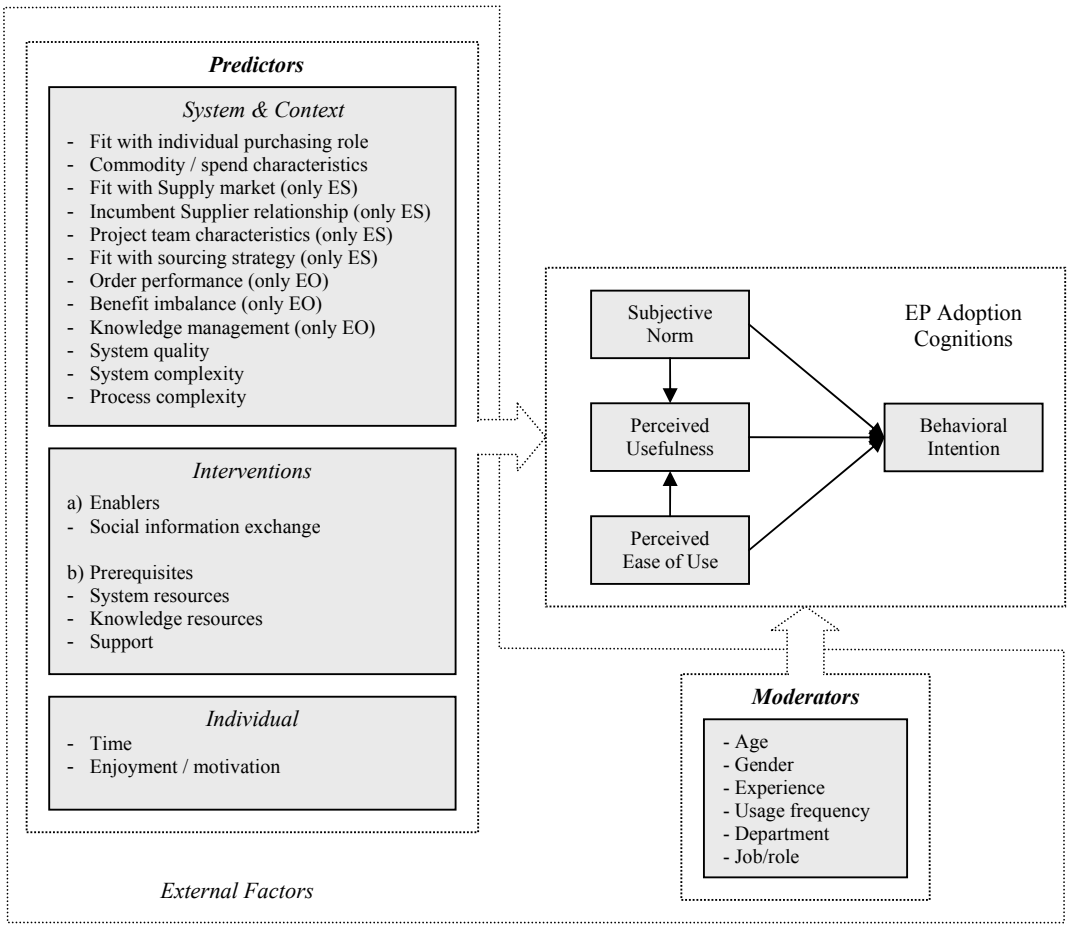
- Age
- Gender
- Experience
- Usage frequency
- Department
- Job/role

The type of commodity, i.e. goods or service being purchased, does not lead to different scores on the EP adoption cognitions in the e-ordering case. For the e-sourcing case, the type of commodity was strongly related towards the department and did show a moderating relation. A possible explanation for this difference lies in the relative importance of the external factors that are taken into consideration for each type of system.

The external factors related to the individual were analyzed as factor to divide groups and analyze different average scores on the EP adoption cognitions. The data from the cases is not sufficient for statistical analysis to establish the differences between groups (e.g. with ANOVA). Analyses between groups are not the same as the moderating effects between the EP adoption cognitions that were identified in the theoretical exploration (Chapter 3). Still, the individual characteristics, due to their conceptual nature, are assumed to be moderators rather than predictors.

The external factors from practice are shown in Figure 7.

Figure 7 External Factors from Practice



4.8 Conclusion

In this chapter, case studies were shown in which the different types of external factors and their effect on the EP adoption cognitions in practice were researched. Four case studies have been presented and analyzed first separately and then collectively. The cases yield a rich descriptive insight in the role that external factors might play in forming or altering the EP adoption cognitions.

Support has been found for the predictive external factors related towards context and system, interventions, and individual on the EP adoption cognitions.

Support has been found for the following external factors with a moderating effect:

- Age
- Gender
- Experience
- Usage frequency
- Department
- Job/role

The case studies do not show a clear picture on the effect of interventions. First of all, it is difficult to establish what the actual effect of an intervention due to the followed case methodology. Respondents had difficulty with specifying and recollecting interventions. Also, the effect of an individual intervention can hardly be filtered out. Secondly, when interventions are clearly distinguished, like training, management request or support, their effect on EP adoption cognitions is either not demonstrated or contradicting.

While the effect of individual interventions on the EP adoption cognitions is difficult to establish from the case studies, two aspects of interventions appear to influence the effectiveness of interventions:

- The role of social information exchange plays a role in reducing uncertainty of the output and learning the characteristics of a system.
- The role of power sources in the interventions plays a role in the effectiveness of interventions.

The presented cases showed the identification of external factors and their relation with the EP adoption cognitions. The analysis of each case also provided more information about the roll-out process, influence-ability and stability of the EP adoption cognitions over time.

The remaining ambiguity about the actual effect of interventions, gives rise for a) synthesis of practical and theoretical findings and b) the introduction of an alternative view of ‘influence tactics’ to the toolset that can be used to alter EP adoption cognitions. This is done in the next chapter.

Chapter 5 Synthesis - External Factors

In this chapter, the previous findings dealing with the role of external factors are synthesized and a focus is chosen on influence tactics for the remainder of this dissertation. The first section shows the integrated findings of external factors for EP adoption cognitions. This provides the answer to the first research question. The findings up to this point do not provide a clear toolset to manipulate EP adoption cognitions. Therefore, in the next section, different theoretical perspectives are reviewed and the concept of 'influence tactics' is chosen as the research focus. Implications for the remainder of this dissertation are dealt with in the last section of this chapter.

5.1 Synthesis of Theory & Practice

In the previous two chapters, the incidence and the effect of external factors on EP adoption cognitions were explored in theory and practice. In both instances a wide range of external factors were found that influence the EP adoption cognitions. The results from the theoretical and practical exploration are synthesized by comparing the incidence and effect found in theory and practice.

Predictor - System & Context

Based on the theoretical review, two categories of external factors (based on a total of 20) were identified related to context & system: TTF / job relevance and system characteristics. The external factors identified in the case studies related to context & system, are augmented to this main division. The factors differ for e-sourcing and e-ordering systems (see Appendix F). For TTF / job relevance these are: fit with individual purchasing role, commodity / spend characteristics, fit with supply market (only ES), incumbent supplier relationship (only ES), project team characteristics (only ES), fit with sourcing strategy (only ES), order performance (only EO), benefit imbalance (only EO), knowledge management (only EO). The second category is renamed in EP system to indicate that it is, at this point, based on the empirical EP specific research. Three factors are added to it: system quality, system complexity, and process complexity.

Predictor - Interventions

Based on the theoretical review, four categories of external factors (based a total of 51) were identified with a predictive controllable effect: social influences, training, facilitating conditions / support, roll-out. The same types of factors were found in practice, and the importance of interventions in general was also supported. Social influences are combined with social information exchange found in the practical exploration. The role of facilitating conditions / support is also refined with empirical findings into: system resources, knowledge resources and support. Training, received quite substantial support in theory. In the case studies the effect is not so clear and does not appear to have a predictive effect on the EP adoption cognitions and actual usage. Due to its support in theory and evident role in learning how to operate a system training is still retained as external factor.

While the types of interventions that were found in practice coincide with those from theory, the effect of these interventions is more difficult to compare. The results from the practical orientation of interventions do not shed light on the effect of these interventions on the EP adoption cognitions. Substantial support is, however, found for the role of social information exchange in the case research. An addition, support is found for a distinction between an prerequisite and enabling effect. Some interventions were found to have an prerequisite effect, and the others have an enabling effect.

Predictor - Individual

The theoretical review shows a predictive effect for CSE and experience / knowledge. None of these are confirmed in the practical review, although two new categories were found with a predictive effect: time and enjoyment / motivation.

Moderator

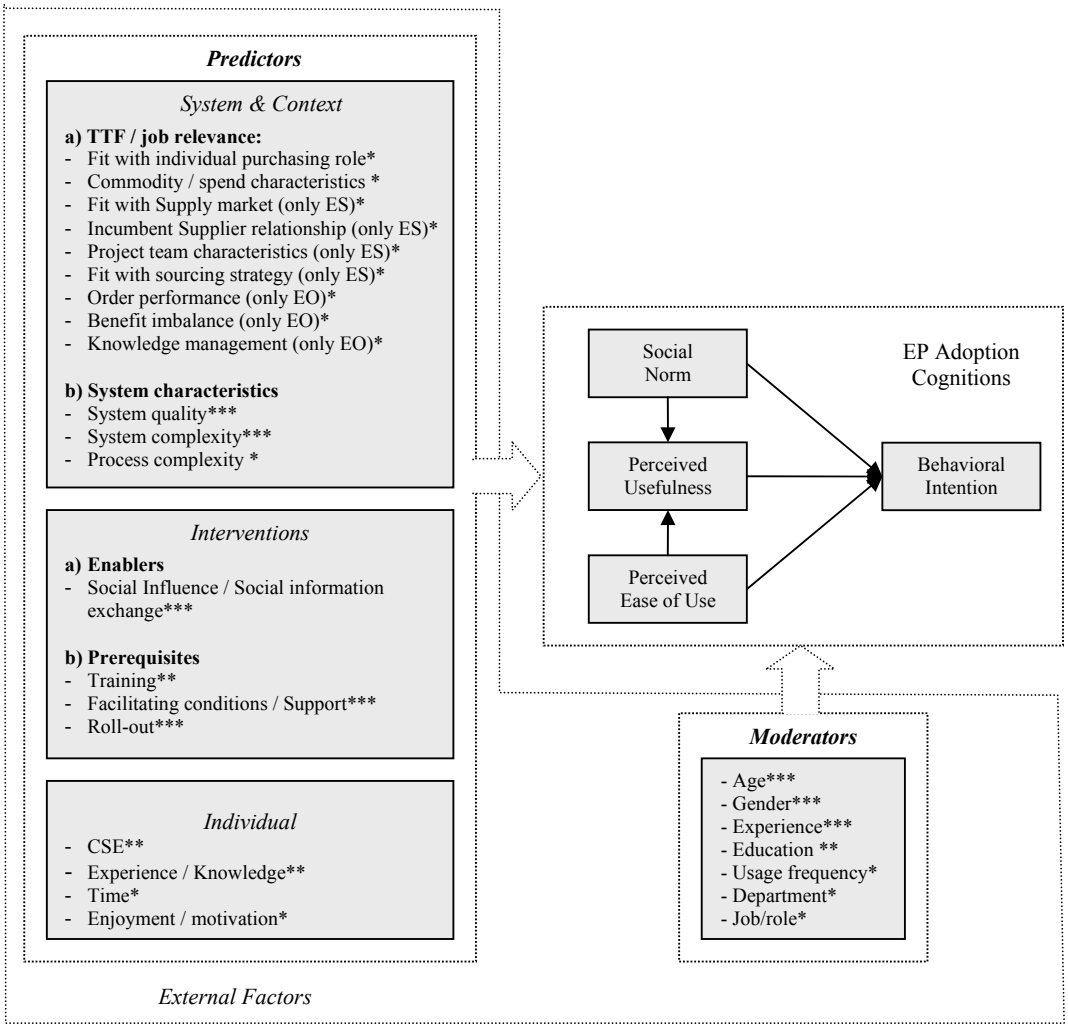
Based on the theoretical review, four categories of external factors (based a total of 55) were identified with a moderating effect: age, gender, education and experience / knowledge. Three were confirmed in practice: age, gender and experience. An additional three were identified in practice: usage frequency, department, job/role.

The distinction between predictors and moderators is somewhat precarious. Some predictors may be used as moderators as long as they serve the purpose of clearly segment the target population. For instance, in previous research, TTF and job relevance have been identified as predictors (respectively of PEOU and PU). In the case research support is found for the fit with a job as an external factor for both e-

sourcing and e-ordering systems (see Appendix F). The job or role in using the system is also found as 'moderator' in the sense that it can be used to make a division between different groups with a different score on the EP adoption cognitions.

Figure 8 shows the combined results of the theoretical and empirical exploration of external factors and their effect on EP adoption cognitions.

Figure 8 External Factors from Theory & Practice



* = confirmed in theory (Chapter 3)
** = confirmed in practice (Chapter 4)
*** = confirmed in theory and practice (Chapter 3 & 4)

The combined results of the theoretical and empirical exploration of external factors provide support for a wide range of factors related to context & system and individual. For the interventions, on the contrary, the overall findings of the effect of interventions are not clearly established from the case studies. For the remaining set of interventions with an enabling effect, only two aspects of the way in which an effect is realized are identified: a) the role of power bases and b) the importance of social information exchange. The actual effect of specific interventions with an enabling effect on the EP adoption cognitions (e.g. the 'enabling' part of training or communication) is still unclear.

The interventions with an enabling effect are highly *relevant* in a situation where the majority of the external factors are given. In a given organization, where a certain EP system is chosen and a target population is identified, the control over the majority of the external factors for a change agent is restricted. The possibility or intention to intervene in both organization, system and target population is often limited in a roll-out of an EP system. The toolset for a change agent aiming for collective adoption by a target population is then limited to the way in which the system is presented towards the possible users.

The interventions with an enabling effect are *important* as they may form the difference between 'compliance' and 'commitment'. Using 'force' to get individuals in a target population to use an EP system is quite effective. There may be different degrees in which force can be applied, but if users do not have an alternative and all prerequisites are resolved, the usage is very likely to increase. Users may then 'comply' with using the system, but are not convinced. This may result in a deviation of the intended usage as users search for ways to circumvent system usage. This can be even stronger in a situation with a 'benefit imbalance', which was evident in both e-ordering cases. In such a situation, ways to revert or persuade users is still needed.

The effect of interventions with an enabling effect is not straightforward. The intricacy of administering social pressure, i.e. applying interventions with an enabling effect, is difficult and a 'trial-and-error' approach can be seen in the case studies. The ways in which constraints for system usage could be alleviated were easier in all four case studies. Solutions to certain constraints are often evident. This may, at least partially, explain the possible over-management of the facilitating conditions in the first case study.

Based on the discussion above, a focus is chosen for the remainder of this dissertation to identify enabling interventions and unveil their effect on the EP adoption cognitions.

In the next section, theoretical directions are reviewed that can assist in researching these enabling interventions.

5.2 Theoretical Directions

The remaining ambiguity about the actual effect of interventions gives rise to the introduction of an alternative view on the enabling toolset that can be used to manipulate the EP adoption cognitions.

Two mechanisms in which the interventions lead to an effect on the EP adoption cognitions emerged from the case research (see Chapter 4):

- The role of social information exchange plays a role in reducing uncertainty of the output and learning the characteristics of a system.
- The role of power sources in the interventions plays a role in the effectiveness of interventions.

These aspects are kept in mind in evaluating different theoretical directions for their suitability for eliciting the effect of an enabling toolset. The fit with the original research premises, e.g. an organizational change agent and a target individual, is added as an additional criterion. Eight theoretical directions are evaluated for the purpose of this research on the basis of the aforementioned criteria:

- information processing theory,
- media richness theory,
- argument theory,
- elaboration likelihood model,
- social influence theory,
- social cognitive theory,
- adaptive structuration theory, and
- social network theory.

The evaluation of the eight theoretical directions is shown in Appendix G.

Based on the evaluation of eight theoretical directions, ‘social influence theory’ is selected as the most suitable theoretical basis to further explore the effect of enabling

interventions. Social influence theory deals with social influence and social power. Both the role of power bases, social information exchange, and agent-target combination is acknowledged. As previously introduced in Chapter 1, research on social influence builds on social power. Social power and influence have been introduced by French and Raven (1959). They define social influence as a force an agent exerts on a target to induce a change in behavior, opinions, attitudes, goals, needs, and values. Social power is then defined as the potential ability of an agent to influence a target. On the basis of resource availability and dependency, perceived power can be asserted towards reaching a desired change. Power can thereby be seen as a potential which is effectuated in certain influences. The concept of power has been used in many different situations to explain or predict the choice and application of certain influence tactics or measures. Influence tactics are the ways in which agents attempt to influence a target. There have also been studies without the link to power or under synonyms like influence strategies.

The focus on influence tactics is chosen for the remainder of this dissertation.

5.3 External Factors, Interventions and Influence Tactics

Interventions & Influence tactics

Some of the external factors can be manipulated or controlled by an agent. The distinction between factors that can or cannot be manipulated is referred to as controllable and uncontrollable external factors. Only the controllable external factors can be manipulated in an intra-organizational context to affect the cognitions of target individuals.

In this dissertation, the term interventions is used for *all* controllable factors. Interventions are thereby the external factors that can be manipulated by agents to affect the individual cognitive mechanism leading towards EP adoption. Although many types of work system interventions might be initiated, the interventions of primary interest here are those that represent either purposeful or proactive action. For the sake of simplicity, we do not attempt to develop a complete taxonomy of possible interventions or to model the complex relationships that might exist between and among all interventions and their outcomes.

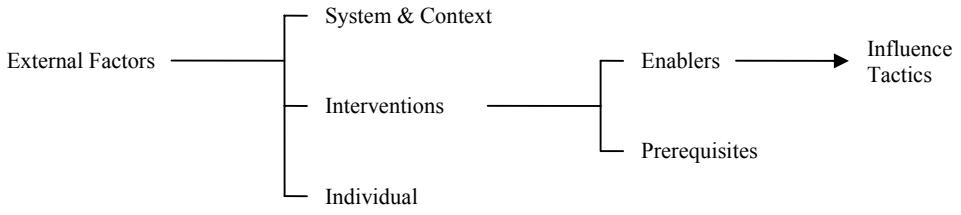
All interventions have a source (agent), a receiver (target) and effect. These elements can be used to classify interventions:

- The target of interventions can be the cognitions of an individual (e.g. communication), on the work system (e.g. process definitions), the IT system (e.g. system updates) or the wider organization (e.g. organizational changes).
- The following sources of interventions are distinguished: users, peers, experts and managers (Jasperson et al., 2005).
- Interventions can have an enabling or a prerequisite effect (Cenfetelli, 2004). They are not simply the opposite of each other. Interventions are perceived by an individual and can have different effects: prerequisites for usage only have a negative effect. An enabling intervention, on the other hand, plays the role of either discouraging or encouraging adoption.

In this dissertation, specific attention is given towards influence tactics, which are proactive, targeted ways to alter cognitions and behavior. In an organizational setting where a given EP system is technically implemented and ready to be used by end-users, these influence tactics are nearly the only factors that can be manipulated.

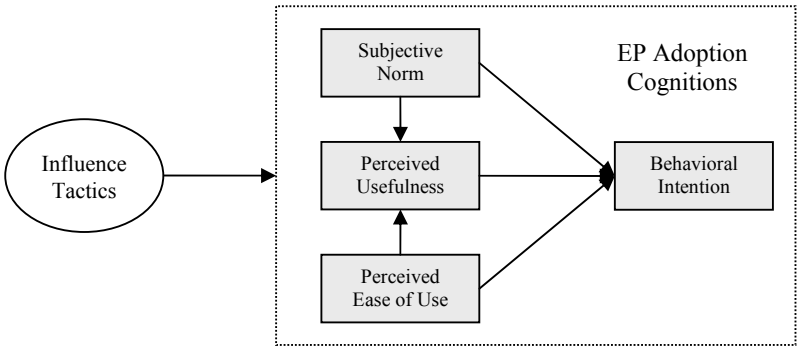
The focus on influence tactics implies a focus on the subset of interventions with an enabling effect on the EP adoption cognitions. This excludes interventions that are a prerequisite. Interventions, in turn, are the subset of external factors that can be controlled. This excludes other external factors with effect on the EP adoption cognitions related to context & system and related to the target individual. Figure 9 depicts the relation between external factors, interventions, and influence tactics.

Figure 9 Relation between External Factors, Interventions, Influence Tactics



The research model for the remainder of this dissertation is shown in Figure 10.

Figure 10 **Research Model for the Remainder of this Dissertation**



Research on influence tactics has developed in two distinct ways. The first line of research builds on the theoretical foundation of power theories and can be characterized as deductive research. Empirical work in this stream mainly focuses on finding support for theoretical concepts on social power and social influence. The second stream of research takes a more inductive approach towards classifying influence tactics on the basis of empirical findings. In this type of research, ways in which people attempt to influence each other are identified, clustered and subsequently explained in theoretical terms. The advantage of the first approach is scientific rigor. The question remains, however, if the theory is exhaustive. Conversely, the main advantage of the second approach is the completeness, given a certain context, and the obtained empirical description. The underlying mechanisms of causal relations of this approach are weaker.

In this dissertation, deductive and inductive approaches are combined to define a new classification of influence tactics specifically for EP. First, a theoretical classification is chosen (Chapter 6). Subsequently, this classification is refined based on a case study and focus group discussions(Chapter 7).

5.4 Conclusion

In this chapter, the findings from the theoretical and practical exploration in Chapter 3 and 4 are compared and combined. The comparison reveals that the identified external factors and their effect in practice coincide to a large extent with previous theoretical findings. The combined findings provide an answer to the first research question:

Q1 What external factors affect EP adoption cognitions?

The answer to the first question, the external factors from theory and practice, is shown in Figure 8. The external factors are clustered according to their effect, i.e. moderators and predictors, and three categories, i.e. context & system, individual, interventions.

The external factors related to context & system can be used to make initial predictions of the EP adoption cognitions. The external factors related to the individual can be used for segmentation. The external factors related to interventions can have an enabling and prerequisite effect. The actual effect of interventions with an enabling effect on the EP adoption cognitions remains unclear.

Based on an evaluation of eight theoretical directions to research interventions with an enabling effect, the concept of influence tactics has been selected. The research model for the remainder of this dissertation is thereby the effect of influence tactics on the EP adoption cognitions.

In the next two chapters, influence tactics are explored in theory and practice resulting in definitions of influence tactics and the development of hypotheses of their effect on PU, PEOU, and SN in Chapter 8.

Part II:

Identification of Influence Tactics

Part II has the objective of answering the second research question:

Q2 *What influence tactics affect EP adoption cognitions?*

Part II is concerned with the identification of influence tactics. It starts with a literature review in Chapter 6. In this chapter, a theoretical classification and initial propositions on the effect of these tactics are determined. The theoretical influence tactics are used in Chapter 7 to identify the incidence and effectiveness of these influence tactics in practice based on qualitative empirical research. The results lead to a revised set of influence tactics. The findings from theory and practice are used in then next part to develop and test hypotheses of the effects of influence tactics on EP adoption cognitions.

Chapter 6 Theoretical Exploration of Influence Tactics

6.1 Introduction

In the previous chapter, influence tactics were proposed as a new perspective for researching ways to influence the EP adoption cognitions. Influence tactics are seen as a perspective to a subset of interventions with an enabling effect on the EP adoption cognitions. In this chapter, the extant research on influence tactics is reviewed to a) choose a theoretical classification to be used in this dissertation and b) develop a theoretical basis for developing propositions for the effect of influence tactics on the EP adoption cognitions. In the next section, the method of identifying and analyzing relevant extant research is described. The results are presented in section 6.3 where a choice is made for the classification of influence tactics. In section 6.4, the literature review is used to develop theoretical propositions for the influence tactics. Conclusions are drawn in the last section of this chapter.

6.2 Method

The domains in which influence tactics have been researched cover a wide area. They have received a substantial amount of attention in sociology and behavioral psychology, but also in fields like marketing (e.g. Lai, 2007; Simpson & Mayo, 1997), organizational behavior (e.g. Farmer et al., 1997), Human Resource Management (e.g. Harris & Ogbonna, 2006; Dulebohn et al., 2004; Wayne et al., 1997), operations management (e.g. Hu & Shue, 2005), quality management (e.g. Lam, 1997), supply management (e.g. Farrel & Schroder, 1996); project management (e.g. Shim & Lee, 2001; Markham, 1998) negotiation (e.g. Kim et al., 2005; Wolfe & Mcginn, 2005; Steensma et al., 2003), Public Relationships (O'Neil, 2003), strategic management and leadership (e.g. Yukl, 2006; Charobonneau, 2004). The wider body of knowledge uses a variety of influence tactics, strategies or persuasive techniques as independent variables and either cognitive constructs or behavioral constructs as dependent variable. While they all focus on ways to alter cognitions and behavior of one or more targets, the wide variety of dependent and independent variables inhibits 'adding up' the identified relationships in previous empirical work to generalize the findings. A meta-analytical review as performed in Chapter 3 is therefore not possible, without limiting the analysis to a predefined set of either independent or

dependent variables. For the purpose of determining which set of influence tactics is useful for this dissertation the independent variables are therefore not restricted. Ideally, the EP adoption cognitions should be taken as dependent variables. Based on an initial scan and database key-word search no previous work with influence tactics has been performed with EP adoption cognitions or IT adoption cognitions in general. Propositions for the effect of influence tactics on the EP adoption cognitions can therefore not be derived directly from previous research and are inferred from the conceptual overlap.

Without placing restrictions on the research discipline, dependent or independent variables, the literature review presented in this chapter is of an intrinsically exploratory nature.

The sample of articles that are included in this review are limited by:

- *A dyadic perspective*. Influence tactics have been studied between a) a target-agent combination, e.g. interpersonal or interorganizational communication, b) one agent and several targets, e.g. group communication or addressing audiences or marketing to masses, and c) a network of agents and targets. The studies included in this review are limited towards a dyadic perspective, which refers to a target-agent combination. Literature concerning the persuasion of groups or masses is thereby excluded.
- *An organizational setting*. The sample of studies for this review is limited towards an organizational context. Settings in personal relationships, which are researched extensively in social psychology, e.g. in parent-child, spouses, are excluded.

The sample of literature used in this review is gathered by the following process:

- Review of databases of psychological measures. Keyword search on influence tactic or strategy in several databases[8] yields a long list of 94 instruments. From these instruments 19 are retained based on the aforementioned criteria. This excludes a range of measures for influence tactics in personal relationships, like parents and children, or persuasion to masses. An overview of the 19 scales, their description, their classification of influence tactics and dimensionality in the scale is shown in Appendix H.

[8] The American Psychological Association (APA) recommends a list of databases (http://www.apa.org/science/faq-findtests.html). The prime sources in this review are the Adelaide guide (http://www.adelaide.edu.au/library/guide/med/menthealth/scales.html) and the ETS Database of Psychological measures (http://www.ets.org/testcoll/index.html). The latter contains over 25.000 measurement instruments and their descriptions. It contains both published and unpublished tests that may be freely reproduced.

- Keyword literature search. The following scientific databases have been used: PsychINFO, ABI Inform / Proquest, Elsevier ScienceDirect and Wiley Interscience. The key words that were used are 'influence tactic' and 'influence strategy'. A search in abstract, title, and keywords from 1995 till June 2006 resulted in a long list of 299 articles. Based on a screening of the abstract and the aforementioned criteria the list was limited to 72. Subsequently, the articles were reviewed and the frequently cited articles were identified. The citations of these key articles from 1995 till June 2006 are identified using the ISI citation database and reviewed for inclusion in this review[9]. A total set of 112 sources are included in this review (see Appendix I).

The analysis of the literature should lead to a choice in the set of influence tactics and develop a notion of their effect on the EP adoption cognitions. The review should therefore at least uncover different alternative sets or classifications of influence tactics. A synthesis and evaluation is then made for the purpose of this dissertation leading to a choice of tactics. In addition the conceptual similarity of previously used dependent variables with the EP adoption cognitions is used to formulate theoretical propositions based on previous research.

6.3 Literature Review

A debate on how to identify, define and cluster influence tactics has taken place by social psychologist and communication scholars, resulting in a plethora of classifications, underlying dimensions and clusters. First of all, a definition is derived from previous research. Subsequently, the major taxonomies are reviewed and a classification of influence tactics is chosen.

6.3.1 Defining Influence Tactics

Defining Influence Tactics

Social influence is a comprehensive concept defined as the process through which individuals modify their cognitions, attitudes, and behaviors in response to socially construed contexts (Barry, 2001). Influence tactics refer to the subcategory of willful and goal-directed social influence from one agent to get targets to do or think something they would not do independently. Influence tactics, strategies, style (e.g.

[9] The ISI Web of Knowledge database is used to find citations of key articles. These are: Kipnis et al. (1980), which is cited 346 times, followed by Yukl & Falbe (1990), which is cited 134 times (including a great deal of overlap).

Farmer & Maslyn, 1999) and attempts are seen as synonyms. Concepts like power (Raven, 1992), influence principles (Cialdini, 2001), organizational politics (e.g. Vigoda & Cohen, 2002), are different concepts that are closely related to influence tactics. Influence tactics are seen as ubiquitous and pervasive in everyday life. In addition, influence tactics take up a central position in management and leadership (Yammarino et al., 2005).

All definitions of influence tactics in the sample of articles refer to some attempt to induce change in a target's cognitions and/or behavior. Hinkin & Schriesheim (1990), for instance, define influence tactics as changing an individual's behavior, beliefs, and attitudes. Other authors add additional elements to their definitions, e.g.:

- Influence tactics are latent intangible constructs that materialize in actual activities. This implies that an influence tactic is not an instance or collection of overt behavior. Actual behavior from an agent can, on the other hand, reflect the underlying influence tactic. The influence tactics then refers to ways of achieving change.
- have a proactive nature (e.g. Kipnis et al., 1980, Yukl & Falbe, 1990, Yukl et al, 2005). This excludes purely reactive behavior like reinforcement mechanisms.
- Influence tactics come in distinct types and have different objectives. This provides the basis for classification of influence tactics based on attributes or underlying dimensions.
- Influence tactics can refer to a change in both cognitions as well as behavior. The term *persuasion* is used as the super-category referring to changing beliefs, attitudes, intentions, motivations, and behaviors. Some authors define influence tactics as attempts (Yukl, 2006). This implies that an influence tactic may have the objective, but is not represented by their actual effect on cognitions and/or behavior. Some authors restrict their definition of influence tactics towards behavioral compliance to a specific recommendation or request. These studies focus on ways to get others to do something and behave in a particular way. In this dissertation, this is called *compliance.* In this dissertation, the definition is limited towards cognitions, the EP adoption cognitions, with the assumption of ultimately leading to behavior.

Integration of the aforementioned elements leads to the following working definition of influence tactics in this dissertation:

Influence tactics are defined as proactive, targeted ways of altering EP adoption cognitions

6.3.2 Classifying Influence Tactics

First order classification of Influence Tactics

Influence tactics captured the attention of scholars nearly half a century ago and researchers started to develop taxonomies or classifications, assessing the conditions under which tactics are deployed and their effectiveness on predefined outcomes. One of the earliest works to identify influence tactics resulted in the taxonomy of Marwell & Schmitt's (1967). This classic taxonomy underlies a great proportion of the subsequent research on influence tactics. They distinguish the following sixteen tactics: Reward, Punishment, Positive Expertise, Negative Expertise, Liking or Ingratiation, Gifting or Pre-giving, Debt (Calling in past favors), Aversive Stimulation, Moral Appeal, Positive Self-feeling (you'll feel better if), Negative Self-feeling (you'll feel bad if), Positive Altercasting (e.g. smart people do…), Negative Altercasting, Altruism (ask for favor), Positive Esteem of Others, Negative Esteem of Others. Many other classifications in the sample have been suggested with two (Chelariu et al., 2006), three (Buttner & McEnally, 1996) , four (Hu, & Shue, 2005; Egri et al., 2000), five (Payan & Nevin, 2006), six (O'neil, 2003; Castro et al., 2003; Tikoo, 2002; Boyle et al., 1992; Xin & Tsui, 1996), seven (Enns et al., 2001, 2003a, 2003b; Fu & Yukl, 2000; Atuahene-Gima & Li, 2000), eight (Kennedy et al., 2003; Farrell & Schroder, 1996; Yukl & Falbe, 1990) , nine (Charobonneau, 2004, Falbe & Yukl, 1992; Yukl et al., 1993, 1995, 1996; Lee & Bohlen, 1997), eleven (Yukl, 2005); twelve (McDonald & Gooding, 2005; Lee & Sweeney, 2001), thirteen (Yukl, 2005, 2006), sixteen (Fu et al., 2004; Leong et al., 2006) different influence tactics.

Three classifications of influence tactics are used most frequently in the sampled articles. Kipnis (e.g., Kipnis et al., 1980; Kipnis, 2001) and Yukl and his colleagues (e.g., Yukl, 1989; Yukl & Falbe, 1990, 1991, Yukl & Tracey, 1992; Yukl et al., 1995, 1996, 1999, 2003, 2005) have formed the basis of how influence tactics are studied in organizational settings. Nearly all articles in the sample that deal with interpersonal influence cite either Kipnis or Yukl. In parallel, another smaller line of research was initiated by the work of Frazier and colleagues, who focused on influence tactics on an inter-organizational or inter-departmental level (e.g. Frazier & Summers, 1984, 1986; Frazier & Rody, 1991). These three approaches will now be dealt with one by one.

Kipnis

Kipnis (1976) stated that the choice for an influence tactic depends on a rational decision process of resource availability (power bases), the inhibitions of using a power basis, and on the resistance that one expects. As a follow-up, Kipnis et al. (1980) investigated the ways agents have at their disposal for influencing others. They used an inductive method with descriptions form the targets of how they 'got their way'. A second study revealed a factor structure for 58 items with eight influence tactics: assertiveness, ingratiation, rationality, sanctions, exchange (or benefits), upward appeal, blocking, and coalitions. The last two were not confirmed in the factor structure, but retained for heuristic reasons. The resulting scale was called the Influence Tactics Questionnaire (ITQ). Consecutive research by Kipnis and colleagues led to the refinement of the original scales, the omission of 'blocking' and minor rewording of the tactics. The measurement instrument was published as the Profiles of Organizational Influence Strategies (POIS) and came in three forms: for co-workers, superiors and subordinates. The completion of all three measurements leads to a 'profile' of the tactics employed by a particular individual. The seven tactics of the POIS are: reason, friendliness, coalition, bargaining, assertiveness, higher authority, and sanctions (Kipnis & Schmidt, 1985). The POIS provided a basis for decades of follow-up research on influence tactics (cf. Ammeter et al., 2002; Higgins et al., 2003). A notable replication is performed by Hinkin & Schriesheim (1990), who developed new items to measure the same subscales. Several replications have led to critical notes on the dimensionality (Hochwater et al., 2000; Blickle, 2000a). Barbuto & Moss (2006) conclude from their review of influence tactic literature that six of the seven POIS tactics are evident in most iterations of influence tactic research in the organizational behavior field.

Yukl

Building on the research from Kipnis et al., Yukl and colleagues (Yukl & Falbe, 1990; Yukl & Tracey, 1992) were the first to examine influence tactics from both the agent and target perspective. A new set of items was developed, and some scale names were changed to reduce ambiguity (e.g. rational persuasion / reason was substituted for rationality). Upward appeals / higher authority and coalition tactics were combined into a single coalition tactics, because many respondents failed to differentiate between them when rating downward influence behavior. In addition, influence tactics were added: inspirational appeals, legitimating, consultation, pressure, and personal appeals. A factor analysis of the items provided support for nine distinct tactics, including five represented in the POIS (Yukl et al., 1991).The measurement instrument was called the Influence Behavior Questionnaire (IBQ) and includes an agent and a target version. Most of the follow-up research with the IBQ

has used a target version of the questionnaire, because ratings made by other people are likely to be more accurate than agent self ratings (Yukl et al., 2005). In subsequent research Yukl and Tracey (1992) used the IBQ as a multisource feedback tool for managers to measure how subordinates and peers perceived their use of the proactive influence tactics. Three tactics (rational persuasion, inspirational appeals, and consultation) were found to be significantly related to target commitment and managerial effectiveness. The results were confirmed by research with influence incidents from agents and targets, and the incidents provided additional evidence for the construct validity of the nine tactics (Falbe & Yukl, 1992; Yukl et al., 1996). In follow-up research Yukl provided support for two additional tactics (Yukl, 2005): collaboration, which involves offering resources or assistance, and apprising, which involves an explanation the targets personal benefit. This brings the total amount of influence tactics identified by Yukl to eleven.

Frazier & Summers

Frazier & Summers (1984) initiated research in influence tactics in an inter-organizational context. They developed a classification based on the exertion of power and previous research on power bases (French & Raven, 1959) and recognize six influence tactics: request, information exchange, recommendation, promises, threats, and legalistic plea. Frazier & Rody (1991), Venkatesh et al. (1995), Payan & McFarland (2005) and Payan & Nevin (2006) all based their work on this classification.

The most frequently used influence tactics and their definitions throughout all these approaches are shown in Table 12.

Table 12 Most Frequently used Influence Tactics in the Sampled Articles

Frazier & Summers	*Yukl*	*Kipnis*	*Definition*
Information Exchange			the source uses 'discussions on general business issues' without suggesting 'specific target action'
	Rational Persuasion	Rationality Reason	The agent uses logical arguments and factual evidence to show a proposal or request is feasible and relevant for attaining important task objectives
Recommendation			The source suggests that following a specific course of action is likely to be beneficial
	Apprising		The agent explains how carrying out a request or supporting a proposal will benefit the target personally or help advance the target person's career
	Inspirational Appeals		The agent makes an appeal to values and ideals or seeks to arouse the target person's emotions to gain commitment for a request or proposal

(tabel continued on the next page)

Promises			The source pledges to provide the target with a specific reward contingent on the target's compliance with the source's stated desire
	Exchange	Exchange / Bargaining (POIS)	The agent offers an incentive, suggests an exchange of favors, or indicates willingness to reciprocate at a later time if the target will do what the agent requests
Request			The source merely informs the target of the action(s) it would like the target to take without mentioning or directly implying any specific consequences of the target's subsequent compliance or noncompliance
	Personal Appeals		The agent asks the target to carry out a request or support a proposal out of friendship, or asks for a personal favor before saying what it is
Legalistic plea			The source cites a legalistic, contractual, or informal agreement 'that either requires or suggests that the target perform a certain action'
	Legitimating Tactics		The agent seeks to establish the legitimacy of a request or to verify authority to make it by referring to rules, formal policies, or official documents
Threats			The source communicates to the target that it will apply negative sanctions should the target fail to perform the desired action
	Pressure	Assertiveness	The agent uses demands, threats, frequent checking, or persistent reminders to influence the target person.

Higher order classification of Influence Tactics

Farmer et al. (1997) propose that influence tactics do not stand for discrete, unconnected actions. The possible conceptual overlap and disconnection from actual actions leads to the notion of proposing higher-order classifications in broader clusters (Leong et al., 2006). This is done by clustering (e.g. tactics into strategies by Lee & Sweeney, 2001) or suggesting dimensions underlying influence tactics.

The most widely suggested dimension underlying the influence tactics in the sampled articles is the level of coerciveness (e.g. Chelariu et al., 2006; Payan & McFarland, 2005; Simpson & Mayo, 1997, Frazier & Summers, 1984), operationalized in either two categories, hard and soft (e.g. Van Knippenberg et al., 1999) or coercive and noncoercive (e.g. Payan & McFarland, 2005; Hu & Sheu, 2004), or three categories: non, soft and hard coercive (e.g. Venkatesh et al., 1995). Rationality has been seen as a separate higher order dimension (Kipnis & Schmidt, 1985, Yukl & Falbe, 1990; Farmer et al., 1997; Wells & Kipnis, 2001). Other dimensions used are direct and indirect (Goebel et al., 2006), explicitness of persuader's intent, manipulation of rewards, locus of control and explicitness of rationale, organizationally sanctioned or destructive (Egri et al., 2000), instrumentality and task orientation (Frazier & Summers, 1984; Venkatesh et al., 1995).

Choice of classification of Influence Tactics

The wide range of different classifications gives rise to the question which one is 'right' for the purpose of this dissertation. The results of the literature review show the importance of the context specificity, the specific objective of the influence tactics, to use higher-order classifications to facilitate generalization, and to build on previous research and a theoretical basis for deriving propositions. These criteria are used for choosing a suitable classification of influence tactics to be used in the remainder of this dissertation.

Only two studies have been found that deal with influence tactics within a purchasing context: Farrel & Schroder (1996), and Venkatesh et al. (1995). They respectively base their work on the Yukl and the Frazier & Summers tradition. The latter has a stronger foundation in power theory and uses the following higher-order dimensions: coerciveness, task orientation and instrumentality. Based on the work of Venkatesh et al. (1995), the Frazier & Summers classification of influence tactics is chosen for this dissertation.

The theoretical classification is used as starting point for the practical exploration of factors in the next chapter. The Frazier & Summers classification of influence tactics with the higher-order dimensions by Venkatesh et al. (1995) are shown in Table 13.

Table 13 Theoretical Classification of Influence Tactics

Influence Tactic	*Higher order classification*			*Results*	
	Coerciveness	*Task Orientation*	*Instrumentality*	*Incidence*	*Effect*
Request	non	no	no	High	n.s.
Information Exchange	non	yes	no	High	n.s.
Recommendations	soft	yes	no	High	High
Promises	soft	no	yes	Low	n.s.
Threats	hard	no	yes	Low	High
Legalistic Pleas	hard	yes	no	Low	High (-)

n.s. = non significant

Venkatesh et al. (1995) is the only empirical work in the sampled articles in which these influence tactics are tested in a purchasing environment. To develop propositions, a connection is made to empirical findings using the original Frazier & Summers classification and the related Yulk and Kipnis classification. In addition, an underlying theoretical base for the effect of influence tactics is explored. This is done in the next section. The grounding in previous empirical and theoretical work aids the hypothesis development for an altered classification in Chapter 8 in which propositions from theory (Chapter 6) and practice (Chapter 7) are combined.

6.4 Propositions from Theory

The Frazier & Summer (1984) has been chosen as a classification for this research. The research stemming from the original Frazier & Summer (1984) article provide little leads on what effect can be expected from these tactics on the EP adoption cognitions. Therefore two steps are performed:

- the effects of other influence tactics are explored in the 112 sampled empirical articles. This is shown in 6.4.1.
- three theoretical bases for the effect of influence tactics are reviewed. This is shown in 6.4.2.

Finally, based on these two sources, theoretical propositions are developed. This is shown in 6.4.3.

6.4.1 Effect of Influence Tactics

The effect of influence tactics is reviewed by first analyzing the end variables that were used in the sampled articles and then reviewing the incidence and effectiveness in the sampled empirical work.

Dependent variables

The sampled articles show a wide range of dependent variables. Examples of types of dependent variables used in this type of research include job performance and salary increase (Kipnis & Schmidt, 1988), assessment of promotability (Thacker & Wayne, 1995), manifestated influence (Venkatesh et al., 1995), perceptions of performance evaluations' fairness (Dulebohn & Farris, 1999) or managerial effectiveness (Yukl & Falbe, 1991).

Analogous to the role, direction and objective, the type of dependent variable and context in which the study is performed may also lead to different results in the applicability of influence tactics. For instance, Strutton and Pelton (1998) investigated the effect of ingratiatory influence tactics and found that it contributes to stronger lateral relationships and reciprocal actions.

The most commonly used dependent variables in the sampled articles are:

- *Commitment*. Commitment occurs when the target person has a favorable attitude toward the agent's request or proposal and is enthusiastic about carrying out the request or supporting the proposal.
- *Compliance.* Compliance occurs when the target is willing to do what the agent asks but is apathetic about it and will make only a minimal effort.

Resistance is added by some authors (e.g. Yukl et al., 2005), resulting in categories of behavior with a different level of attachment and behavioral outcome in response to an influence tactic. Resistance refers to the deviation from the intended behavior, i.e. when the target person is opposed to the request and tries to avoid doing it, reject or even sabotage it (cf. Tepper et al., 2006; Reunis et al., 2005, p224).

The end-variables of commitment and compliance provide the basis to use the insights from previous influence tactics research for the propsition development in section 6.4.3. The influence tactics expected to lead to commitment are thereby proposed to affect PU and PEOU. The influence tactics expected to lead to compliance are proposed to affect SN.

Incidence and effectiveness

Yukl and Falbe (1990) determined that consultation and rational persuasion were the most frequently used influence tactics. Venkatesh et al. (1995) found recommendations and information exchange are used most often. Based on the original Kipnis et al. (1980) work, rationality, assertiveness and exchange are the most commonly used tactics. Several directions have been distinguished in the research on influence tactics. Yukl and colleagues propose that different tactics are used in upward, lateral and downward directions. They found that inspirational appeals, consultation, ingratiation, exchange, legitimating, and pressure were more likely to be used when attempting to influence subordinates (Yukl & Falbe, 1990; Yukl, et al., 1993; Yukl & Tracey, 1992).

Overall, the research based on Kipnis, Yukl and Frazier & Summers shows consistent results for the effectiveness of rationality. Kipnis & Schmidt (1988) found that rationality, characterized by the use of logic, detailed plans, and information to support arguments was most effective for obtaining desired organizational outcomes. This is supported by later work of Yukl & Falbe (1990). This finding also coincides with Farrell & Schroder (1996) who found support for rational persuasion, in addition to inspirational appeal, and consultation as significant predictors of manifest

influence. Likewise, Venkatesh et al. (1995) using Frazier & Summers found that recommendations were the most successful in influencing others in the buying center.

Furthermore, consultation, and inspirational appeals were found to be moderately effective (Yukl & Tracey, 1992). Research indicates that an exchange, characterized by a willingness to trade favors or offering to make sacrifices is moderately effective in organizations (Yukl et al., 1993). Assertiveness, characterized by using demands, pressure, and insistence, was found to be the least effective (Falbe & Yukl, 1992; Kipnis & Schmidt, 1988).

Besides research on the direct effects of influence tactics some authors have shown preliminary results for parallel and sequential tactics. Differences have been found in the sequencing of tactics within prolonged influence attempts. Yukl et al. (1993) and Yukl (1998) found that softer tactics such as personal and inspirational appeals, rational persuasion, and consultation were used earlier on, while harder tactics such as pressure, exchange, and coalition were more likely to be used later if initial attempts failed. The researchers offered an explanation for these findings based on the notion that harder tactics involve greater costs and risks. Parallel executed tactics may yield different results (Falbe & Yukl, 1992; Yukl et al., 1993). Combined 'soft' tactics can increase their overall effectiveness. Furthermore, rational persuasion enhanced the effectiveness of 'soft' tactics. Combinations between 'hard' and 'soft' tactics, on the other hand, have found to be less effective than 'soft' tactics by themselves. Contrary findings for the latter have been found: forcing influence styles appears to add to effective leadership, not because it is effective in and of itself, but because it reinforces the impact of non-forcing power use (Emans et al., 2003). Complex interactions of parallel and sequential influence tactics are yet to be fully understood.

The findings in the sampled articles are augmented to the overview of empirical finding from Yukl (2006) to derive an overview of the direction, sequencing incidence and effectiveness of influence tactics. These findings are used to derive propositions for the effect of influence tactics on EP adoption cognitions in the next section. This overview is shown in Table 14.

Table 14 Direction, Sequencing, Incidence & Effectiveness of Influence Tactics

Influence Tactics Frazier & Summers	*Yukl*	*Kipnis*	*Direction*	*Sequencing*	*Incidence*	*Effectiveness*
Information Exchange	Rational Persuasion	Rationality Reason	All	initial request	High	High
Recommendation	Apprising		Primarily down and lateral	not studied		Moderate
Promise	Exchange	Exchange / Bargaining (POIS)	primarily lateral	follow-up	High	Moderate
Request	Personal Appeals		primarily lateral	initial request		Moderate
Legalistic Plea	Legitimating Tactics		primarily down	follow-up request	High	Low
Threats	Pressure	Assertiveness	primarily down	delayed follow-up request	High	Low

The incidence and effectiveness of the influence tactics is used in the proposition development in section 6.4.3.

6.4.2 Theoretical Perspectives on the Effect of Influence Tactics

Three theoretical perspectives for developing propositions are recognized:

- French & Raven's theory on power basis provide support for the effect of the power basis that is utilized by the six influence tactics: referent and information power lead to commitment; coercive and legitimate power to compliance; for expert and reward power both compliance or commitment can occur.
- Kelman's theory on influence processes provides support for a type of process that may be triggered by an influence tactic leading either to compliance or commitment.
- Cialdini's theory on influence principles provides support for the underlying principle for an influence tactic to achieve an effect.

French & Raven's Power bases

The concept of power is closely related to influence tactics. Power is seen as the potential to influence others and it is exercised through the use of influence tactics. It is the potential to influence rather than the actual influence. The relative potential between target and agent can therefore underlie the agent's use of influence tactics (Somech & Drach-Zwahvey, 2002). On the other hand, actually having a basis of power does not mean that one should use it. This implies that there is no straightforward relationship between power and influence tactics. Relative power

between a target and an agent can be seen as either an antecedent for the choice of an influence tactic, a moderator of the effect of an influence tactic, an interaction effect between power between power and influence, or a direct antecedent of cognitions independently of influence tactics. Yukl (2006) mentions that the current state of knowledge is limited on these four types of relationships between power and influence.

Still, the connection between power and influence tactics is recognized in nearly all of the sampled studies. This can be done explicitly as part of the study (e.g. Hinkin & Schriesheim,1990; Yukl, 1998; Somech & Drach-Zwahvey, 2002) or basis to derive propositions; or implicitly by building on one of the three main classifications. Both the ITQ/POIS and F&S are based on power theory and IBQ acknoledges a connection (Yukl, 2006).

Like in the studies on influence tactics, various forms of power have been identified. In the seminal work of French & Raven (1959) they developed a classification with five different bases of power: reward, coercive, legitimate, referent, and expert power. A sixth basis (informational power) was added later on (Raven, 1965, 1992, 1993). In the following decades, their classification turned to be the basis for nearly every power or influence tactic related study.

Reward and *coercive* power refer to the agent's ability to generate positive and negative outcomes with respect to the target. This includes tangible rewards like bonuses or promotions and threats like reprimand or dismissal. Using either of these bases will induce only a superficial change in the target, leading to compliance. The continuation depends upon control of the target by the agent. *Legitimate* power is based on the target's belief that the agent has a legitimate right to exert influence, and that the target has an obligation to accept this influence. *Referent* power depends on the target's identification with the agent. This power base also leads to acceptance by the target as it enables the target to maintain a relationship with the agent or to identify with the agent. *Expert* power is the attribution of superior knowledge or experience to the agent. This power basis leads to acceptance. *Informational* power is based on access and control over information. Information from various sources can lead to internalized and lasting changes in the target's beliefs, attitudes or values. An agent can influence this process by controlling the information flow. This informational power is independent of the agent's relationship with the target. The perceived relevance and validity of the information is of utmost importance.

The six bases of power have been further detailed by Raven (1992). For instance, coercive power and reward power can also be exercised in personal form, including personal (dis)approval, besides the impersonal forms. Legitimate power was extended to more subtle forms of obligation based on other subjective norms. These include reciprocity, i.e. the obligation to return favors, equity, i.e. feeling of being entitled for compensation, and responsibility / dependence, i.e. the obligation to help those who cannot help themselves. A more complex extension is made for expert power and referent power, where positive outcomes may lead to individuals doing the exact opposite if they are recommended by unattractive agents. Finally, informational power was extended to include indirect besides direct information. This includes overhearing third-party communications, which may turn out to be even more persuasive than direct forms of communication. The original and revised classification of power bases remains an important theoretical basis for deductive empirical work on influence tactics.

Studies on the effect of utilizing a power basis show that expertise, legitimacy, or coercion, may not generate internal, psychological attachment, even when external behavioral compliance is achieved. This type of behavior is only likely to be sustained under surveillance or control. Conversely, reward, informational or referent power are more likely to lead to internalized behavior (Raven, 1992).

Kelman's Processes

The most frequently used theoretical basis of influence outcomes for developing propositions or providing explanations in the sampled articles is the work of Kelman (1958). Kelman's interest was in understanding the changes brought about in individuals' attitude by external inputs. In particular, his research attempted to understand if the change in attitude resulting from external input was of temporary and superficial nature or more enduring. He proposed different processes by which a target accepts influence or conforms to a request, which lead to different depths of acceptance. This implies that for a overt behavioral outcome may be similar, but underlying processes in which an individual engages may be different. Kelman distinguished the following three processes of social influence that affect individual behavior:

- *Instrumental compliance process*: when an individual adopts the induced behavior not because (s)he believes in its content but with the expectation of gaining rewards or avoiding punishments.
- *Personal identification process*: when an individual accepts influence because (s)he wants to establish or maintain a satisfying self-defining relationship to another person or group.

- *Internalization process*: when an individual accepts influence because it is congruent with his/her value system. By distinguishing between these processes, one could ascertain if usage behavior is caused by the influence of referents on one's intent or by one's own attitude.

Kelman also proposed different antecedents and consequences for the influence processes. The compliance process, for instance, tends to be performed under surveillance by the agent. In contrast, the identification process is prone to be induced by the targets relationship with the agent. Internalization process tends to be performed under conditions of the relevance of the issue, regardless of surveillance or salience. The process of internalization or identification leads to commitment or even advocacy, when the request is consistent with the targets value system. Individuals who follow the compliance process are likely to become compliant and show minimal, pro forma behavior. For a complex, difficult task, commitment is usually the most desirable outcome for the agent, but for a simple, routine request, target compliance may be all that is necessary to accomplish the agent's objectives (Yukl et al., 2005).

Cialdini's Principles

Another line of argumentation that is used to develop the outcome influence tactics are persuasion principles. They comprise "heuristic rules" for people in their decision to yield or not to a request (Cialdini, 2001). The following six principles are identified by Cialdini (2001):

- *Commitment / consistency principle* . After committing to a position one should be more willing to fulfill a behavioral request that is consistent with that position.
- *Reciprocity principle*. One should be more willing to fulfill a behavioral request to the extent that it constitutes a reciprocation of behavior.
- *Social validation principle*. One should be more willing to fulfill a behavioral request to the degree that similar others are or have been performing it.
- *Authority principle*. One should be more willing to be more willing to fulfill a behavioral request of an individual who is a legitimate authority
- *Scarcity principle*. One should want to try to secure those opportunities that are scarce.
- *Liking principle*. One would be more willing to fulfill a behavioral request of friends or other liked individuals.

The three lines of reasoning, French & Raven's Power bases, Kelman's processes and Cialidini's principles, show the importance of contextual specificities for predicting or

explaining influence tactics outcome. In particular, they demonstrate the importance of the objective of the influence tactics in terms of the intended behavioral change and the relative 'resources' between agent and target to be able to influence the target.

An overview of the findings from previous research, as well as theory on power, processes and principles, that can guide the development of propositions is shown in Table 15.

Table 15 Theoretical Basis for Influence Tactic Propositions

Influence Tactics			*French & Raven's Power bases*	*Kelman's Processes*	*Cialdini's Principles*
Frazier & Summers	*Yukl*	*Kipnis*	*Effect type*	*Effect type*	*Effect type*
Information Exchange / Recommendation	Rational Persuasion	Rationality Reason	Commitment	Personal identification / internalization	Social validation / Liking / authority
Recommendation	Inspirational Appeals		Commitment	Internalization / personal identification	Liking
Request	Personal Appeals		Commitment	Personal identification	Liking / authority
Promise	Exchange	Exchange / Bargaining (POIS)		Instrumental compliance / internalization	Reciprocity / scarcity
	Coalition Tactics	Coalitions			
Legalistic Plea	Legitimating Tactics		Compliance	Instrumental compliance	authority
Threats	Pressure	Assertiveness	Compliance	Instrumental compliance	authority

The three theoretical perspectives of the effect of influence tactics are used in the proposition development in section 6.4.3.

6.4.3 Propositions for Influence Tactics

Previous findings from both Venkatesh et al. (1995) (Table 13), other influence tactic research (Table 14), and the three theoretical perspectives (Table 15) are used to develop propositions of the overall magnitude of the effect an influence tactic may have on the EP adoption cognitions. The combination of these sources for proposition development are combined in two ways. Firstly, the proposed incidence is based on the incidence found in both Venkatesh et al. (1995) and previous influence tactic research (Table 14). Secondly, the effect on the EP adoption cognitions is proposed on the basis of the conceptual overlap between the outcomes of French & Raven's

power bases, Kelman's processes, and Cialdini's principles (Table 15) and the EP adoption cognitions. The assumption is made that commitment is conceptually similar to an effect on PU and PEOU, and compliance on SN.

The expected effect of power bases, influence processes and principles is used to develop an expectation of which EP adoption cognitions might be affected: PU, PEOU or SN. The influence tactics expected to lead to commitment are thereby proposed to affect PU and PEOU. The influence tactics expected to lead to compliance are proposed to affect SN. This leads to a set of propositions shown in Table 16.

Table 16 Influence Tactic Propositions from Theory

Influence Tactics	*Expected Incidence*	*Propositions*		
		PU	*PEOU*	*SN*
Request	High	Positive	Positive	Positive
Information Exchange	High	Positive	Positive	Positive
Recommendations	Med	Positive	Positive	Positive
Promises	Med			Positive
Threats	Low			Positive
Legalistic Pleas	Low			Positive

The propositions for the effect of six influence tactics on the EP adoption cognitions may lead to questions: Are these in fact the relevant influence tactics for EP adoption? Are they exhaustive or should tactics be added? Is the factor structure robust for the context of EP? In addition, the question may arise how strong the support is for the propositions based on previous research with different end-variables, objectives and context?

6.5 Conclusion

The extant research on influence tactics is reviewed. 112 recent articles were included in the review and several classic works. The sampled articles are synthesized to a) choose a theoretical classification to be used in this dissertation and b) develop theoretically grounded propositions of their effect on the EP adoption cognitions

The following classification of influence tactics is chosen of Venkatesh et al. (1995):

1. Request
2. Information
3. Recommendation
4. Promise
5. Threats
6. Legalistic Plea

Propositions for each of these influence tactics have been derived using previous research on influence tactics and theories on power, influence processes and influence principles. The propositions are shown in Table 16. The most effect is expected from request and information exchange.

In the next chapter, the classification is used as a basis for a practical exploration of influence tactics. This leads to a revised classification and propositions from practice. These propositions from practice are integrated with the propositions from theory developed in this Chapter into a conceptual model in Chapter 8.

Chapter 7 Practical Exploration of Influence Tactics

7.1 Introduction

In this chapter the influence tactics are explored in practice. The classification by Venkatesh et al. (1995) is taken as a starting point and revised during three rounds of empirical inquiry. Revisions are made to improve the fit of this classification of influence tactics to the domain of EP adoption. The fit with this domain means defining a classification of influence tactics that is collectively exhaustive, parsimonious, and non-redundant, i.e. mutually exclusive, for EP adoption. The following revisions are made: redefinition of the influence tactics to integrate source characteristics, omission of an influence tactic and addition of two new influence tactics. This leads to a new classification of seven influence tactics for the purpose of this dissertation. In addition, the practical exploration is used to derive practical propositions for the new set of influence tactics.

In the next section, the method used for the practical exploration is described. In section 7.3 the results of three rounds of empirical inquiry are described in consecutive order. In the following section the findings are used to define the new set of influence tactics and practical propositions. Conclusions for this dissertation are drawn in the final section.

7.2 Method

Three rounds of empirical inquiry are performed. The rounds follow an evolutionary approach, where the insights from the previous round are used as an input for the next. The following data collection is performed:

a) First of all, a case study is conducted to assess the applicability of the classification of influence tactics and to gather initial practical propositions. The case study provides rich descriptive insights which lead to suggestions on altering the classification of influence tactics.
b) Secondly, a first round of Focus Group Discussions (FGD) is performed to gather support for the suggested revisions of the classification of influence tactics. A FGD is a qualitative research method were a group of field experts are guided by a facilitator in a free discussion about a certain topic (Morgan,

1997). The guidelines of Krueger & Casey (2000) are used for planning ane executing the FFD. Based on the findings additional revisions are suggested in the classification. Furthermore, also in this round of data collection initial practical propositions are gathered.

c) Thirdly, the revised classification of influence tactics is reviewed in a second round of FGD's on its applicability for this dissertation. Additional support is found for the changes suggested in the previous rounds of data collection. In addition, this round of data collection is also used to derive practical propositions for the new set of influence tactics.

Several methodological points of concern may arise with respect to the revision of the theoretical classification in the suggested way. First of all, the Venkatesh et al. (1995) classification in the previous chapter was developed to serve a broader context than the purpose for which it is applied in this dissertation. With additional empirical data to revise the classification, the question rises how much context specifics should be brought into the classification. This question can be generalized to the issue of balancing a deductive and inductive approach. As mentioned previously in Chapter 5, scholars have adopted two approaches in deriving classifications of influence tactics: a deductive approach based on extant theory and an inductive approach based on empirical data collection. A combined approach is used in this dissertation. The combination should lead to the rigor and theoretical basis for hypotheses from the deductive approach and the context-specific focus of the inductive approach. Striking the balance between purely deductive and inductive approaches leads to the question of the scope of generalization. As a guideline for this research, the classification of influence tactics should at least serve the purpose of affecting EP adoption cognitions. It should be exhaustive and parsimonious for the research context. Generalization could be possible outside the research context but is not explicitly considered as criterion to alter the classification of influence tactics.

Secondly, the exploratory nature of this way of gathering and using empirical data to revise the classification relies on the interpretation of the researcher. The evolving perspective of using insights from each round of data collection as an input for the next leads to the following questions: a) when does a new insight justify an alteration or addition to the classification and b) when has sufficient data been collected to support an alteration or addition? Since each round of data collection could provide sample specific insights, alterations are only suggested with prudence. The following guidelines are used: a new insight can only lead to an alteration or addition if it is suggested by multiple sources within a round of data collection. The case study has a higher risk of sample specific findings than FGD's and therefore this source of data

collection can only lead to suggested alterations to the classification. Alterations or additions are only retained if they are confirmed in more than one round of data collection. The latter is derived from the saturation guidelines for case selection in a multiple case study design (Yin, 2003). Due to these guidelines, the third round of data collection has a more confirmatory nature than the previous rounds.

An explicit synthesis of the findings is performed in section 7.4 by defining of a new set of influence tactics based on theory and revised by empirical inquiry. Finally, practical propositions are developed by comparing the rounds of data collection with the new definition of the influence tactics.

7.3 Empirical Inquiry

7.3.1 Influence Tactics Case study

A case was chosen within a multinational consumer electronic company. The objective of this case study was to collect opinions of individuals on the Venkatesh et al. (1995) classification of influence tactics. A sample was chosen of users that had experienced a range of different influence tactics. The case is therefore a post-hoc analysis of the experienced influence tactics. Respondents were asked to score the original items of the Venkatesh et al. (1995) influence tactics and the EP adoption cognitions. In addition, the respondents were invited to comment on the exhaustiveness, possible internal relationships, conceptual overlap and effect of the influence tactics.

Data Collection

The prime sources of data collection are structured interviews during the period of April and May 2005. A selection of interviewees was made with the objective of covering as much spread as possible across the following variables: gender, age, region, e-sourcing training, spend category, and e-sourcing experience. A total of 26 interviews were conducted. The distribution of the 26 respondents across the variables is shown in Table 17.

Table 17 Data Collection for the Influence Tactics Case

Variable	*Categories*	*Count*	*%*
Gender	Male	21	81%
	Female	5	19%
Age	<30	3	12%
	30-40	19	73%
	>40	4	15%
Region	EMEA	18	69%
	APAC	6	23%
	NAM	2	8%
Training	yes	19	73%
	no	7	27%

Variable	*Categories*	*Count*	*%*
Spend	Distribution	9	35%
	Leverage	5	19%
	FM	5	19%
	Services	4	15%
	Travel	2	8%
	Marketing	1	4%
Experience	Novice	1	4%
	Beginner	10	38%
	Proficient	12	46%
	Expert	3	12%

Case Description

The case study was set in a cross departmental shared service center responsible for all non-product related spend. The service organization was initiated as an organization-wide effort to centralize purchasing processes and to gain operational synergies between departments. The service organization is organized along two dimensions. The first is a regional dimension with three categories: North America (NAM), Europe Middle East Africa (EMEA) and Asia Pacific (APAC). The second dimension refers to the commodity structure. The highest aggregation in this commodity structure is a supply market cluster, for instance travel & entertainment, professional & personnel, industrial leverage, marketing, forwarding & distribution, IT, facility management & energy. Each of these supply market clusters consists of spend categories, for instance, facility management comprises real estate, furnishing, catering, etc. Each of these spend categories covers a wide range of commodities.

In the beginning of 2004 a sourcing system was introduced to support and standardize processes in several supply market clusters. A system was implemented from B2e Markets. This system supports the specification, information and proposal phases as well as the quotation and awarding processes. In the one and a half years between the introduction of the system and the time of interviewing a total of € 289 million has been sourced, of which € 47 million auctioned. A variety of techniques was used to create user adoption. This should yield variation on the perceived influence tactics.

Case Analysis

Influence tactics were measured with the original items. Across the 26 respondents the incidence shows a clear distribution between the levels in which the influence tactics were experienced. The 'softer' tactics, request, information exchange, and recommendation, were experienced more than the 'harder' tactics, Promise, Threat, and Legalistic Plea. The distribution is shown in Table 18.

Table 18 Incidence of Influence Tactics in Case Study (N=26)

Influence Tactic	*Mean*	*Median*	*Std. Deviation*	*Minimum*	*Maximum*
Request	5,12	5	1,33	2	7
Information Exchange	4,12	5	1,59	1	7
Recommendation	4,48	5	1,81	1	7
Promise	2,60	2	1,78	1	6
Threats	1,52	1	0,77	1	4
Legalistic Plea	1,78	2	1,69	1	6

The higher-order coerciveness dimensions for classifying influence tactics is confirmed in this sample. While this may serve a theoretical purpose, the question may rise if it is useful to use a classification of influence tactics in practices in which the occurrence of tactics is not evenly distributed across the different influence tactics. Perhaps less emphasis should be placed on the harder tactics. More specifically, 'threat' as tactic that may hardly occur in practice and could therefore be superfluous in the classification of influence tactics.

Responses were gathered on a 7-point Likert scale for each of the original items on the EP adoption cognitions: PU, PEOU, and SN. Factor scores are derived by averaging the scores on each of the items. The overall scores (N=26) are quite positive: people find the system useful (PU = 5,37) and easy to use (PEOU = 4,55). They experienced a substantial level of subjective norm (SN = 4,93).

Effect of theoretical classification of influence tactics on the EP adoption cognitions is analyzed by calculation Spearman's correlation coefficient.

- Significant negative correlations were found between: Legalistic Plea and PEOU (-0,46; $\alpha = 0,02$) and nearly significant for Promise and SN (-0,34; $\alpha = 0,09$).
- Significant positive correlations were found between: Recommendation and PU (0,37; $\alpha = 0,04$) and nearly significant with SN (0,34; $\alpha = 0,09$).
- No significant effect was found in the sample for Request, Information Exchange, and Threats.

These findings should be interpreted with caution due to the limited sample size (N=26).

Still, the findings show a clear role of Recommendations. The prime role of Requests and Information Exchange in affecting EP adoption cognitions could have been expected on the bases of the theoretical exploration and the level of occurrence in this case. Their effect on the EP Adoption cognitions is, however, not shown in this sample. Additional findings are the negative correlations that have been found for

Legalistic Pleas and Promises. These findings may indicate a counter-productive effect of applying these hard tactics.

Already in the first chapter three generic sources of influence tactics were introduced: managers, experts or peers. Respondents were asked to comment on the sources of all influence tactics. The following results have been found:

- Request: respondents recognized managers (55%) as a prime source of requests.
- Information Exchange: peers (31%) and experts (47%) are seen as the prime source of information exchange. The role of the manger is limited. The train-the-trainer approach which was applied was reflected in the expert sources.
- Recommendations are primarily thought to be made by managers (39%) and experts (34%)
- Promise, Threats, Legalistic Plea are all seen as primarily used by managers. Several respondents explicitly mentioned corporate policies initiated or used by managers as a tool to induce change.

These findings suggestion that the complete factorial set of 3*6 source-influence tactics combinations may not all occur in practice: influence tactics may be attributed to a certain type of source. A classification can reflect the source in the definition of the influence tactics to make the classification more particular for the research context.

Respondents commented on the reasons why they gave a certain score on the EP adoption cognitions. The remarks are highly consistent with the remarks exploration of external factors (see Appendix F).

Conclusions

Based on the findings of this case study, the following points emerge concerning the classification and effect of influence tactics:

- The redefinition of the harder tactics and possible omission of ‘Threats’
- Integration of source in the redefinition
- Possible negative proposition for Promise and Legitimating Plea.

These points are taken into consideration for the next round of empirical data collection.

7.3.2 First Round of Influence Tactics FGD's

Data Collection[10]

During the 2005 conference of the Dutch purchasing management association two discussion sessions were held where attendants could discuss the topic of creating user adoption of EP. After a brief introduction, the discussion focused on the effectiveness, occurrence and the source of influence tactics. Specific attention was given to the redefinition of influence tactics for completeness and balance across the occurrence of tactics, the role of hard tactics, possible negative effects. Two professors familiar with the research of this dissertation and with expertise of EP were asked to lead the discussions. Notes were made on a flip-over and discussants were asked to make their own notes in a predefined format. The notes page is shown in Appendix J.

A total of 42 people who participate in the two FGD's, 31 (74%) submitted their personal notes for the purpose of this research. The discussants are a 'convenience sample' of Dutch purchasing professionals with an interest in EP. They cover a wide range of industries and nearly all discussants have a certain level of expertise and experience in a various roles concerning EP. Table 19 shows the distribution of the discussants.

Table 19 Respondents of First FGD on Influence Tactics (N=31)

Variable	*Categories*	*Count*	*%*
Industry	Consultancy	5	16%
	Services	1	3%
	Industry	7	23%
	EP supplier	2	6%
	Public	9	29%
	Unknown	7	23%
Level of expertise	None	4	13%
	Beginner	13	42%
	Proficient	8	26%
	Expert	5	16%
	Unknown	1	3%

Variable	*Categories*	*Count*	*%*
EP role	non user	6	19%
	user	9	29%
	Project leader	5	16%
	Manager	5	16%
	Consultant	1	3%
	EP supplier	2	6%
	Multiple	2	6%
	Unknown	1	3%

Data Analysis

The discussants expected an effect from all influence tactics. The following overall general effectiveness was expected relative to each other:

- Information Exchange is the most effective influence tactic for EP adoption, followed by Legalistic Pleas.
- A reasonable effect is expected for Recommendation, Request and Promises.
- Limited effect is expected for Threats.

[10] A more elaborate report on the discussions can be found in the report: "Het effectief beïnvloeden van mensen voor de adoptie van E-Procurement - Rapportage van de bevindingen van twee sessies 'Hoe krijg je mensen mee met EP?' tijdens de NEVI Inkoopdag 2005", June 2005 (in Dutch)

The results show the importance that discussants attribute to information exchange. A distinction was made during both discussions between using the influence tactics for first time usage or continued usage. For continued usage the discussants expect an even higher effect of Information Exchange and Legalistic Pleas.

Discussants were asked to comment on the effect of influence tactics on specific EP adoption cognitions. They expect PU to be affected primarily by Information Exchange, PEOU by Recommendation and Information Exchange, and SN by Legalistic Pleas.

A manager was recognized as prime source of Legalistic Pleas, Threat, Rewards, and Request. An expert was recognized as prime source of Recommendations. Information Exchange could come from all sources.

During the discussion the balance between using 'hard' and 'soft' influence tactics was raised. In both discussions the role of pressure was related to the effect in terms of compliance or commitment. The overall level of agreement on this topic was limited in both the individual sessions as well as between the sessions. During the first session the importance of creating favorable attitudes by involvement of people, persuasion and collaboration was stressed. This also implies an important role of the change agents initiating change before the actual system is introduced. In addition, the possibility of involving people may be limited due to practical reasons for a larger user community. During the second session the use of pressure and coercive measures was advocated by the discussants. The 'hard' tactics were expected to affect SN, although also possible negative effects of Legalistic Pleas on PEOU were mentioned. Both sessions indicate the difference in opinions between groups of discussants. In a sense this supports the practical relevance of this research introduced in the first Chapter as the group of practitioners stress the need for more clarity of the effect of influence tactics. Furthermore, the discussion on the effect of influence tactics show that the influence tactics do not cover two-way interaction between agent and target, like collaboration or initiating a joint effort to choose or apply the system. This was a recommended in addition to the set influence tactics.

The discussions led to three additional remarks concerning the completeness of the influence tactics:

- Due to the expected importance of Information Exchange it was discussed more in depth as to how the influence tactic and how it should be applied. A distinction was noted between information that does and does not attract attention of the receiver. In addition the discussants recognized a difference between informational and normative information, where the first only includes facts while the latter includes subjective messages. Also a difference between was recognized between information that is pushed or pulled, i.e. viewed on demand.
- In both sessions the role of measuring system usage was mentioned.
- One person mentioned 'the fun factor' as an additional influence tactic. Discussants mentioned the appeal to fun or hedonism as way to increase the attractiveness of usage. This has been explored in consumer adoption of IT (Van der Heijden, 2004).

Conclusions

The findings of this FGD lead to the confirmation or disconfirmation of the following points concerning the classification and effect of influence tactics from the case study:

- The role of harder tactics remains ambiguous. 'Threats' are superfluous and can are therefore omitted from the classification. A negative proposition for the effect of Legitimating Pleas on PEOU are confirmed in the FGD's.
- The integration of sources in definition is found to be beneficial for clarity.

The following new points were made:

- Possible introduction of a) Collaboration and b) Control
- Possible redefinition of Information Exchange

These points are taken into consideration for the next round of empirical data collection.

7.3.3 Second Round of Influence Tactics FGD's

Data Collection[11]

During the 2006 conference of the Dutch purchasing management association three discussion sessions were held with attendants of the conference. The topic of the

[11] A more elaborate report on the discussions can be found in the report: "Invloedstactieken voor de Adoptie van E-Procurement (EP) De deelnemers van de Erenstein inkoopconferentie 2005 (10 & 11 nov. '05, Lattrop) aan het woord". A digital copy of this report can be found on the NEVI site: www.nevi.nl

discussion sessions was ‘influence tactics for EP adoption’. After a brief introduction, the discussion focused on the effectiveness, occurrence and the source of influence tactics. Findings from a preparatory questionnaire were used as input for the discussions. Specific attention was given to the redefinition of influence tactics for completeness and balance across the occurrence of tactics, the role of hard tactics, possible negative effects. A professor familiar with the research of this dissertation and with experience with EP moderated the discussions.

In preparation of the conference invited attendants were contacted with the request to respond to a brief online preparatory questionnaire. The invitation mail was forwarded by the organizers to approximately 180 people three weeks in advance of the conference. 30 people filled in the questionnaire, of which 23 had a valid response and actually attended. The response rate compared to the 68 attendants was 34%. The respondents nearly all had senior positions within the purchasing organization of a large Dutch organization across different industries. The self-proclaimed level of expertise with both EP and change management is quite high. Table 20 shows the distribution of the respondents.

Table 20 Respondents of Second FGD on Influence Tactics (N=23)

Variable	*Categories*	*Count*	*%*
Function	CPO	10	53%
	Program manager	3	16%
	Professor	2	10%
	Other	4	21%
EP expertise	World class	1	7%
	Expert	4	27%
	Proficient	5	33%
	Beginner	5	33%
Change Mgt expertise	World class	1	8%
	Expert	3	23%
	Proficient	7	54%
	Beginner	2	15%

Variable	*Categories*	*Count*	*%*
Company	> 10k fte	6	33%
	2,5k - 10 k fte	6	33%
	500 0 2,5 k fte	3	17%
	< 500 k fte	3	17%
Industry	Production	7	39%
	Services	4	22%
	Education	2	11%
	Other	5	28%

In the questionnaire people were asked to recall a situation in which they were personally involved in the roll-out of an IT system. If possible a preference should have been given to a recent situation in which social influence played a major role; an EP system was technically implemented and caused major changes throughout the organization and processes. The large majority of the respondents could adhere to this request. They were either ‘sponsor’ or project leader of an EP roll-out. The systems primarily supported administrative order processes (e-ordering / req-2-pay). A minority thought of sourcing, ERP, contract management, e-collaboration, analysis system or a combination (SRM systems). The respondents were asked to think of successful and less successful influence attempts and describe these. In addition,

questions were asked on the expected or experienced effectiveness of influence tactics from an agent perspective.

Data Analysis

The respondents indicated that they thought Collaboration would be the most successful influence tactics, followed closely by Recommendation and Control. A moderate effect is expected of Information exchange, Legalistic Pleas, and only little effect of Request and Promises. Legalistic Pleas was expected to be more important for compliance, while Information Push was expected to play a more important role for achieving commitment. The two new influence tactics, collaboration and control, are quite strongly supported and are therefore retained in the classification of influence tactics.

The discussions of classification led tot the following points:

- The general consensus in all three sessions was that threats could perhaps be effective but are not applied in Dutch business culture.
- The discussants mentioned that the control influence tactic is effectuated through 'appraisal'.
- In two of the three discussions the role of 'anecdotal evidence', and role model behavior were stressed. Also examples of role model behavior and 'road shows' with both objective and subjective information were mentioned. Also the push and pull character of information was recognized.

Based on these findings, threats are omitted from the classification, appraisal is added to the control influence tactic and distinction should be made between influence tactics utilizing subjective and objective information.

All three sessions had a different atmosphere and placed a different emphases the use of coercive measures. In one group the consensus that the key towards realizing adoption lies in a balanced set of influence tactics with both persuasive and coercive measures. Across the three sessions there was consensus on the importance of increasing the level of coerciveness is the population wide adoption progresses.

Respondents were asked which influence tactics they expected to have an effect on the different EP adoption cognitions. All influence tactics were expected to affect one or more EP adoption cognitions, except for threats and promises. PU was expected to be influenced by Information Exchange, Recommendation, and Collaboration. PEOU was expected to be influenced by Information Exchange and Collaboration. SN was expected to be influenced by Request, Recommendations, and Appraisal & Control. A lower effect was also expected on SN by Collaboration and Legalistic Pleas.

Both in the questionnaire as in the sessions, individuals commented on ways to create user adoption. The following points were made: create buy-in, mandate, show reasons on end-user level, fact-based analysis, selling the system / persuasion, use the key-users, reward, and consistent message. In addition, some caveats were mentioned: beware of personal differences, unfriendly interface, too much top-down pressure, 'lip service', unnecessary complex process redesign, high work pressure, and complex approval flows. The points mentioned by the respondents and discussants are used for attributes to define and classify influence tactics in the next section. The points do not lead to an addition of new influence tactics.

Conclusion

- The suggested redefinition of influence tactics to include their source, the omission of threat and addition of collaboration and appraisal & control as influence tactics is accepted
- The proposed effects of 'hard' tactics remain ambiguous.

7.4 Classification of Influence Tactics

7.4.1 Definition of Influence Tactics

The three rounds of practical exploration lead to suggested alterations and additions for the Venkatesh et al. (1995) classification. The following choices are made based on the previous empirical findings:

- Threat is removed from the classification
- Collaboration and Appraisal & Control are added.
- The source is integrated in the influence tactics: a request can only be issued by a manager, information and recommendations can be issued by any source, collaboration only by managers and experts, and all hard tactics only by managers.

The choices for alterations and additions lead to a new set of seven influence tactics.

The labels of influence tactics are revised to reduce ambiguity. Information Exchange is renamed in Information Push in order to exclude the 'pull' information. This fits better with the proactive nature influence tactics and creates a sharper distinction with facilitating conditions related information, e.g. instruction manuals. Persuasive is added to Recommendation to stress the subjective nature in contrast to Information Push. Legalistic Plea is renamed into Legitimate Pressure to broaden the definition of

the tactic. Finally, Promises is renamed Reward to stress the instrumental nature. The new labels and definition of the influence tactics are shown in Table 21.

Table 21 Definition of Influence Tactics

Influence Tactic	*Abbrev*	*Definitions*
Managerial Request	MR	the extent in which a request from a managerial position induces cognitive change
Information Push	IP	the extent to which provided 'informative' information (where both parties agree that it is factual) induces cognitive change
Persuasive Recommendation	PREC	the extent to which 'normative' (persuasive) information induces cognitive change
Collaboration	COLL	the extent to which collaboration (joint action on the same level) induces cognitive change
Reward	REW	the extent to which reinforcing measures/instruments induce cognitive change
Legitimate pressure	LEGP	the extent to which reference to corporate policies / procedures induces cognitive change
Appraisal & Control	A&C	the extent to which coercive measures induces cognitive change

7.4.2 Propositions from Practice

Propositions for the new set of influence tactics are developed by comparing the proposed effect of the influence tactics on EP adoption cognitions in the three rounds of data collection. This comparison is challenging due to the fact that each round has a different nature of deriving propositions. In the case study an actual measurement of EP adoption cognitions and influence tactics took place. This reflects perceived experiences of the respondents from a target perspective. In both rounds of FGD's the respondents and discussants were asked for the expected effect of influence tactics from an agent perspective, which reflects their expertise instead of their actual experience. Some level of interpretation is therefore required to be able to synthesize the propositions from the three data sources. An additional difficulty in deriving propositions from the three different sources arises from the fact that the first two rounds were based on the original theoretical set of influence tactics, whereas in the third round the revised classification was taken as a basis for the FGD's and preparatory questionnaire. This requires translating the findings from the first two rounds to the new classification.

The three rounds of data collection result in the measurement or opinions from the respondents and discussants on the incidence, the overall effectiveness and the directed effect on specific EP adoption cognitions. In the case study, the overall perceived extent to which an influence tactic is taken as proxy for the incidence. Since both rounds of FGD's are from an agent perspective the overall effectiveness is also taken as a proxy for the incidence. This is based on the assumption that agents would prefer to apply influence tactics that they perceive to be more effective than others.

This results in an overview of incidence and effect on the EP adoption cognitions for each of the three rounds of data collection.

The same approach is followed for developing propositions from the three sources as was done for proposing and accepting changes to the classification: propositions should come from two data sources. An acception is made for propositions for Collaboration and Appraisal & Control, which were only introduced in the third round. The level of consensus for the effect of the influence tactics different is reasonably high. The propositions of the effect of the new influence tactics are shown in Table 22.

Table 22 Influence Tactics Propositions from Practice

Influence Tactics	*Expected Incidence*	*Propositions*		
		PU	*PEOU*	*SN*
MR	Med			Positive
IP	High	Positive	Positive	
PREC	High	Positive		Positive
COLL	High	Positive	Positive	
REW	Low			Positive
LEGP	Med		Negative	Positive
A & C	High			Positive

7.5 Conclusion

In this chapter the practical exploration of influence tactics is shown. The Venkatesh et al. (1995) influence tactics are revised in three rounds of empirical data collection to increase the applicability for EP adoption. The alterations are based on a case study with 26 interviews, a first round of FGD's with 42 purchasing professionals in two sessions and a second round FGD's with 68 purchasing executives in three discussions sessions, of which 23 submitted responses to a preparatory questionnaire. The following revisions are made: redefinition of the influence tactics to integrate the agent, omission of an influence tactic (Threat) and addition of two new influence tactics (Collaboration and Appraisal & Control). The new classification of influence tactics should be more exhaustive and parsimonious for the research context. The new classification comprises the following influence tactics:

- Managerial Request (MR)
- Information Push (IP)
- Persuasive Recommendation (PREC)
- Collaboration (COLL)
- Reward (REW)
- Legitimate pressure (LEGP)
- Appraisal & Control (A&C)

This classification provides an answer to the second research question:

Q2 What influence tactics affect EP adoption cognitions?

An overview of the definitions of the influence tactics is shown in Table 21.

Propositions are derived from the empirical data for the new set of influence tactics. The propositions from practice are shown in Table 22.

In the next Chapter a research model is developed using the new classification of influence tactics. Hypotheses in this model are developed from the propositions from theory (see Table 16) and practice (Table 22). These hypotheses are tested in Chapter 10.

Part III:

Establishing the Effect of Influence Tactics

Part III has the objective of answering the main research question:

Q *What is the effect of influence tactics on EP adoption cognitions?*

In the third part, the effects of influence tactics on EP adoption cognitions are hypothesized and tested. Based on the findings in the theoretical exploration in Chapter 6 and the practical exploration in Chapter 7, a conceptual model is developed in Chapter 8. This model shows the hypotheses of influence tactics and their effect on EP adoption cognitions. In Chapter 9 a measurement instrument for the influence tactics is developed and pre-tested. In Chapter 10 the effects of influence tactics on the EP adoption cognitions are tested with data from seven different organizations.

Chapter 8 Synthesis – Influence Tactics

8.1 Introduction

In this chapter the findings from chapters 6 and 7, the theoretical and practical exploration of influence tactics, are synthesized into a research model with hypotheses for the effect of seven influence tactics on three EP adoption cognitions. The seven influence tactics, MR, IP, PREC, COLL, REW, LEGP, and A&C, are based on the classification developed in the previous chapter.

An approach to combine insights from different sources is first explained and then performed in the section 8.2. The resulting research model is presented and methodological implications are discussed. In section 8.3 a continued research design is shown to test the hypotheses in the remainder of this dissertation.

8.2 Research Model

In the previous chapter, a classification of seven influence tactics is developed. This provides the basis of a research model with seven influence tactics as independent variables and the EP adoption cognitions as dependent variables. Hypotheses on how the dependent variables are affected by the independent variables are developed in this section.

There are two sources that may provide insights to guide the development of hypotheses:

1. *Empirical findings on the effect of the seven influence tactics*. In chapter 7 propositions were shown that were derived from the empirical data collected to define the influence tactics.
2. *Theoretical findings on the effect of influence tactics.* In chapter 6 extant social influence literature is reviewed. Both findings from empirical studies with different dependent variables, as well as theory on the power, process and principles, were used to develop propositions for a set of six influence tactics. A translation is necessary to be able to use these insights to guide possible propositions for the new and revised set of seven influence tactics.

In general, combining findings from different research methods may lead to stronger inferences as they confirm or compliment each other. Such a mixed method approach may lead to a more comprehensive understanding of the phenomenon. In addition, it

may alleviate the risk of common or single method bias, i.e. compensate the weakness of one approach with the strengths of another. The process of combining different research approaches is called 'triangulation'. The term triangulation is originally derived from the metaphor of navigation, where different measurements were used to determine position and bearings. Analogous to this approach, triangulation in research strives to combining findings from different data sources, investigators, theoretical perspectives, research methodologies or data types (Miles & Huberman, 1994). The latter refers to combining findings from qualitative and quantitative research.

A combination of the aforementioned different sources is expected to yield stronger hypotheses, but does present some challenges. The process of deriving composite findings from different research approaches can present some difficulties. Determining how findings 'add up' is not an objective process. Corroborating findings may be quite straightforward to combine, but contrasting findings may rely on some level of interpretation to synthesize. Also difficulties might arise in determining the weight that should be attributed to findings from the different research methods. Both challenges are relevant for the development of hypotheses in this dissertation. In addition to these typical issues in combining research findings, another challenge occurs: the four sources all on different definitions of independent variables. This requires a 'translation' of findings. This is performed in the following section.

8.2.1 Hypotheses for Influence Tactics & EP Adoption Cognitions

The practical and theoretical exploration of influence tactics and external factors provide leads for hypotheses. To utilize these leads for developing hypothesis, first a basis of comparison was made by translating all findings to the seven influence tactics. No translation was necessary for the exploration of the influence tactics in practice, because the same seven tactics were used. The translation for hypotheses from the theoretical exploration of influence tactics was performed by comparing the conceptual definition of the influence tactics. This is shown in Table 23.

Table 23 Hypotheses for Influence Tactics from Theory & Practice

Influence Tactic	*Theory (Table 16)*				*Practice (Table 22)*			
	Incidence.	*Effect*			*Incidence.*	*Effect*		
		PU	*PEOU*	*SN*		*PU*	*PEOU*	*SN*
Managerial Request	High	Pos	Pos	Pos	Med			Pos
Information Push	High	Pos	Pos	Pos	High	Pos	Pos	
Persuasive Recommendation	Med	Pos	Pos	Pos	High	Pos		Pos
Collaboration**					High	Pos	Pos	
Reward	Med			Pos	Low			Pos
Legitimate pressure	Low			Pos	Med		Neg	Pos
Appraisal & Control**					High			Pos

** not included in theory

The combination of findings and supporting rationale is discussed below for each influence tactic. The three theories indentified in Chapter 6 on the effect of influence tactics, Kelman's influence processes (Kelman, 1958), Cialdini's influence principles (2001) and power bases (French & Raven, 1957), are used to support choices in synthesizing the findings into hypotheses.

Management Request (MR)

In the practical exploration of influence tactics, MR is primarily expected to show an effect through subjective norm. This is supported in theory on external factors by the superior's influence construct (Taylor & Todd, 1995). In the theoretical exploration of influence tactics moderate support is also found for "request" having an effect on SN. In addition an effect on PU, PEOU is shown. The addition of a manager as sole source of MR changes the connotation as apposed to a simple "request". An effect can be expected based on the positional power of manager. This is, however, refuted in the practical exploration. The power associated with the managerial position is of less importance than the personal aspect of the target-agent relationship. MR relies on a referent power basis and perhaps to a lesser extent legitimate and coercive power bases. In terms of Kelman's influence process, MR is proposed to lead to personal identification. In terms of Cialdini's persuasion principles, MR is proposed to create an effect through a) liking and to a lesser extent b) authority. Due to the stronger personal part of the conceptualization of MR that the positional part only the effect on SN is retained as hypothesis.

H1 MR has a positive effect on SN

Information Push (IP)

In general, information plays a pivotal role in the formation of cognitions. This is one of the generalizations that underlies all adoption and diffusion research and is supported throughout the four sources of data collection. To clarify which role it plays, a distinction needs to be made between different types of information. In a

sense, all influence tactics can be said to contain an element of information exchange. The most salient division of information types is made between the influence tactics IP and PREC. Based on the theoretical distinction between 'informative' and 'normative' information (see Chapter 6) and the FGD's (see Chapter 7), IP is proposed to be limited to factual information, while PREC contains some level of subjective, persuasive content. The 'sender' of IP must be, at least to some extent, recognized by the receiver as a qualified authority to provide information. IP relies on an expert power basis. The content of the information in IP is suggested to relate to the characteristics and features of the system. It can therefore be used to form a notion on both the performance as well as the ease of use of the system. In terms of Kelman's influence process, IP is proposed to lead to internalization. Based on the previous discussion, IP is hypothesized to affect PU and PEOU.

H2a IP has a positive effect on PU
H2b IP has a positive effect on PEOU

Persuasive Recommendation (PREC)

PREC is distinguished from IP by its persuasive content. PREC has a subjective nature and has an aim of convincing the target of the merit of EP. In all four data collection round this element is shown in a proposed effect of PREC on PU. Also, effects on PEOU and SN have been shown in the theoretical exploration of influence tactics and the practical exploration of external factors. The definition of the constructs used, respectively recommendation and communication, differ slightly from PREC. In the definition of PREC, advice concerning the ease of use is less salient. PREC is primarily based on the social function of a referent as an advocator of the utility of EP. This means that the subjectivity can not only be related to the content of the message, but also to the agent. Recommendations may be accepted from people, not only based on their actual expertise, but on the credibility which is attributed to them. A personal liking can contribute to this. PREC relies on a referent power basis and perhaps to a lesser extent also on expertise. In terms of Kelman's influence process, PREC is proposed to lead to personal identification and internalization. In terms of Cialdini's persuasion principles, PREC is proposed to create an effect through social validation. The hypotheses derived from this discussion are that PREC affects PU and SN and does not affect PEOU.

H3a PREC has a positive effect on PU
H3b PREC has a positive effect on SN

Collaboration (COLL)

COLL is introduced in the practical exploration of influence tactics as a joint effort between target and agent to employ EP. The suggested effects in this round of data collection are only on PU and PEOU. A possible rational to support this effect is that working together with an agent may include a transfer of system or process related knowledge, which in turn can contribute to a positive perception of its performance. In addition, actual sharing of efforts or help can contribute to PEOU. The social role of engaging in a joint effort is not recognized and the findings from the other three sources do not shed any light on the workings of COLL. While a social component is not recognized in the previous research in this dissertation, a certain level may be expected due to the following social influence theories. COLL is proposed to be based on both referent power and to a lesser extent expert and legitimate power. The latter refers to the feeling that one should reciprocate when offered assistance. In terms of Kelman's influence process, COLL is proposed to lead to both personal identification and internalization. In terms of Cialdini's persuasion principles, COLL is proposed to create an effect through social validation and reciprocity. In summary, COLL is hypothesized to affect all cognitions.

H4a COLL has a positive effect on PU
H4b COLL has a positive effect on PEOU
H4c COLL has a positive effect on SN

Reward (REW)

REW is an influence tactic that relies on the agent's possession of means to reward certain behavior. This is recognized as an instrument to administer social pressure. One could also expect an effect on PU as usage results in more favorable conditions for the end-user. Since the definition of PU is limited to the direct results of the system, the effect on PU is excluded. The only effect of reward is thereby through social pressure. REW relies on a reward power. In terms of Kelman's influence process, REW is proposed to lead to instrumental compliance. In terms of Cialdini's persuasion principles, REW is proposed to create an effect through scarcity and authority.

H5 REW has a positive effect on SN

Legitimate Pressure (LEGP)

The four data sources show contradicting and possibly spurious effects for LEGP. Negative effects have been demonstrated on PEOU in both practical orientations. A

possible explanation offered in the FGD's is that recipients of LEGP reevaluate the required efforts to learn how to operate the system and feel more burdened by it.

LEGP relies on a legitimate power. In terms of Kelman's influence process, LEGP is proposed to lead to instrumental compliance. In terms of Cialdini's persuasion principles, LEGP is proposed to create an effect through authority. The resulting compliance is not contingent to an active evaluation of the advantages or drawbacks of the system, but merely on social pressure. Based on this reasoning no effect would be expected on either PU or PEOU. For PU, on the contrary, an effect has been proposed in both the theoretical review of influence tactics as the practical exploration in of external factors. The latter effects come from "pressure / mandate", which may include the more extreme form of making alternative behavior impossible. In the case description where this has occurred, it becomes clear that the mandate is more of an prerequisite external factor than a proactive influence tactic. The effect on PU and PEOU may therefore be spurious. In the theoretical exploration of influence tactics also positive effects have been shown on PU and PEOU. In addition, within the theoretical explorations findings are not consistent. For instance, Venkatesh et al. (1995) shows an overall negative effect of legalistic plea, the predecessor of the LEGP construct. This provides additional support to previously mentioned claim of a negative effect of LEGP on PEOU. The social effect of LEGP leads to the additional hypothesized relation between LEGP and SN.

H6a LEGP has a negative effect on PEOU
H6b LEGP has a positive effect on SN

Appraisal & Control (A&C)
A&C has only been introduced on the basis of the practical exploration of influence tactics. It is seen as an instrumental form of authority and relies on coercive power. In terms of Kelman's influence process, A&C is proposed to lead to instrumental compliance. In terms of Cialdini's persuasion principles, A&C is proposed to create an effect through authority. This leads to the only hypothesis that A&C only affects SN.

H7 A&C has a positive effect on SN

EP Adoption Cognitions

For the sake of comprehensiveness, the hypotheses amongst the EP adoption cognitions, stemming from extant TAM research are added:

H8a PU has a positive effect on BI
H8b PEOU has a positive effect on BI
H8c SN has a positive effect on BI
H8d PEOU has a positive effect on PU
H8e SN has a positive effect on PU

8.2.2 Research Model & Overview of Hypotheses

The hypotheses as described in the previous section form a research model connecting the influence tactics and EP adoption cognitions. Figure 11 shows the research model.

Figure 11 Research Model

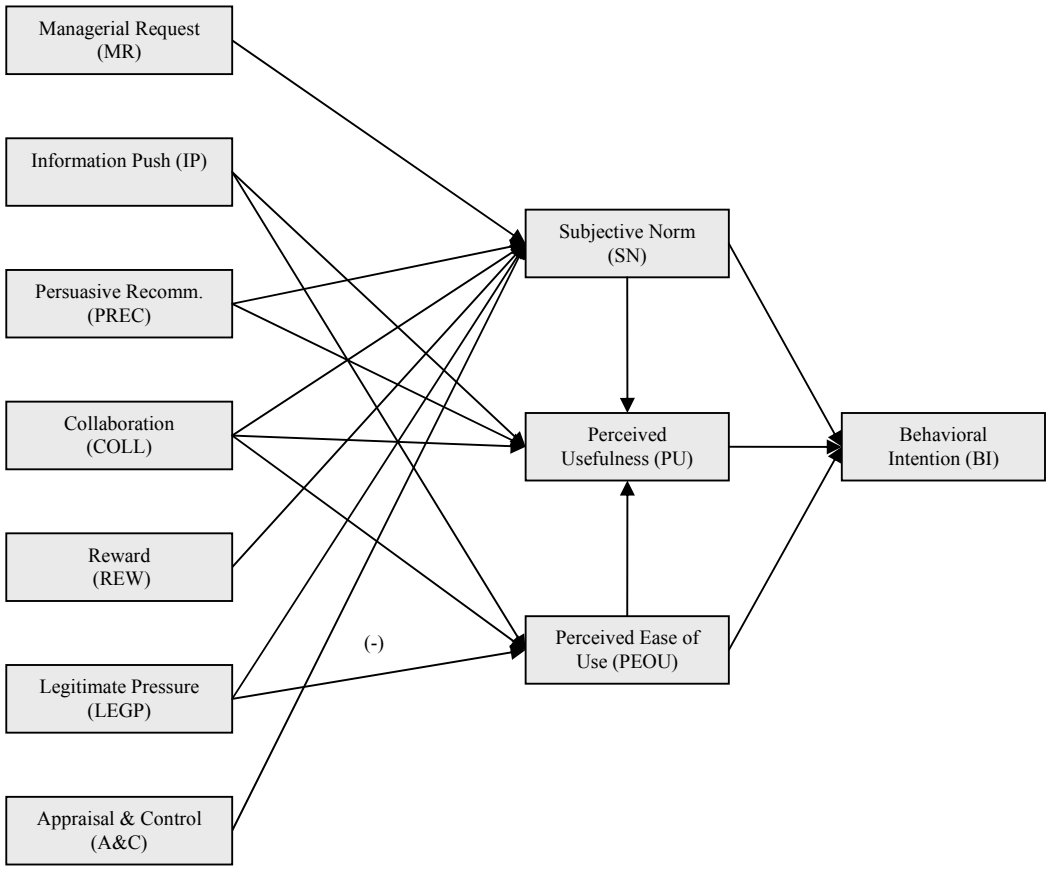


Table 24 provides an overview of the twelve hypotheses in this model.

Table 24 Overview of Hypotheses

Nr.	*IV*	*DV*	*Hypothesis*
H1	MR	SN	Managerial Request has a positive effect on Subjective norm
H2a	IP	PU	Information Push has a positive effect on Perceived Usefulness
H2b	IP	PEOU	Information Push has a positive effect on Perceived Ease of Use
H3a	PREC	PU	Persuasive Recommendation has a positive effect on Perceived Usefulness
H3b	PREC	SN	Persuasive Recommendation has a positive effect on Subjective norm
H4a	COLL	PU	Collaboration has a positive effect on Perceived Usefulness
H4b	COLL	PEOU	Collaboration has a positive effect on Perceived Ease of Use
H4c	COLL	SN	Collaboration has a positive effect on Subjective norm
H5	REW	SN	Reward has a positive effect on Subjective norm
H6a	LEGP	PEOU	Legitimate Pressure has a negative effect on Perceived Ease of Use
H6b	LEGP	SN	Legitimate Pressure has a positive effect on Subjective norm
H7	A&C	SN	Appraisal & Control has a positive effect on Subjective norm
H8a	PU	BI	Perceived Usefulness has a positive effect on Behavioral Intention
H8b	PEOU	BI	Perceived Ease of Use has a positive effect on Behavioral Intention
H8c	SN	BI	Subjective Norm has a positive effect on Behavioral Intention
H8d	PEOU	PU	Perceived Ease of Use has a positive effect on Perceived Usefulness
H8e	SN	PU	Subjective Norm has a positive effect on Perceived Usefulness

IV = Independent Variable, DV = Dependent Variable

8.2.3 Methodological Implications of the Research Model

The following methodological implications are embedded in the research model:

Construct Validity

Construct validity refers to the relationship between constructs and their operationalization (Straub et al., 2004). Constructs are conceptual artificial constructions and not directly observable in reality. Their meaning is inferred from actual measurements. Three types of validity are distinguished within construct validity: discriminant, convergent and nomological validity. Nomological validity refers to the constructs and their theoretical network. It focuses on how well the concepts theoretically link with different concepts that have previously been proven to be related. The influence tactics are grounded in previous social influence theory and the role of social influence in general has been previously proven to be related to the adoption cognitions. A link between influence tactics and the EP adoption cognitions can thereby be assumed without unraveling and testing a full nomological network with related constructs.

Discriminant validity refers to extent to which construct differs from measurement items that are not believed to make up the construct. Convergent validity refers to the extent that measurement items that are thought to reflect the construct ‘converge’ or are in fact associated. Discriminant and convergent validity relate to the measurement of constructs and will be dealt with in more depth with analytic techniques to establish factorial validity in Chapter 9. Still, raising the issues of discriminant and convergent validity leads to the question if the seven influence tactics are in fact different concepts. Are there really seven influence tactics or are two influence tactics so

similar that there are in fact only six? At this point, without empirical support for discriminant and convergent validity, both previous research and empirical qualitative research provide support for the seven distinct constructs. While the existence of seven constructs is plausible, quantitative data may support an alternative factor structure. The balance between purely statistically leads for altering individual construct definitions and more content based leads are dealt with extensively in Chapter 9 and 10.

Internal Validity

Internal validity is the extent to which the model accurately identifies causal relationships between variables (Hair et al., 1998). Internal validity differs from construct validity as it focuses on alternative explanations and the strength of links between constructs (Straub, 1989).

- *Prediction vs. explanatory research model*
  Research models differ according to their purpose. Research models that link independent and dependent variables, either in a comprehensive or parsimonious approach, to create a high explanatory power differ from research models where a predictive goal is followed. This dissertation falls in the latter category. A high degree of explanation of the variance of the dependent variables (high adjusted R^2) is not sought after, but rather the demonstration of an effect of an independent variable on one or more dependent variables. The research model is not believed to show high explanation of the EP adoption cognitions as many other external factors might play a role. The research model should be able to show the effects of individual influence tactics on the EP adoption cognitions.

- *Statistical inference and assuming causality*
  The hypotheses are formulated as causal relationships. With a statistical approach alone causality cannot be demonstrated, but only statistical inference or association between variables. Association means that when a 'cause A' occurs that it is likely that the 'effect B' will also take place, i.e. A and B are correlated. Correlations can only show that the data is in accordance with the proposed model. In statistical terms, reversing the 'arrows' would yield an equivalent fit of the data with the proposed model. The statistically correct formulation of the hypotheses would be that the null hypothesis of A and B not being correlated is rejected. To demonstrate causality between the variables, two additional criteria have to be met: establishing a chronological order where the cause precedes the effect and ruling out rival hypotheses or

alternative explanations. The latter is dealt with separately below. The first criterion, demonstrating precedence of the influence tactics, can be assumed from all previous case studies and FGD's. In addition, the assumption of causality underlies nearly all previous influence tactics research. Therefore, causal relationships are assumed and the directional hypotheses retained as opposed to the statistical formulation.

- *Ruling out rival hypotheses or alternative explanations*
  In the research model many extraneous variables, i.e. factors outside the research model are recognized to have an effect on the dependent variables. A role of system and context characteristics in affecting EP adoption cognitions was recognized both in theory (Chapter 3) as in practice (Chapter 4). In itself, a relatively low explanation of the variance of the dependent variables by the dependent variables included in the research model does not present methodological concerns for predictive purposes. The risk, however, of low explanation of the end-variables increases the possibility of extraneous factors not only affecting the dependent variables, but also the independent variables. In this case, spurious effects of the influence tactics on EP adoption cognitions may be found, where the correlation is actually determined by a third factor or group of factors. These so-called confounding factors provide an alternative explanation for an identified effect between the independent and dependent variables. In general, more than in laboratory settings, social research in a 'real life' context should be wary of possible distorting factors. In this research, the model should lead to extra caution.

  In theory there is hardly any reason to believe both influence tactics and EP adoption cognitions could be caused by one or more underlying constructs. It should be noted, that the amount of possible confounding factors has hardly been studied: the amount of similar constructs taken into account in UTAUT / TAM or influence tactics research is limited. It is, on the other hand, conceivable that factors affect both the influence tactics and the EP adoption cognitions. For instance, a corporate culture might exist where agents are opposed to 'harder' measures and at the same time the targets are very receptive towards new innovations. The only sets of factors that have previously been shown to be related to both influence tactics and EP adoption cognitions and therefore may be confounding are personal characteristics of the target, e.g. age. If these personal characteristics in fact are related to both influence tactic and EP adoption cognitions, then they are more likely to be a moderator. For example, when IP with PE are shown to be related, age with IP

and age with PU, then it is conceptually hard to accept that age fully causes both IP and PU and that therefore the relationship between IP and PU is spurious. Partial correlation with both could occur, which could be interpreted as a moderator effect.

Since this is the first study to link two theoretical domains, social influence and IT adoption theory, the prime interest is in providing credibility for the main effects. The possibility of confounding and moderating factors is not rejected, but no exhaustive research will be conducted to untangle the different possible extraneous effects. To still assure that confounding issues do not distort the findings, several proxy variables of possible confounding factors are included to diagnose and if necessary possibly rectify the role of extraneous variables.

External Validity

External validity is the degree to which causal relationships can be generalized toward the entire population (Hair et al., 1998). Building on generally accepted theory for choosing the dependent variables and developing both the independent variables and hypothesis strengthens the external validity. Conversely, introducing context and object specific elements into the model, can increase its strength or application in a specific domain but can limit the external validity. In the development of this research model empirical qualitative data is included from a specific context, purchasing functions in multinational organizations, and for a specific object, e-ordering and ES. The level of specificity may be limited due the generic level of the gathered practical input and generic formulation of both the influence tactics and EP adoption cognitions. In addition, the conceptual level makes it plausible that findings can in fact be translated to other contexts. This implies that findings will be similar when context and object criteria are relaxed. Particularly for similar contexts or objects the findings can be assumed to be robust.

8.3 Continued Research Design

In order to provide support for the suggested effects of influence tactics on the EP adoption cognitions, the remainder of this dissertation is dedicated to test the model and hypotheses. Large scale survey research is chosen as method. The shift towards survey as a method of data collection means that the researcher is detached and can infer rule-based knowledge. Since the research model and hypotheses build upon the

previous research in this dissertation, the evolution from exploratory to more confirmatory nature is made.

The following choices are made for the continued research design:

- *Scale development*: the instrumentation to measure the constructs will be developed using theory and previous qualitative research. An item battery will be generated, a selection process performed and a pre-test of a measurement instrument conducted to assess the psychometric properties. Additionally, expert pre-test will be performed for content validity.
- *Data collection*. A sample-frame will be selected from individuals who have recently adopted EP within large Dutch-based organizations. A large scale field-survey will be conducted using an online tool.
- *Data analysis*. Individual relations between influence tactics and the EP adoption cognitions will be assessed with regression analysis and the research model will be estimated with Structural Equation Modeling (SEM). The SEM will be preceded by data cleansing, resolving data pooling issues, descriptive statistics and factor analyses to establish the validity and reliability of the refined measures and scales.

Each of the research design choices for these points is detailed below. Afterwards methodological implications from the research design are discussed.

8.3.1 Scale Development

Before any measurement can lead to credible outcomes, the measurement instrument has to measure what it should, in an accurate and reliable manner. This also applies to social research. The importance of appropriate scales for measuring constructs is paramount and has been pointed out by many researchers from different disciplines within social science (Churchill, 1979; Hinkin, 1995; Rossiter, 2002; Straub et al., 2004). In order to draw any kind of conclusion regarding relations between latent constructs, scales must be constructed so as to capture the 'true' concept. The observation of true covariance between the variables of interest is directly dependent upon the ability to accurately and reliably operationalize the unobservable construct in a scale. The definitions of the seven influence tactics are new and existing measurement scales for these influence tactics are not readily available. Such measurement scales are needed in order to test the research model.

To ensure adherence to criteria of quality, specific approaches have been suggested for the process of scale construction. Some of these approaches emphasize the

conceptual quality of the scale (e.g., Rossiter, 2002) and others the scale's psychometric properties (e.g., Churchill, 1979). Rossiter (2002) claims that every application of a scale is to some extent idiosyncratic. Rossiter (2002) explicitly recognizes the context specificity of a scale. He calls for including object, attributes and rater characteristics in the process of construct definition and item development. Rossiter (2002) opposes the idea that in purely positivistic studies, scales are generally believed to be the same across contexts and applications. In this research, EP is the object and potential end-users of EP tools are the raters. Therefore, the specific context of this research calls for specific scales.

Rossiter's approach may overstate the context and object specifics and underutilize existing established scales. As shown in Chapter 6, many previously developed and tested scales are available. Furthermore, while the seven influence tactics may be new, they still build on existing theoretical work where scales have been employed. Some of the items from previously developed general scales can therefore be used. Rositter also places more emphasis on content validation than on psychometric properties of a scale. Still, these remain important to provide – mainly positivistic oriented – researchers confidence in the quality of scales. Therefore, a method is suggested which combines Rositter's approach for developing scales with a more classic one suggested by Churchill (1979).

The followed method and actual scale construction are described in the next Chapter.

8.3.2 Data Collection

Population & Sample
The overall population for this research is all individuals in an organization where an agent feels that they should use an e-ordering or e-sourcing system. Respondents are targets. The organizations are limited to Dutch organizations due to practical reasons.

Data from different organization-system combinations are collected. The overall population is not stratified in a sense that a fixed ratio of different organization-system is collected. The only criterion that is set is that data should be collected for both e-ordering and e-sourcing. The types of organizations are not limited, but some criteria make an organization-system setting more attractive for this research. First of all, individuals in organizations in which an e-ordering or e-sourcing system is recently rolled out will have a better recollection of the applied influence tactics. Secondly, settings where people have a lot of different opinions are preferred. This

should lead to variance on the dependent variables. Thirdly, a wide array of influence tactics should have been applied to get variance on the independent variables.

The applicability of an organizational setting for this research is not determined a priori, but expected to follow from a two-phased approach in data collection. First of all, a high-level problem owner is addressed in an organization. This can be either a CPO or someone responsible for purchasing systems. When the problem of creating user adoption is recognized data collection is initiated for the sub-population within the respective organization. No sampling technique is applied; all users and potential users identified by the problem owner are addressed. A report of influence tactics and EP adoption cognitions in a certain organization was provided to problem owners.

Online survey tool

An online tool is selected as means of collecting data. Using an online tool has some merits compared to a paper based survey. First of all, the effort of reaching potential respondents is easy and does not require any costs. A simple e-mail containing a hyperlink is sufficient to invite respondents to participate. Secondly, data storage and processing is less prone to errors compared to manual processing. Instant storage and processing is possible. This also facilitates automated reporting of descriptive statistics. Thirdly, possible concerns with technical issues and access of the respondents to internet are not expected to present any problem. Due to the research object, e-ordering and e-sourcing, access to internet can be assumed as it is a prerequisite for being able to use these systems. To increase the response rate, the problem owner underwrite the invitation for data collection in his/her organization. Also targeted reminders can be sent, as an online survey tool facilitates the tracking of non-respondents.

8.3.3 Data Analysis

Since the research includes several independent and dependent variables, each consisting of multiple items, multivariate analysis is appropriate. Multiple regression analysis is by far the most applied multivariate technique (Hair et al., 1998). These techniques are also referred to as ‘first generation’ techniques that require separate steps for a) analyzing item loadings on their latent construct and creating a composite variable, and b) analyzing the linkage of independent and dependent composite variables.

Structural Equation Modeling (SEM) is a second generation multivariate data analysis technique that enables a single, systematic and comprehensive analysis among

multiple independent and dependent constructs. SEM is gaining popularity in behavioral science. Gefen et al. (2000) show a sharp increase in its application in the top-ranking IT journals that are based on a positivist, empirical tradition. Besides the increased analytical possibilities, also the possibility to assess latent constructs contribute to its popularity in modeling social reality. SEM estimates the fit between data and a whole system of variables and its interrelations. First generation regression techniques can only analyze one 'layer' of linkages between independent and dependent variables. SEM is therefore applicable for testing models that contain latent constructs, i.e. compound unobserved constructs that consist of multiple observed indicators. Furthermore, the complexity of causal networks that can be assessed is higher than in simple correlation-based techniques. SEM is specifically designed to estimate a-priori specified, multiple and interrelated dependence relationships. Causality is thereby often assumed based on theoretical underpinnings of the identified relationships. SEM is primarily a confirmatory analysis technique.

There are two types of SEM: a) covariance-based (e.g. LISREL, AMOS) and b) variance or component based or partial-least-squares (e.g. PLS-Graph, SmartPLS). Both types differ in terms of their objectives, statistical assumptions, modeling of indicators, and statistical tools.

- These two methods differ in their *objectives*. Covariance based SEM is to assess the complete set of paths in a specified model for a given dataset. The variance based SEM, like regression analysis, is used for rejecting the null-hypothesis of no effect. It analyzes individual relationships rather than the overall fit of the model. This enables some level of exploratory research rather than purely confirmatory analysis.
- Besides the stronger reliance on a theoretical basis, covariance based SEM relies on stricter *statistical assumptions*. Estimation methods for covariance based SEM like Maximum Likelihood (ML) or Generalized Least Squares (GLS) requires multivariate normal data and a larger minimal sample size. Variance based SEM, using iterations of Ordinary Least Squares, is relatively robust to deviations from a multivariate distribution. Due the distribution free approach it can be performed on smaller datasets. The statistical assumption for covariance based methods may leave more room for specification, like fixed values for the error terms. On the other hand, the statistical estimation of the model relies on stricter assumptions, e.g. positive definite input matrices. Variance based SEM techniques relax these assumptions and associated risk like non-convergence of the model.
- Another difference between the two types of SEM is the way in which *indicators* are modeled as a latent construct. A latent construct can be modeled

with formative indicators. These are uncorrelated elements that 'add up' to form the latent construct. Alternatively, a construct can be modeled with reflective indicators. These are all correlated and all show a change in the underlying construct. Covariance techniques can only deal with reflective indicators. This does not present a limitation for this research as only reflective indicators are used.

- The statistical toolset for analyzing differ between the two types of SEM. Both variance and covariance SEM provides statistics for analyzing the overall model fit, individual causal paths and loadings of individual items. The amount of statistical tools, however, is less extensive for variance based SEM. In addition, more techniques are available for covariance SEM for additional detailed analysis, for instance analysis of interaction effects between items or the analysis of residual non-common error.

Table 25 shows the differences between the two SEM approaches and regression analysis. A more detailed comparison is made by Gefen et al. (2000).

Table 25 Comparison between Regression, Variance and Covariance SEM

	1. Regression	*2. SEM*	
		a. Variance (PLS)	*b. Covariance (LISREL)*
Objective of overall analysis	Reject a set of path-specific null hypotheses of no effect	Reject a set of path-specific null hypothesis of no effect	Show that the null hypothesis of the entire proposed model is plausible, while rejecting path-specific null hypothesis of no effect
Objective of variance analysis	Variance explanation (high R-square)	Variance explained (high R-square)	Overall model fit, such as insignificant Chi-square or high AGFI
Required theory base	Does not necessarily require sound theory base. Supports both exploratory and confirmatory research.	Does not necessarily require sound theory base. Supports both exploratory and confirmatory research	Require sound theory base. Supports confirmatory research
Assumed distribution	Relatively robust to deviations from a multivariate distribution, with established methods of handling non-multivariate distributions.	Relatively robust to deviations from a multivariate distribution.	Multivariate normal, if estimation is through maximum likelihood. Deviations from multivariate normal are supported with other estimation techniques.
Required minimal sample size	Supports smaller sample sizes, although a sample of at least 30 is required.	At least 10 times the number of items in the most complex construct.	At least 100-150 cases.

Based on Gefen et al. (2000)

SEM is selected as the data analysis method for this research model, due to the possibility of estimating the overall model at once as apposed to multiple simple regression analyses. Within SEM a variance based method is chosen. The primary reason is the fit of the objective of the technique, path specific hypothesis rather than overall model fit, with the research objective of demonstrating an effect of each influence tactic. In addition, the requirements for data distribution and sample size are appropriate for the first data collected to support the research model. Future replications may use the more rigorous and stringent covariance based SEM techniques.

8.3.4 Methodological Implications

Occurrence of Influence Tactics

An influence tactic has to have been applied in practice before its effect can be assessed. No stratification in the sampling of organization-system settings is made to ensure that the level of occurrence is the same across all seven tactics. It is conceivable that the occurrence of certain influence tactics is too low in the overall sample to assess their effect. A closer look at the incidence found in both theory and practice reveals that this risk is higher for more coercive tactics. It such a case, it is possible that hypotheses are rejected based on their low incidence rather than their actual lack of effect. The results that can be accepted from this research only apply to hypotheses that are accepted (or in statistical terms: the rejection of the null-hypothesis of no effect). A non-identified effect does not necessarily imply that the influence tactic does not have an effect. A more controlled research setting, like laboratory experiments, could further elicit the effect for influence tactic if none of the hypotheses could be accepted on the basis of the data collected in this research.

Temporal effects of Influence Tactics

The research method that is followed in this dissertation requires influence tactics to first have occurred. A post-hoc, reflective assessment presents some methodological concerns. Asking targets about their perceived influence tactics does present some risk of distortion of the target as apposed to the ‘real’ applied influence tactics. The recollection of influence tactics may be wary or may have been forgotten completely. In addition, the actual effect may attenuate over time. A substantial degree of stability of EP adoption cognitions over time is plausible based on the findings of the second e-ordering case (see Chapter 4). The scores on the EP adoption cognitions are likely to be influence-able to a greater extent in the early phases of awareness, acceptance and usage of the system. Ideally, a target is surveyed when influence tactics and the

formation of EP adoption cognitions have just occurred. This may not be the case with the post-hoc assessment.

Potential sources of bias

Research in an uncontrolled real-life setting may present some sources of bias. The error terms have generally thought to have a random and systematic component. The latter is primary determined by a common method. Common method variance may present a threat to the validity of conclusions as it could have confounding effects. Podsakoff et al. (2003) discusses several sources of common method bias depending on raters (e.g. consistency motif, implicit theories, social desirability, leniency bias, mood), items (e.g. wording, anchors, length), and context (e.g. same time, location, medium). In any given study, any of these factors could play a role, but are especially pertinent in behavioral science where predictor and criterion variables are attained from the same rater (Podsakoff et al., 2003). Some measures are taken to limit common method bias, e.g. using feedback to ensure unambiguous and objective wording and randomizing item order. The different contexts will also contribute to temporal, proximal, psychological separation of respondents. Controlling for method bias would require additional research to facilitate a multi-trait multi-method analysis. This is not performed in this dissertation.

8.4 Conclusion

In the first part of this chapter the findings of the practical and theoretical exploration of influence tactics have been synthesized into a research model with hypotheses for the effect of seven influence tactics on three EP adoption cognitions. The research model and hypothesis are shown in Figure 11 and Table 24.

In the second part of this dissertation, a research design has been developed for the remainder of this dissertation. This includes three parts:

- *Scale development*. A measurement instrument will be developed using theory and previous qualitative research.
- *Data collection*. A sample-frame is selected and a large scale field-survey will be conducted using an online tool.
- *Data analysis*. The research model will be estimated with Structural Equation Modeling (SEM).

In the next Chapter the constructs are operationalized and a measurement instrument is developed to be able to test the hypotheses in Chapter 10.

Chapter 9 Measuring Influence Tactics

9.1 Introduction

In this chapter, a measurement instrument or scale is developed for measuring the previously defined influence tactics[12]. Different perspectives on scale development are combined into one scale development approach, and this approach is used to build an instrument for measuring the use of seven influence tactics. This method is described in section 9.2. An item battery is generated, combined on the basis of inter-rater reliability and initial scales are evaluated with respect to their psychometric properties.

9.2 Method

In the field of purchasing only limited explicit attention has been given to processes of developing a measurement instrument. In the marketing discipline, discussions regarding measurement development are more widespread, and can be traced back to the seminal article of Churchill (1979). Churchill (1979) calls for better measures for marketing constructs, and proposes an eight-step method with an emphasis on obtaining favorable psychometric properties. The Churchill approach has become the dominant paradigm in marketing and has improved scale construction by providing a step-by-step approach for conceptualization and validation. Rossiter (2002) challenged the Churchill approach and proposed a six-step procedure called C-OAR-SE, which is an acronym for construct definition (C), object classification (O), attribute classification (A), rater identification (R), scale formation (S) and enumeration and reporting (E). This approach emphasizes the conceptualization of constructs, thereby addressing a weakness in the Churchill paradigm. Finn & Kayande (2005) support Rossiter's call for more attention for conceptualization and content validity, but criticize the extreme context dependence. While Churchill seems to overemphasize the empirical validation using respondent samples at the cost of conceptual rigor, Rossiter seems to overemphasize the contextual nature.

[12] The scale development in this chapter s based on Reunis, M.R.B. , Van Raaij, E.M (2006) Scale Development for E-Procurement (EP) Adoption Influence Tactics, Proceedings of the 15th IPSERA Conference, San Diego, California, April 6-8.

Following the criticism of Finn & Kayande (2005), the two approaches are balanced for development of a measurement instrument for the influence tactics as latent reflective constructs. Based on two reviews of best practices in operations management (Hensley, 1999) and marketing (Hinkin, 1995) a three-step approach is followed:

1. *Item generation*.
   The generation of items may be the most important part of developing sound measures. Content validity is the main aim of this step, which can be accomplished by a strong guiding theoretical framework and employing a rigorous sorting process that matches items to construct definitions. Both inductive and deductive approaches can be distinguished. Here, a combined approach is suggested.
2. *Scale development*
   Design of pilot study. The aim of this step is to examine the psychometric properties of a new measure. Choosing the specific sample, wording of items, reducing pattern response bias, and scale length are important issues to consider here.
   Scale construction. Factor analysis techniques are used to assess the stability of the factor structure (dimensionality) and provide information that will facilitate the refinement of the new measure. The elimination of poorly loading items is an iterative balancing act between psychometric properties and content validity. In this stage, poor item development practices surface: scales should not be derived post hoc.
   Reliability assessment. In this step, consistency of items within a measure and the stability of the measure over time are assessed.
3. *Scale Evaluation.*
   A new sample is used to evaluate the psychometric properties of the scale: construct validity (discriminant and convergent validity), as well as criterion-related validity.

9.3 Development of a Measurement Instrument

9.3.1 Item Generation

A combined deductive and inductive approach was followed to develop a battery of measurement items. The prime focus of item generation is establishing content validity of the latent constructs. The measures must capture the intended content through the items in the scale. This means that a.) an item battery should be developed

and b.) items should be selected from the item battery to cover the concept yet contain no extraneous content. Regrettably, there is no quantitative or qualitative measure that tests whether the scale adequately captures the specific domain of interest. Expert judgment is therefore of utmost importance in assessing the content validity of a measure.

The *deductive approach* takes a firmly grounded theoretical definition of the concept under scrutiny as a guide for the development of items. Existing classification schemes or typologies from prior research can be used to develop new items or select existing ones from previous research. An in-depth understanding of the investigated phenomenon is required for this approach. Researchers can either derive items from previously defined theoretical concepts or develop conceptual definitions grounded in theory, and then utilize a sample of experts to generate items (e.g. by using a critical incidents technique). Hinkin (1995) refers to the deductive approach as "logical partitioning" or "classification from above." The deductive approach fits more in a Churchill view of scale development.

The *inductive approach* starts from empirical reality instead of established theory and identifies or defines constructs based on what individuals in a specific context say and do, using descriptions, narratives or observations. These constructs are then analyzed with respect to content and clustered into a number of categories. Subsequently, labels and definitions are added based upon the empirical findings. Hinkin (1995) calls the inductive approach “classification from below”. This approach fits more with Rossiter’s C-OAR-SE method.

Item battery generation

The deductive and inductive approaches were combined for item battery generation. A review of existing items served as the deductive input for the item battery. Previous scales were reviewed on item level. Previously used scales for influence tactics were identified in the theoretical review in Chapter 6. A long list of 94 scales was identified. After initial review, 19 scales were deemed relevant for this study (see Appendix H). These were subsequently reviewed more carefully for their relevance and 7 scales remained. Of these 7 scales, 69 items were added to the item battery long list. For the inductive approach of item generation, a content analysis of the empirical inquiry in Chapter 7 was performed. This yielded wording for items for the seven tactics. A total of 35 new items were induced from the empirical data. This results in a total item battery of 104 questions from both previous research and research in this dissertation.

Item selection

After determining an item battery, or long list of potential questions to adequately measure the latent constructs, all items were subjected to a sorting process. This process serves as a pretest, permitting the deletion of items that are deemed to be conceptually inconsistent (Hinkin, 1995). A convenience sample of 19 respondents was used to cluster the 104 items into the seven predefined categories. The clustering is essentially an analytical process that does not require deep knowledge of the phenomena under investigation and can therefore rely on input from MSc / PhD students with good English language skills. The clustering effort provides insight into the relationships of the items with the proposed constructs. Inter-rater reliability was used as a proxy measure for the loading items on constructs. Based on a combination of a.) high inter-rater reliability, b.) conceptual completeness of the construct and c.) expert discussions on content validity, the long-list of 104 items was condensed into a short list of 41 items: 6 items for 6 constructs and 5 for one remaining construct.

The number of items per construct is a delicate balance: more items could contribute towards a more reliable measure; however, increasing survey length could lead to lower response rates or unreliable data as a result of annoyance on the part of the respondent. The amount of five or six items per construct is believed to balance these issues (Hinkin, 1995). Another issue in constructing the short list is the fit with the theoretical concepts. As mentioned before, no strict theoretical definition is used to guide the sorting process, but the sorting process itself contributed towards the conceptual definition. The list of 41 items formed the input for the next step. Table 26 lists the seven influence tactics and summarizes the process of item generation.

Table 26 Item Battery for the Influence Tactics

Influence Tactic	*Abbr.*	*Concept*	*From theory*	*From cases*	*Long list*	*Short list*
Management Request	MR	A manager who asks to use the system or accept his/her ideas / suggestions, states his/her wishes, and/or asks to comply to his/her request to influence the target individual	6	4	10	6
Information Push	IP	A source that provides factual information about characteristics of the system, the workings of systems, its performance, and how to operate it.	9	7	16	6
Persuasive Recommendation	PREC	A source that uses convincing argument and business effects to influence, convert and counter hesitations of the target individual	14	5	19	6
Collaboration	COLL	Joint effort with an expert or manager to determine system suitability and specification to influence the target individual	5	7	12	6
Legitimate Pressure	LEGP	A manager who refers to policies, rules, procedures, obligation, or authority to influence the target individual	13	3	16	6
Reward	REW	A manager who offers instrumental rewards and favor to influence the target individual	12	4	16	6
Appraisal & Control	A&C	A manager who monitors and assesses the performance of usage by target individual	10	5	15	5

The item generation stage is probably the most important step in developing quality measures in terms of capturing the intended underlying concept. The combined theoretical and empirical item generation process should prevent important aspects of a construct from being omitted. It should assure that the representation of the 'real' phenomenon is captured. The rigorous sorting process and expert discussions should prevent redundancy and lay the basis for the factor structure. In the next step, the expectations of the properties of the scales are evaluated empirically.

9.3.2 Scale Development

At this point, the set of 41 items is ready to be administered to a sample so that the psychometric properties can be assessed. Two aspects are distinguished: *construct validity*, which is an issue of operationalization or measurement *between* constructs, and *reliability* which is an issue *within* a construct (Straub et al., 2004). Different quantitative heuristics or techniques are available to assess aspects of construct validity and reliability. For construct validity the focus lies on the fit of the measures with each other: the items should converge on a construct (convergent validity) but the constructs should diverge from each other (discriminant validity). Here, an exploratory factor analysis is performed on a data set. In order to assess reliability, several traditional methods exist to establish the accuracy and stability of the measures. Here, the internal consistency is calculated and other techniques are briefly discussed.

Study design

A survey instrument was developed and administered to purchasing professionals in order to collect data on the 41 items. The wording of the items was discussed with three experts, which led to some minor revisions of items. The questions were all of the form: "I experienced the following influence tactics". The scales used for all items were 7-point Likert-type scales, ranging from "totally disagree" to "totally agree".

The survey was administered to participants in an e-procurement seminar for practitioners. This sampling frame was selected because it is representative for the population for which the scale is developed. The survey asked respondents to report on their experiences with influence tactics in a situation where they have adopted a new technology. Respondents were requested to think of a situation in which they were an intended user of a new information technology that was introduced in their organization. The survey consisted of three parts. The 41 items were divided over the first two parts. In the first part, the respondents were asked to report on the perceived use of 'soft' influence tactics (PREC, MR, IP, COLL) in their organizations, followed by 'harder' tactics (LEGP, REW, A&C) in the second part of the questionnaire. The third part of the questionnaire contained questions on the background of the respondents. Both paper-based and online versions were administered. In the online version, items were presented in random order so as to prevent response pattern bias.

Since multivariate techniques are susceptible to sample size effects, larger sample sizes increase the confidence in assessing construct validity and reliability. Several item-to-sample ratio's have been proposed. However, as long as there is sufficient inter-correlation, a smaller sample size can be used. A total of 54 responses were collected, just above the absolute minimum for factor analysis suggested by Hair et al. (1998). During the conference, five assistants administered the survey using laptops. When all five laptops were being used by respondents, the paper-based version of the questionnaire was provided. There were no significant differences in responses between the paper based, English version (n=26) and online, Dutch version (n=28) of the questionnaire.

Scale construction

As mentioned before, exploratory factor analysis was used to identify latent constructs. Before this could be carried out, the data was analyzed for missing data, outliers and the prerequisites for multivariate analysis. Four cases were omitted from data analysis because of high proportions of missing data, leaving a total of 50 observations. Overall missing data was limited (<10%) and no apparent distribution of

missing data across cases (observations) could be identified. The distribution of missing data by variables (items) showed more missing variables in the second part of the survey, but no data imputations were deemed necessary. In addition, univariate, bi-variate and multivariate outliers were analyzed, leading to the omission of another observation. Finally, normality, homoscedasticity and linearity were assessed. These were slightly violated, which in itself is not harmful for factor analysis as long as sufficient inter-correlation is present in the sample.

Inspection of the data matrix showed sufficient correlations (> 0,30) between variables to justify the application of factor analysis. In addition, the Bartlett's Test of Sphericity –testing the null hypothesis that the correlation matrix is an identity matrix (all of the diagonal elements are 1 and all off diagonal elements are 0) – is rejected (sign. 0,0005). Correlation among variables is therefore present. On the other hand, the degree of inter-correlation and the appropriateness of factor analysis using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) are troubling. The MSA is a measure that varies between 0 and 1, where 1 describes a perfect prediction without error by the other variables. A value of 0,5 is a suggested minimum (Hair et al., 1998). Initial analysis shows a low MSA of 0,379.

Variables with a low individual MSA score and high partial correlations (based on the anti-image correlation matrix) are excluded from the analysis. Partial correlations of variables should be small as variables can be explained by the factors: if the partial correlation is high there is no ‘true’ underlying factor and factor analysis is inappropriate. Individual variables with an unacceptable MSA were excluded, resulting in a final set of 21 variables. Unfortunately, this process of item purification led to the deletion of all 5 items measuring Appraisal & Control. The overall MSA with this set of variables is 0,643, which is well above the qualifying threshold of 0,5. An additional advantage of the reduced set of variables is the improvement in the sample-to-variable ratio, which contributes towards improved interpretation of findings in this relatively small sample.

A *common factor analysis* approach is selected a priori for the data analysis. There are two types of factor analysis: common factor analysis and (principal) component analysis. Both are popular data reduction techniques and if samples are large or communalities are high, both approaches show comparable results. Their overall goals, however, differ: component analysis primarily serves the purpose of data summarization, whereas common factor analysis focuses on understanding the structure. The purpose of common factor analysis is more ‘theoretical’ than ‘psychometric’. Component analysis uses common, specific and error variance, while

common factor analysis only uses the common variance. The latter approach uses estimated communalities of the variance of the variables. When prior knowledge suggests that specific and error variance is low, component analysis is appropriate (Hair et al., 1998). This knowledge is not available in this exploratory factor analysis. Moreover, common factor analysis estimates underlying constructs that cannot be measured directly and thereby provides a better basis for future use in SEM. *Principal Axis Factoring* is selected as extraction method. The extraction method is the algorithm to identify the loadings. Principal axis factoring is generally used for common factor analysis.

A visual assessment of the scree plot, assessment of eigenvalues and preliminary notions of the data structure all point towards the extraction of six factors. Cumulative variance extracted is 74%, which is above the suggested minimum of 60% for social science (Hair et al., 1998). *Varimax* rotation was selected as rotation method. Rotation helps simplify the factor pattern in order to achieve more meaningful theoretical factor structures by rotating the (reference) axis. Rotation also helps to redistribute the variance from earlier to later factors. Rotation techniques fall into two categories: orthogonal and oblique. With orthogonal rotation the extracted factors are uncorrelated by definition and in oblique rotation this property is relaxed and the factors are allowed to be correlated. The latter is more flexible and arguably closer to social reality. However, oblique rotations can become specific in a sample with a low case-to-variable ratio. For the purpose of identifying latent independent constructs correlation it is desirable that the independence of factors is preserved. Therefore an orthogonal rotation technique is chosen. There are several different orthogonal rotation techniques, e.g. varimax (attempts to achieve loadings of ones and zeros in the columns of the factor matrix), quartimax (attempts to achieve loadings of ones and zeros in the rows of the component matrix), equimax (combines the objectives of both varimax and quartimax rotations). Varimax is chosen due to the clearer separation of factors. The rotated factor solution shows a *simple structure* with 21 variables loading on 6 factors.

Interpretation of the factor matrix is based on an assessment of factor loadings. An important distinction for considering factor loadings is the difference between practical and statistical significance. The larger the sample or the number of variables, the smaller the loading can be to be considered significant. Here, a small sample is used, so results should be interpreted with caution. Hair et al. (1998) show that in a sample of 50, a factor loading of 0,75 is required for significance of 0,05 (and power of 0,80). These are quite 2003). Hair et al. (1998) suggest guidelines for practical significance based on the notion that squared loadings are the amount of variance of

the variable accounted for by the factor. Loadings of ±0,30 are considered to be the minimal level; loadings of ±0,40 are important and loadings of ±0,50 and larger are considered to be practically significant. The guidelines are based on a minimum sample of 100. Therefore, a more conservative threshold of ±0,40 was used here. All loadings above ±0,40 are shown in Table 27.

Table 27 Rotated Factor Matrix

	Factor					
	1	*2*	*3*	*4*	*5*	*6*
REW2	,799**					
REW3	,744*					
REW4	,711*					
REW5	,831**					
REW6	,745*					
LEGP2		,833**				
LEGP3		,797**				
LEGP5		,783**				
LEGP6		,685*				
IP2			,887**			
IP4			,654*			
IP5			,606*			
COLL1				,534*		
COLL2				,883**		
COLL6				,597*		
PREC3					,405*	
PREC5					,689*	
PREC6					,839**	
MR2						,768**
MR3						,678*
MR4						,627*

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 7 iterations. * Item is considered practically relevant, ** item is considered practically relevant and statistically significant (p<0,05)

Reliability assessment

Reliability is a prerequisite for achieving valid measurements. The assessment should therefore be an integral part of scale construction and assessed iteratively for different factor structures. Reliability refers to the internal consistency of items in a construct and the stability of the items in construct over time. The most commonly accepted internal consistency measure is Cronbach's Alpha. Traditional stability measures include split-halves, test-retest and inter-rater reliability. Here, only the internal consistency reliabilities are calculated. The generally accepted cut-off rate for Cronbach's Alphas in social science research is 0,70 (Nunnally, 1978). In exploratory research, however, Alphas as low as 0,50 have been deemed acceptable (Hinkin, 1998). One factor has a Cronbach Alpha of 0,688, while the other five range from

0,730 to 0,897. Several scholars tend to delete items from a construct to increase the coefficient Alpha, following the 'purification' guidelines in the Churchill approach. This practice, however, can jeopardize content validity, as will be discussed in step 3 below.

9.3.3 Scale Evaluation

The previous two steps were all about the development of a new scale. In step 3, the scale is tested using a new sample. A new sample is recommended so as to prevent sample specific findings of the factor structure. Naturally, iteration can take place between the evaluation and development steps. Straub et al. (2004) describe validation guidelines for scales and make a distinction between techniques for a) content validity, b) construct validity and c) reliability. Rossiter does not explicitly mention the necessity of an additional sample but stresses the a-priori specification and focus on content validity. The Churchill approach, on the other hand, explicitly recommends a second data set to assess reliability, i.e. the stability of the measure across different measurements and preferably also different methods. In addition, construct validity should be reassessed. Churchill advocates the multi-trait multi-method technique to combine the aforementioned objectives. Confirmatory factor analysis techniques can also be used to test discriminant and convergence validity. Hinkin (1995) advocates other tests than purely 'within-measure' factor analysis and stresses the importance of demonstrating criterion-related validity (predictive or nomological validity). This can be done by confirming theoretically hypothesized relationships with regression analysis or structural equation modeling. Several additional validations techniques exist, like assessing the relationship between a scale and surrogate measures (criterion related validity).

A careful reanalysis of content validity is deemed necessary as the data analysis resulted in the omission of nearly half of the items from the scale (20 out of 41). In the classic Churchill approach, the next phase would be gathering a new sample to test reliability and construct validity. In this case, however, a reassessment of content validity is added. The remaining scale could be damaged by the 'cleansing' of the scale on the basis of the psychometric properties. For each of the factors, the items that 'survived' the cleansing are evaluated if they collectively still adequately represent the original influence tactic.

1. *Reward*
   The content validity of the items used to measure the construct 'reward' is satisfactory. The original conceptualization of reward is still fully reflected in the variables that load high on the first factor. Only one item was dropped. The factor analysis indicates that the following elements are part of the same underlying unidimensional construct: awarding (prize), rewarding and doing a favor. The construct of reward still has a predominantly instrumental nature; however, 'doing a favor' and 'exchange', which are still included, could also have a non-instrumental connotation of the scale.

2. *Legitimate pressure*
   The content validity of the items used to measure the construct 'legitimate pressure' is satisfactory. The original conceptualization is still largely reflected in the variables that load high on the second factor. Two items were dropped. Factor analysis indicates that the following elements of legitimate pressure are part of the same underlying unidimensional construct: using policies/rules/procedures and using authority. The fist seems to be a stronger part of the latent construct. Items that were dropped refer more explicitly to the use of authority and 'pushing' compliance.

3. *Information Push*
   The content validity of the items used to measure the construct 'information push' raises some concerns as it only partly covers the conceptual definition. The original conceptualization is only partly reflected in the variables that load high on the third factor. Three items were dropped that deal with the characteristics and performance of the system. Factor analysis indicates that the following elements of information push are part of the same underlying unidimensional construct: options of the system and ways to operate the system. The first could implicitly refer to information to form a notion of the system and its performance, however, the three item construct shows a stronger emphasis on information to support learning how to operate the system. A theoretical basis exists for factual information supporting both the assessment of the utilitarian aspects as well as the usage / learning aspects (e.g. two types of rational persuasion as defined by Yukl). Nomological validity can be jeopardized with a minimal element of performance related information. As a remedy, it is suggested to add an item focusing on the system characteristics (IP1) in order to balance the content of the construct.

4. *Collaboration*

   The content validity of the items used to measure the construct collaboration is satisfactory, although it is more specified: the source is limited to an expert and the application domain is limited to the working context and/or purchasing situation. The original conceptualization is partly reflected in the variables that load high on the fourth factor. Three items were dropped that deal with identifying opportunities, expert help and a manager searching for input. Seeking an opinion could be seen as part of a different construct; the other items only repeat and generalize the items that are retained. Factor analysis indicates that the following elements of collaboration are part of the same underlying unidimensional construct: jointly determining the suitability, specification, and use. These elements reflect three consecutive phases. The emphasis on the purchasing context is not a problem as generalizing outside the purchasing domain is not an explicit goal for this research. Reflection on these findings leads to the redefinition of the concept as collaboration with expert, instead of augmenting the scale to include a managerial role.

5. *Persuasive Recommendation*

   The content validity of the items used to measure the construct persuasive recommendation is somewhat troubling. The original conceptualization is only partly reflected in the variables that load high on the fifth factor. The element of persuasion by converting opinions and countering hesitations was dropped as a result of the factor analysis. Three items were dropped that deal with converting, persuasion with arguments, benefits for the 'big picture' and countering hesitations. The role of information (argumentation) was already a confusing issue for raters in the clustering effort (related to the construct information push): this led to adding 'factual' in IP and leaving the possibility for normative information in PREC. After factor analysis the emphasis on inspirational persuasion, i.e. normative information, is even stronger. Factor analysis indicates that the following elements of persuasive recommendation are still part of the same underlying unidimensional construct: recommendation for business benefit and inspiring. The emphasis (in terms of loadings) is on the latter. The implication of the factor loadings is that the actual recommendation part for personal benefit is diminished. To rectify this issue the conceptual definition is altered.

   The reliability of the 3 item-scale for persuasive recommendation is below the recommended 0,70 (Cronbach α of 0,688). Omission of item PREC3, however, would increase the reliability of the scale to a satisfactory level (Cronbach α of 0,779). This would further increase the shift of the underlying

concept from recommendation to a part of persuasion. The construct thereby comes close to the construct inspirational appeal (Yukl, 2005). The initial conceptualization is better preserved with a three item construct and therefore preferred.

6. *Managerial Request*
   The content validity of the items used to measure the construct managerial request is satisfactory. The original conceptualization is fully reflected in the variables that load high on the sixth factor. Three elements were dropped that deal with asking, requesting cooperation, and stating wishes. Although the latter could be seen as distinctive aspect, the initial conceptualization of a request remains intact. Factor analysis indicates that the following elements of managerial request are still part of the same underlying unidimensional construct: requesting compliance, requesting acceptance of ideas and asking politely. The emphasis (in terms of loadings) is on the first element.

7. *Appraisal & Control*
   The A&C construct was not confirmed in the exploratory factor analysis. This implies that the items initially expected to form the A&C construct did not load on one dimension in the data sample. The conceptual definition in relation toward the other influence tactics should therefore be seriously revised to be considered for inclusion in a next round of data collection. Based on the previous inter-rater reliability in step 1, it is suggested to limit the construct towards control of a target's behavior. Only two items (A&C1 and A&C3) are then included.

Balancing

Using empirical data to asses the quality of scales presents some caveats. A clean structure in the factor loading does not guarantee that the content validity, as determined ex ante, is still intact. It is important not to take psychometric findings and factor structure as they are, but to review if the factors still represent the indented concept. "Simply because items load on the same factor does not imply that they necessarily measure the same theoretical construct" (Nunnally, 1978). A comparable logic also holds for the assessment of reliability: an acceptable internal consistency does not guarantee that the 'right' concept is measured, only that it is measured accurately. The discussion of the content analysis showed that four constructs remain intact (REW, LEGP, COLL, MR), that the PREC construct is slightly redefined and additional items are proposed for IP and A&C. The discussion of content validity leads to a set of 24 items.

The resulting 24 items are used in this dissertation as the measurement instrument or scale fore the seven underlying influence tactics. The 24-item scale is shown in Table 28.

Table 28 Measurement Instrument for Influence Tactics

		I experienced…
1	PREC3	an expert who made it clear that by following his/her recommendation(s), our business would benefit
2	PREC5	someone who inspired me to use the system
3	PREC6	a source who described the workings of the system with enthusiasm and conviction
4	MR2	a manager who requested compliance with his/her suggestion(s)
5	MR3	a manager who requested to accept his/her ideas on system usage
6	MR4	a manager who asked me politely to use the system
7	IP1	someone who explained the characteristics of the system
8	IP2	someone who presented information related to the various options of the system
9	IP4	a source who demonstrated 'tips & tricks' for using the system
10	IP5	an expert who gave me instructions on how to operate the system
11	Coll1	collaboration with an expert to apply the system in a new purchasing process
12	Coll2	a joint effort with an expert to determine the suitability of the system in my working context
13	Coll6	joint specification of the system with an expert for my specific purchasing situation
14	Rew2	a manager who offered an award or prize for best application of the system
15	Rew3	a manager who implied that those who complied with him / her would be rewarded
16	Rew4	a manager who offered to give me something I want in exchange for doing what he/she wants
17	Rew5	a manager who emphasized what s/he would offer in return for my cooperation in adopting the system
18	Rew6	a manager who indicated that s/he will do a favor in return for helping him/her.
19	Leg. P2	a manager who used sections of company rules and policies as a "tool" to get me to agree to his / her demand(s)
20	Leg. P3	a source who "reminded me" of our obligations stipulated in our company's rules and procedures
21	Leg. P5	a manager who made a point to refer to company policies when attempting to influence my actions
22	Leg. P6	a manager who used his/her authority to ensure that I accomplish my duties
23	A&C1	a manager who assessed my results of using the system
24	A&C3	a manager who monitored my system usage

Preferably, the revised measurement instrument should be tested with a confirmatory factor analysis (CFA) with a new sample. Before using the measurement instrument in the next chapter to establish the effect of influence tactics on EP adoption cognitions, the factor structure and psychometric properties are analyzed. This should provide confirmation of the validity and reliability of the measurement instrument.

9.4 Conclusion

In this chapter, a three-step approach was proposed for scale development, balancing Churchill's and Rossiter's view. Rossiters' C-OAR-SE procedure relies primarily on content validity, whereas Churchill focuses on construct validity and its assessment of psychometric properties. Here, the focus on content and construct validity is balanced. The three steps are: 1. item generation, 2. scale development, scale construction and reliability assessment, and 3. scale evaluation.

This chapter provides an application of the proposed method for the development of a scale for seven influence tactics. First of all, items are generated from both existing research and interviews on influence tactics using a theoretical framework as a guiding framework. The items are submitted to a rigorous sorting process using 19 raters, condensing the long list of 104 to 41 items. A first data set (N=54) was collected during an EP seminar and an exploratory factor analysis was performed. This resulted in a set of 21 items representing 6 underlying factors. Before the scale could be evaluated with a second data set, content validity has been reassessed.

This resulted in a proposed 24-item measurement instrument for 7 influence tactics. The 24-item measurement instrument is shown in Table 28.

Chapter 10 Empirical Results

10.1 Introduction

In this chapter the model of influence tactics and their effect on EP adoption cognitions is tested. In the next section a brief description is provided on the method of hypothesis testing by means of PLS. Subsequently, section 10.3 shows the data collection, followed by the data analysis in section 10.4. This chapter ends with a discussion of the findings in section 10.5 and conclusions in section 10.6.

10.2 Method

As mentioned previously in Chapter 8, PLS is a form of variance based SEM in which multiple interrelated dependence relationships between latent constructs can be estimated (Chin, 1995). PLS, like covariance based SEM, is based on two models: the measurement model and the structural model. Both models are explicitly defined before the analyses. The measurement model describes which items load onto a certain factor or the way in which observed indicators make up the unobserved latent constructs. The measurement model uses factor analysis to assess the degree that the observed variables load onto their latent constructs. The measurement model shows the correspondence between manifest or observed variables from the survey and the unobserved latent constructs. The structural model describes the proposed 'paths' or linear relationships between latent constructs.

Hair et al. (1998) suggest the following seven steps for SEM

1. Develop a theoretically based model
2. Construct a path diagram
3. Convert the path diagram in structural equations
4. Choose the input matrix
5. Assess the identification of the model
6. Evaluate the model estimates and goodness-of-fit
7. Model interpretations

Each of these steps is applied in the following way in this research:

1) Develop a theoretically based model

   The role of theory to support the specification of the dependence relationship is of great importance as SEM is in essence a confirmatory

method. While it could be used for exploratory purposes, the modeling technique is suitable for testing a-priori specified relationships. In addition, SEM assumes causal relationships. Theoretical justification of these relationships is important to ensure meaningful, non-sample-specific findings and causality. The theoretical model and its underpinnings have been discussed in Chapter 8.

2) Construct a path diagram

   A path diagram is graphical representation of the causal relationships in a structural model. Here, a rectangle is used to represent constructs. The exogenous (explanatory) constructs are the influence tactics and the endogenous (explained) constructs are the EP adoption cognitions. Causal relationships are depicted with arrows. Inclusion as well as omission of such causal relationships is based on the hypothesis development in Chapter 8.

3) Convert the path diagram

   PLS software does not require translation of the path diagram in structural equations to specify the structural model. The measurement model, referring to the ways indicators are used to measure latent constructs should be specified. The specification of the measurement model has a more confirmatory nature than the factor analysis as the constructs and their indicators are specified a-priori. To ensure the reliability of the measurement instrument the use of previously validated scales is advocated. The 24-item measurement instrument developed in Chapter 9 is used to measure the influence tactics.

4) Choose the input matrix

   PLS uses direct data input, rather than the variance-covariance matrix in covariance based SEM, like LISREL. Just like in any multivariate analytical technique, the input data has effects on the outcomes of the analysis. In particular, deviation of multivariate normality in the input data can have a great effect on the outcome of covariance based SEM. The sensitivity to the input data in PLS, however, is much less than in the covariance based SEM. The input data is normalized, i.e. centered around zero and the standard deviation set to 1, by PLS. Still, screening of the input data remains important. First of all, outliers should be detected. Secondly, missing values should be treated as they impair the ability to estimate the model. List or pair wise deletion or imputation should be considered. The aforementioned steps in preparing the data are performed in section 10.4.1.

5) Assess the identification of the model

When the measurement model and structural model are specified and the input data is screened, the models can be estimated in PLS. This includes a direct estimation of the models using Ordinary Least Squares yielding loadings for the indicators for the latent constructs and path coefficients for the relationships between latent constructs. The direct estimation is followed by an indirect estimation to establish the significance of the path coefficients. In PLS, bootstrapping is used. This is a method in which the model is estimated with multiple samples drawn from the original sample. The results from the model estimation are shown in section 10.4.2.

6) Evaluate the model estimates and goodness-of-fit

The prime objective of using PLS for this research is analyzing the magnitude and significance of the estimated path coefficients. The bootstrapping results in t-values for each of the coefficients, which can be tested for their statistical one-tailed significance at the traditional 0,05 level or smaller (e.g. 0,01 or 0,001). PLS does not have an overall measure for the model fit. The objective of PLS is maximizing the explained variance rather than minimizing the difference between the observed and reproduced variance matrix like in covariance based SEM. The relative fit of the model can be assessed by reviewing the R^2 of the endogenous constructs (Hulland, 1999). The objective for this dissertation is, however, not to gain a high explanation of the endogenous variables, but rather to establish an effect between exogenous and endogenous variables. The principal measure for this dissertation is therefore the significance of the path coefficients. These measures are reviewed in section 10.4.2. In addition, the robustness of the relationships is analyzed by estimating the model for sub-samples, suppressor effects and higher-order structure in section 10.4.3.

7) Model interpretations

The PLS is only used to confirm previously specified hypotheses. No model modification or re-specification is considered due to data-driven considerations, except for trimming the model by excluding non significant findings. The findings are discussed in section 10.4.

10.3 Data Collection

In this section, the data collection is described. In 10.3.1 the procedure and outcome of collecting six samples is described. This is followed by the descriptive statistics of the six samples in 10.3.2.

10.3.1 Six Samples

Selection of organizations

Organizations were selected on the basis of the criteria of being a large Dutch organization in which an EP system has recently been implemented. In addition, a sufficient population of direct users of the system should be available to collect a sample. A listing of 34 senior purchasing executives for large Dutch organizations was provided by SIGB. All senior executives were asked to support the administration of a survey within their organization. Nine organizations were interested. One organization failed the criteria. Two organizations declined participation in a later stage due to other priorities. A total of six samples were collected.

Company I *Transportation Company – E-Ordering*

The first sample was drawn from a rail transportation company. The company has five divisions and a focus of its operations in The Netherlands. The company was previously state-owned. In 2006 the company had approximately 24.000 employees, made a turnover of € 3,8 billion and a net profit of € 197 million

The survey was administered amongst users of a system to support the operational requisitioning, requisition approval and creation of a purchase order, receipt of goods and services, and invoice matching and administration. The system facilitated catalogue and non-catalogue requisitioning.

Company II *Transportation Company- E-Sourcing*

The second sample was drawn from an airline operator. The company has three divisions and worldwide operations servicing 22 million passengers and over 600.000 tons of cargo in 2006. In 2006 the company had approximately 30.000 employees, made a turnover of € 7,2 billion and a net profit of € 276 million

The survey was administered amongst users of a system to support electronic supplier surveys, RFI, RFP and competitive bidding events, i.e. e-auctions.

Company III *Construction Company – E-Sourcing*

The third sample was drawn from a construction company. The company has two major divisions and operations primarily in the Netherlands. In 2006 the company had approximately 4.000 employees, made a turnover of € 1,3 billion and a net profit of € 44 million.

The survey was administered amongst users of a system to support electronic supplier surveys, RFI and RFP. In addition, the system served as a repository for contracts.

Company IV *Electronics Company – E-Sourcing*

The fourth sample was drawn from an electronics company. The company has four divisions and worldwide operations. In 2006 the company had approximately 125.000 employees, made a turnover of € 27,0 billion and a net profit of € 5,4 billion.

The survey was administered amongst users of a system to support electronic supplier surveys, RFI, RFP and e-auctions.

Company V *Energy Company – E-Ordering*

The fifth sample was drawn from an energy and petrochemical company. The company has five divisions and worldwide operations. In 2006 the company had approximately 108.000 employees, made a turnover of € 244 billion and a net profit of € 20 billion[13].

The survey was administered amongst users of a system to support the operational requisitioning, service entry, requisition and/or service approval, creation of a purchase order, invoice matching and administration.

Company VI *Food Company – E-Sourcing*

The sixth sample was drawn from a health, personal care and food company. The company has 18 divisions and worldwide operations with over 400 brands. In 2005 the company had approximately 230.000 employees, made a turnover of € 29,7 billion and a net profit of € 5,0 billion.

The survey was administered amongst users of a system to support electronic supplier surveys, RFI, RFP and e-auctions.

[13] At an exchange rate 1 Euro = 1,30 Dollar

Data collection procedure

The core of the survey contains the 24-item measurement instrument from Chapter 9 for the influence tactics and the original 17 TAM items for the EP adoption cognitions. TAM and influence tactic items were separated and randomly mixed for each respondent to discourage hypotheses guessing. The complete survey was checked and approved by a company representative. In addition, the invitation mail and procedure for administrating the survey was agreed upon. A company (purchasing) executives was asked to sign the mail invitation and to initiate preparatory communication. In addition, an incentive prize was made available in three of the samples. Confidentiality was promised to all survey participants.

Company I *Transportation Company – E-Ordering*

A list of e-mail addresses of users was compiled and supplied by a company representative. This list contained a total of 1037 people who have a direct user role in the system. On March 10th 2006 an announcement was sent to the complete mailing list. On March 13th 2006 an invitation mail signed by company purchasing executives was sent to the complete mailing list. On April 3rd 2006 a reminder was sent those who had not previously reacted. The survey was closed on April 20th 2006.

Company II *Transportation Company- E-Sourcing*

A list of e-mail addresses of users was complied and supplied by a company representative. This list contained a total of 110 people who have a direct user role in the system. On May 8th 2006 an announcement was mailed, followed by an invitation mail signed by company purchasing executives on May 11th 2006. On May 25h 2006 a reminder was sent those who had not previously reacted. The survey was closed on June 1st 2007.

Company III *Construction Company – E-Sourcing*

A list of e-mail addresses of users was compiled and supplied by a company representative. This list contained a total of 559 people who have a direct user role in the system. On January 29th 2007 an invitation signed by company purchasing executives was sent by mail to the complete mailing list. On February 6th 2007 a reminder was sent those who had not previously reacted. The survey was closed on March 12th 2007. To persuade people to respond to the survey an incentive prize was promised.

Company IV *Electronics Company – E-Sourcing*

In this company, no direct mailing was approved. As an alternative, a post was made on the corporate intranet site with an invitation and link to participate in the survey. A potential user population of approximately 800 people could have seen the link on the intranet. The post was placed in November 2006 and stayed on the intranet site till the end of January 2007.

Company V *Energy Company – E-Ordering*

A list of e-mail addresses of users was compiled and supplied by a company representative. This list contained a total of 382 people who have a direct user role in the system. On February 5th 2007 an invitation signed by company purchasing executives was sent by mail to the complete mailing list. On February 19th 2007 a reminder was sent those who had not previously reacted. The survey was closed on February 26th 2007. To persuade people to respond to the survey an incentive prize was promised.

Company VI *Food Company – E-Sourcing*

A list of e-mail addresses of users was compiled and supplied by a company representative. This list contained a total of 154 people who have a direct user role in the system. On January 22nd 2007 an invitation signed company purchasing executives was sent by mail to the complete mailing list. On February 6th 2007 a reminder was sent those who had not previously reacted. The survey was closed on February 26th 2007. To persuade people to respond to the survey an incentive prize was promised.

In total, 2254 mail invitations were sent. 1920 of these invitations were received by potential respondents. A total of 733 people responded to the survey, leading to an initial response rate of 35%. The surveys were filled in by various different user roles. For instance, for an e-ordering system this could include people who generate requisitions or service entries, approve these, create purchase orders, match invoices, or use reporting functions. As mentioned in Chapter 2, only the responses on the EP adoption cognitions and influence tactics for direct user roles are of relevance for this research. For e-ordering these are the people placing orders and for e-sourcing these are the people running sourcing events. These direct users are filtered from the total response, leaving a total of 446 respondents, 237 e-ordering and 209 e-sourcing direct users. The direct user response rate compared to the amount that received the invitation is 21%. The breakdown of the response rates across the six samples is shown in Table 29.

Table 29 Response Rate across the Samples

	I	II	III	IV	V	VI	Grand Total
Sent	1049	110	559	n.a.	382	154	2254
Received	967	110	540	n.a.	353	137	2107
Declined	45		3	n.a.	6	4	58
Responded	337	70	131	50	86	59	733
Response Rate	35%	64%	24%	n.a.	24%	43%	35%
Direct User Response	151	27	122	43	86	17	446
Direct User Response Rate	16%	25%	23%	n.a.	24%	12%	21%

The 446 responses from direct users are used in the next section. First the descriptive statistics of the data are shown. Subsequently, the data is prepared and used for hypothesis testing using PLS.

10.3.2 Descriptive Statistics

Characteristics of the respondents

The 446 respondents of the six samples show substantial distribution across:

- Frequency. Nearly half of the direct user respondents use the system more than once a week (47%). Non users make up a relatively small proportion of the total sample, but are represented substantially in the first sample (37%). Frequent users are strongly represented in sample 5 (71%).
- Experience. Nearly all respondents indicate that they have some level of experience with the system (94%). The majority of the respondents have a low experience. The experience distribution shows comparable deviation across the six samples.
- Gender. The total sample includes more than twice as many male than female respondents. The high representation of male respondents is particularly pronounced in sample 3 (70% male)
- Education. The majority of the respondents have BSc (HBO) education. The e-ordering samples (1 & 5) show more lower educated respondents than the e-sourcing samples. This corresponds with the expected user profile of the systems.
- Age. The mean age in the total sample is around 40. Sample 4 shows the youngest respondents.

Table 30 shows the distribution of respondents for each sample.

Table 30 Characteristics of the Respondents across the Samples

	1		*2*		*3*		*4*		*5*		*6*		*Total*	
	N=151		*N=27*		*N=122*		*N=43*		*N=86*		*N=17*		*N=446*	
Usage Frequency														
No	56	37%	2	7%	2	2%	2	5%	2	2%	1	6%	65	15%
< once a week	63	42%	9	33%	37	30%	23	53%	22	26%	15	88%	169	38%
≥ once a week	31	21%	16	59%	83	68%	16	37%	61	71%	1	6%	208	47%
Missing data	1	1%	0	0%	0	0%	2	5%	1	1%		0%	4	1%
Experience														
None	4	3%	0	0%	1	1%	1	2%	17	20%	3	18%	26	6%
Low	66	44%	15	56%	63	52%	22	51%	43	50%	9	53%	218	49%
High	49	32%	12	44%	27	22%	19	44%	21	24%	4	24%	132	30%
Missing data	32	21%		0%	31	25%	1	2%	5	6%	1	6%	70	16%
Gender														
Female	39	26%	11	41%	6	5%	4	9%	18	21%	5	29%	83	19%
Male	79	52%	16	59%	85	70%	22	51%	32	37%	9	53%	243	54%
Missing data	33	22%		0%	31	25%	17	40%	36	42%	3	18%	120	27%
Education														
High School / Professional	41	27%	1	4%	23	19%	6	14%	22	26%	2	12%	95	21%
BSc	64	42%	21	78%	59	48%	10	23%	20	23%	2	12%	176	39%
MSc / PhD	13	9%	5	19%	9	7%	10	23%	8	9%	11	65%	56	13%
Missing data	33	22%	0	0%	31	25%	17	40%	36	42%	2	12%	119	27%
Age														
Below 40	39	26%	10	37%	54	44%	18	42%	17	20%	8	47%	146	33%
40 or above	80	53%	17	63%	37	30%	8	19%	33	38%	7	41%	182	41%
Missing data	32	21%		0%	31	25%	17	40%	36	42%	2	12%	118	26%

Experience self-reported by the respondents on an 8-point scale, where 0 is no experience, 1 is low, and 8 is high. The low and high category are the clustered responses from respectively 1 till 4 and 5 till 8.

Response on the model variables

The average responses on the EP adoption cognitions are the highest for BI, followed by SN, PEOU and finally PU. The average score for BI is the highest in sample 4 and the lowest in sample 6. The average score for PU is the highest in sample 4, and 5 and the lowest in 1. The average score for PEOU is the highest in sample 3 and the lowest in sample 2. The average score for SN is the highest in sample 4 and the lowest in sample 2. The distribution of the average and standard deviation of the scores of the EP adoption cognitions across the samples is shown in Table 31.

Table 31 **Responses on the EP Adoption Cognitions across the Samples**

EP Adoption Cognitions		*1*	*2*	*3*	*4*	*5*	*6*	*Total*
BI	Average	5,23	5,62	5,59	6,39	6,30	4,86	5,61
	S.D.	1,63	1,50	1,52	1,31	1,17	2,25	1,59
PU	Average	3,61	3,84	4,42	4,47	4,47	3,73	4,08
	S.D.	1,34	1,43	1,18	1,27	1,65	1,54	1,41
PEOU	Average	3,73	3,55	4,51	4,31	4,41	3,68	4,11
	S.D.	1,19	1,01	1,15	1,27	1,49	1,22	1,28
SN	Average	4,37	3,13	4,61	5,03	4,45	4,54	4,44
	S.D.	1,08	1,18	1,00	1,04	1,09	0,96	1,11

The averages and standard deviations for each EP adoption cognitions are calculated on a summated score of the items.

The average responses on the influence tactics are the highest for MR, followed by IP, PREC, COLL, AC, LEGP, and finally REW. The average score for MR, IP, PREC, and COLL is the highest in sample 4 and the lowest in sample 1. The average score for AC is the highest in sample 2 and the lowest in sample 1. The average score for LEGP is the highest in sample 2 and the lowest in sample 1. The average score for REW is the highest in sample 2 and substantially lower in all other sample. Sample 1 showed the lowest average scores on all influence tactics and sample 4 the highest. The distribution of the average and standard deviation of the scores of the influence tactics across the samples is shown in Table 32.

Table 32 **Responses on Influence Tactics across the Samples**

Influence Tactics		*1*	*2*	*3*	*4*	*5*	*6*	*Total*
PREC	Average	2,85	3,82	3,61	4,38	3,82	3,79	3,43
	S.D.	1,21	0,97	1,16	1,24	1,22	1,47	1,29
MR	Average	3,31	4,02	3,61	4,64	3,86	4,21	3,66
	S.D.	1,46	0,95	1,24	1,17	1,23	1,68	1,37
IP	Average	3,29	3,37	3,41	4,54	3,74	3,82	3,52
	S.D.	1,30	1,10	1,32	1,36	1,40	1,72	1,37
COLL	Average	2,60	3,56	2,93	4,44	3,48	3,74	3,08
	S.D.	1,37	1,12	1,22	1,38	1,32	1,55	1,42
REW	Average	1,64	4,71	2,01	2,44	2,29	2,18	2,10
	S.D.	1,13	1,57	1,37	1,40	1,43	1,18	1,46
LEGP	Average	2,03	3,82	2,54	3,32	2,82	2,79	2,53
	S.D.	1,15	1,17	1,47	1,44	1,31	1,33	1,39
AC	Average	1,92	3,65	2,49	3,63	3,15	3,12	2,56
	S.D.	1,28	1,31	1,44	1,39	1,45	1,69	1,50

The averages and standard deviations scores for each of the EP adoption cognitions are calculated using the sum of item scores.

Non-response analysis
Each of the six samples was split in half, leading to groups of early and late respondents. The underlying assumption is that the profile of late respondents is comparable to those who have not responded. The means of the responses of the late respondents were compared to those who had reacted more promptly. An independent sample t-test was performed for the two groups for all the variables in the survey. Both under the assumption of equal and non-equal variance, none of the differences between the groups were found to be significant at 0,01. One variable (PEOU4) was found to be significantly different at 0,05 level. Based on this analysis the non-response bias is found to be negligible.

10.4 Data Analysis

The data analysis including data preparation and hypothesis testing is executed through variance based SEM, i.e. PLS. Data preparation was performed in SPSS 12.02. Hypothesis testing was performed with Smart PLS 1.01. The results are described below.

10.4.1 Data Preparation for Hypothesis Testing

Response pattern
Response patterns were reviewed to detect a tendency for extreme scoring and for neutral scoring. The lack of variance by a respondent could indicate a diminished thoughtful consideration of the questions, e.g. due to rushing through the survey. These cases are not likely to represent the true variance and are deleted to decrease measurement error.

The following cases were deleted:

- A tendency for extreme scoring. A cutoff point was set when 2/3 of all the items were given an extreme score (1 or 7 on a 7 point scale). Based on these criteria, 5 cases were deleted because of too many low scores and one case was deleted due to too many high scores.
- A tendency for neural scoring. A cutoff point was set when 2/3 of all the items were given a neutral score (4 on a 7 point scale). 15 cases were deleted due to too many ‘neutral’ scoring.

Deletion of the cases on the basis of the extreme and central tendency leaves 426 cases.

Missing Values

Missing values can have a severe impact on the outcome of SEM. Therefore a conservative approach was followed to identify cases with too many missing values. The distribution of missing values was analyzed across cases and variables. Any suspicion of a structural pattern of missing values led to deletion of cases. A total of 138 cases were deleted due to missing values. This leaves 288 cases.

Outliers

- Univariate outliers were identified by analyzing the distribution, central tendency and dispersion of each of the variables. Descriptive statistics as mean, median, mode, range and standard distribution were reviewed as well as visual inspection of box plots. No cases were deleted. As an additional means of identifying outliers, all scores were normalizing, i.e. calculating the Z-score, and a cut-off value was set at +/- 2,5. 0,5% of the values were found to exceed these limits, however, no pattern could be distinguished across cases or variables that would lead to deletion. No case exceeded the threshold on more than five variables. No observations or variables were deleted.
- Bi-variate outliers were identified by reviewing the bi-variate scatterplots. No observations or variables were deleted.
- Multivariate outliers were identified by calculation the Mahalanobis D^2. None of the cases exceeded the threshold of 0,001 suggested by Hair et al. (1998). One case was found to have a relatively high Mahalanobis D^2 and exceeded the +/- 2,5 univaritae cutt-off on five cases. This case was deleted, leaving 287 cases.

In the data screening, a total of 159 cases were deleted due to the response pattern, missing values or outliers. This leaves a total of 287 cases and a valid response rate of 15%. This is in line with other studies and an acceptable response rate for social science. The overall sample size is sufficient for (co)variance based SEM. Furthermore, the total sample size is still well in excess of the median sample size of 173 found by Scandura and Williams (2000) in their review of 334 top management journal articles.

The remaining 287 cases are used for hypothesis testing in the next section.

10.4.2 Hypotheses Testing

Measurement Model

The measurement model is based on the 24-item measurement instrument for the influence tactics from Chapter 9 and the original 17-item TAM scales for the EP adoption cognitions. The factor loadings from PLS provide support for the underlying factor structure as the individual loadings are all well in excess of the suggested 0,5 by Peterson (2000). The composite reliability measures are also well above the minimum value of 0,70 suggested by Nunnally & Bernstein (1994), with the lowest value of 0,88 for PREC and the highest of 0,94 for REW. Table 33 shows the summary of the measurement scales.

Table 33 Summary of Measurement Scales

Construct	*Item*	*Mean*	*S.D.*	*Factor loading*	*Composite Reliability*	*Average Variance Extracted (AVE)*
Behavioral Intention					*0,90*	*0,75*
	BI1	5,66	1,57	0,93		
	BI2	5,68	1,65	0,89		
	BI3	5,79	1,67	0,77		
Perceived Usefulness					*0,96*	*0,79*
	PU1	4,54	1,57	0,86		
	PU2	4,11	1,65	0,84		
	PU3	3,90	1,62	0,91		
	PU4	4,00	1,60	0,89		
	PU5	4,15	1,63	0,93		
	PU6	4,12	1,58	0,90		
Perceived Ease of Use					*0,93*	*0,70*
	PEOU1	4,23	1,50	0,87		
	PEOU2	4,31	1,54	0,86		
	PEOU3	4,08	1,60	0,88		
	PEOU4	4,51	1,51	0,86		
	PEOU5	3,80	1,54	0,85		
	PEOU6	3,84	1,43	0,70		
Subjective Norm					*0,90*	*0,82*
	SN1	4,68	1,45	0,87		
	SN2	4,68	1,48	0,94		
Management Request					*0,89*	*0,74*
	MR2	3,46	1,61	0,88		
	MR3	3,40	1,70	0,87		
	MR4	3,83	1,76	0,82		
Information Push					*0,90*	*0,69*
	IP1	3,48	1,60	0,82		
	IP2	3,53	1,65	0,85		
	IP4	3,56	1,68	0,82		
	IP5	3,69	1,77	0,83		
Persuasive Recommendation					*0,88*	*0,70*
	PREC3	3,49	1,70	0,82		
	PREC5	3,52	1,63	0,85		
	PREC6	3,82	1,66	0,84		
Collaboration					*0,93*	*0,81*
	COLL1	3,01	1,72	0,93		
	COLL2	2,96	1,69	0,92		
	COLL6	2,91	1,60	0,85		
Reward					*0,94*	*0,78*
	REW2	2,12	1,57	0,77		
	REW3	1,89	1,34	0,93		

	REW4	1,81	1,27	0,93		
	REW5	1,96	1,34	0,91		
	REW6	1,99	1,43	0,86		
Legitimate Pressure					*0,91*	*0,71*
	LEGP2	2,38	1,61	0,72		
	LEGP3	2,68	1,66	0,91		
	LEGP5	2,54	1,59	0,90		
	LEGP6	2,39	1,54	0,83		
Appraisal & Control					*0,91*	*0,83*
	AC1	2,51	1,65	0,98		
	AC3	2,47	1,62	0,84		

Discriminant and convergent validity was assessed by means of the Fornell and Larcker (1981) test in which the square root of the Average Variance Extracted (AVE) of each construct is compared to the correlation between the construct and other constructs. The square root AVE of a construct should be higher than its correlations with other constructs. The square root AVE of each construct are shown diagonally in Table 34. The other cells contain the bi-variate correlations between the constructs. Table 34 shows that all constructs adhere to this criterion, thereby demonstrating sufficient discriminant and convergent validity of the constructs.

Table 34 Discriminant and Convergent Validity of the Constructs

	BI	*PU*	*PEOU*	*SN*	*MR*	*IP*	*PREC*	*COLL*	*REW*	*LEGP*	*AC*
BI	**0,864**										
PU	0,318	**0,888**									
PEOU	0,262	0,749	**0,838**								
SN	0,262	0,231	0,191	**0,903**							
MR	0,180	0,200	0,165	0,331	**0,857**						
IP	0,218	0,263	0,294	0,259	0,447	**0,829**					
PREC	0,241	0,394	0,361	0,254	0,547	0,707	**0,838**				
COLL	0,077	0,246	0,241	0,119	0,419	0,684	0,667	**0,899**			
REW	-0,011	0,088	0,100	0,124	0,309	0,299	0,304	0,389	**0,817**		
LEGP	0,077	0,054	0,044	0,181	0,522	0,374	0,383	0,467	0,603	**0,844**	
AC	0,087	0,213	0,128	0,145	0,472	0,302	0,364	0,475	0,492	0,703	**0,914**

Structural Model

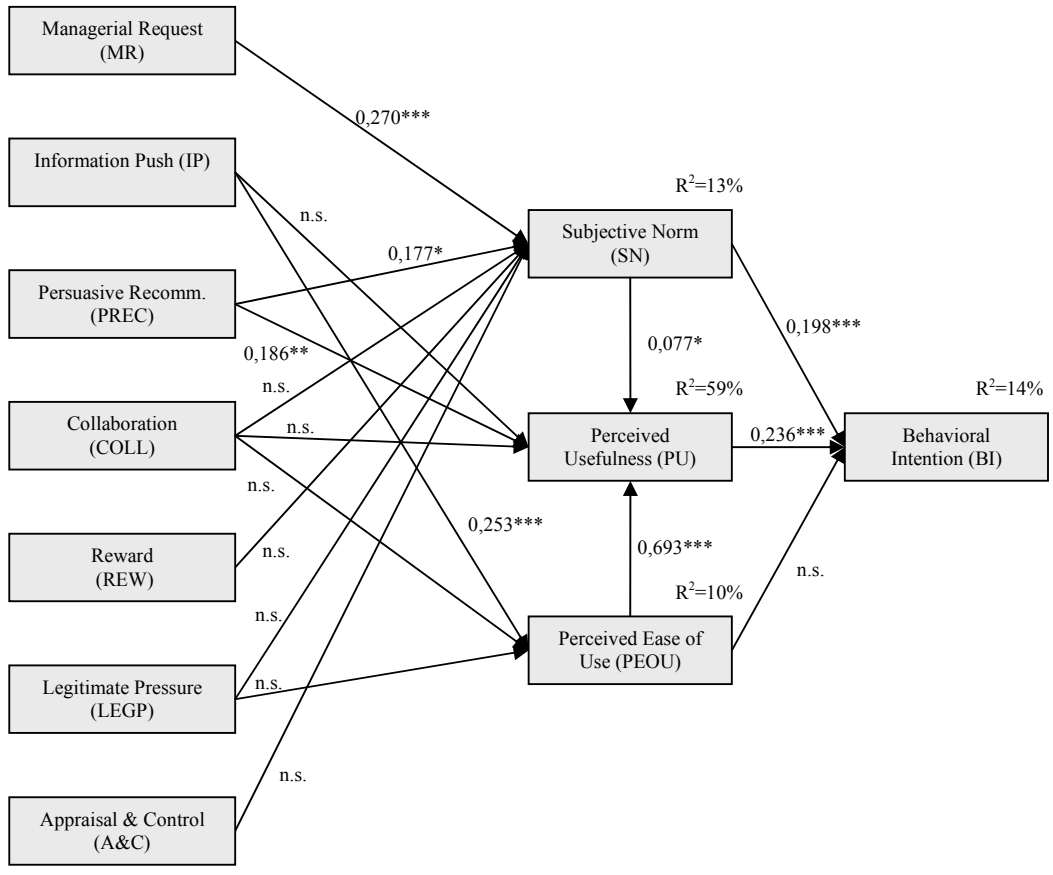
The hypotheses of influence tactics on the EP adoption cognitions, as specified in Chapter 8, were tested by first estimating the path coefficients of the structural model and then applying a bootstrapping procedure to obtain the t-statistics for these path coefficients. For the bootstrapping 250 re-samples are used.

The resulting path coefficients and t-values show support for the following hypotheses:

- H1 MR has a highly significant effect of 0,270 on SN
- H2b IP has a highly significant effect of 0,253 on PEOU
- H3a PREC has a significant effect of 0,186 on PU
- H3b PREC has a significant effect of 0,177 on SN
- H8a PU has a highly significant effect of 0,236 on BI
- H8c SN has a highly significant effect of 0,198 on BI
- H8d PEOU has a highly significant effect of 0,693 on PU
- H8e SN has a significant effect of 0,077on PU

The research model with the PLS results are shown in Figure 12 and the path coefficients are shown in Table 35.

Figure 12 Research Model with PLS results



* = Path coefficient significant at 0,05 level; ** = at 0.01; *** = at 0,001

Table 35 Path Coefficients for Research Model

Nr.	*IV*	*DV*	*Path Coefficient*	*S.D.*	*T-Statistic*	*P-value*	*Significance*	*Hypothesis Supported?*
H1	MR	SN	0,270	0,076	3,549	0,0002	***	Yes
H2a	IP	PU	-0,103	0,065	1,579	0,0577	n.s.	No (~)
H2b	IP	PEOU	0,253	0,074	3,416	0,0004	***	Yes
H3a	PREC	PU	0,186	0,069	2,695	0,0037	**	Yes
H3b	PREC	SN	0,177	0,082	2,155	0,0160	*	Yes
H4a	COLL	PU	0,016	0,064	0,255	0,3995	n.s.	No
H4b	COLL	PEOU	0,116	0,089	1,306	0,0963	n.s.	No (~)
H4c	COLL	SN	-0,116	0,076	1,517	0,0652	n.s.	No (~)
H5	REW	SN	-0,064	0,078	0,816	0,2076	n.s.	No
H6a	LEGP	PEOU	-0,105	0,083	1,266	0,1033	n.s.	No
H6b	LEGP	SN	0,075	0,098	0,761	0,2236	n.s.	No
H7	A&C	SN	-0,009	0,083	0,113	0,4551	n.s.	No
H8a	PU	BI	0,236	0,072	3,298	0,0005	***	Yes
H8b	PEOU	BI	0,047	0,076	0,627	0,2656	n.s.	No
H8c	SN	BI	0,198	0,06	3,281	0,0006	***	Yes
H8d	PEOU	PU	0,693	0,037	18,567	0,0000	***	Yes
H8e	SN	PU	0,077	0,044	1,743	0,0412	*	Yes

IV = Independent Variable, DV = Dependent Variable
* = Path coefficient significant at 0,05 level; ** = at 0.01; *** = at 0,001
(~) = border on significance in the range of 0,05 to 0,10

Possible Suppressor Effects

The negative path coefficients in the path model could indicate 'suppressor effects'. A suppressor is a variable that does not or only hardly correlates with the dependent variable but does correlate with one or more independent variables (David, 2003). If there are two independent variables, X_1 and X_2, for one dependent variable, Y, then X_1 is correlated with Y, and X_2 is not or only barely, but it *is* correlated with X_1. Suppose the "zero-order" correlation, i.e. the bivariate correlation, of X_1 on Y is positive. When X_2 is added, the effect X_1 increases while the effect of X_2 falls to zero or becomes negative. In this case, X_2 is a "suppressor". It is called "suppressor" because its addition to the regression equation "suppresses" irrelevant information (Tzelgov & Henik, 1991). Besides this classical definition of a suppressor, Maassen & Bakker (2001) identify negative and reciprocal suppressors.

The practical relevance of 'suppressors' lies in the increase of the predictive power of another value and are therefore more often included in multiple regression studies rather that explanatory studies as path analysis (Maassen & Bakker, 2001). In path models, the researcher is likely to only include variables for their explanatory value, not just to increase the explanatory value of other variables. Still, the appearance of suppressor variables can play still play a – often unintentional - role in path models.

In order to analyze the possible suppressor effects, the path coefficients of the zero-order correlations between one influence tactic are compared to the coefficients in the complete path model. This shows that four paths between influence tactics and EP adoption cognitions are positive and significant when estimated by themselves, but when estimated in the full model, their path coefficients decrease in magnitude and becomes non-significant. This could indicate that they act as are possible suppressors for other influence tactics. The comparison is shown in Table 36.

Table 36 Zero-Order Correlations and Path Coefficients in the Full Model

			Zero-Order Correlation			*Complete Path Model*			
Nr.	*IV*	*DV*	*Path Coefficient*	*T-Statistic*	*Hypothesis Supported?*	*Path Coefficient*	*T-Statistic*	*Hypothesis Supported?*	*Comparison*
H1	MR	SN	0,332	6,771	Yes	0,270	3,549	Yes	Yes
H2a	IP	PU	0,028	0,619	No	-0,103	1,579	No	No
H2b	IP	PEOU	0,294	5,332	Yes	0,253	3,416	Yes	Yes
H3a	PREC	PU	0,127	3,000	Yes	0,186	2,695	Yes	Yes
H3b	PREC	SN	0,254	4,529	Yes	0,177	2,155	Yes	Yes
H4a	COLL	PU	0,063	1,513	No	0,016	0,255	No	No
H4b	COLL	PEOU	0,241	3,880	Yes	0,116	1,306	No	Suppressor?
H4c	COLL	SN	0,124	2,091	Yes	-0,116	1,517	No	Suppressor?
H5	REW	SN	0,081	1,366	No	-0,064	0,816	No	No
H6a	LEGP	PEOU	0,045	0,554	No	-0,105	1,266	No	No
H6b	LEGP	SN	0,180	3,020	Yes	0,075	0,761	No	Suppressor?
H7	A&C	SN	0,147	2,009	Yes	-0,009	0,113	No	Suppressor?

IV = Independent Variable, DV = Dependent Variable

In order to identify if the independent variable in the four identified relationships is a suppressor for another independant variable, different trivariate combinations are analyzed. A trivariate combination is analyzed of the independent variable in the relationship under scrutiny, e.g. COLL from COLL-PEOU, with another independent variable that shows a positive in zero-order correlation with the same dependent variable. In the case of COLL, the only other independent variable that shows an effect on PEOU is IP. Subsequently, the zero-order correlations of the independent variables are compared with the path coefficients in a trivariate model. A suppressor is identified if the path coefficient of one of the independent variables are inflated compared to the zero-order correlation and the other path coefficient is negative or near zero. The complete analysis is shown in Table 37.

Table 37 Zero-Order Correlations and Path Coefficients in a Trivariate Model

	IV	*DV*	*Zero-Order Correlations*			*Path Coefficients in Trivariate Model*				*Suppressor?*
H4b	*COLL-IP*	*PEOU*	*COLL-PEOU*	*IP–PEOU*	*COLL-IP*	*COLL-PEOU*	*T-Statistic*	*IP - PEOU*	*T-Statistic*	
			0.241	0.294	0.684	0.074	0.830	0.253	2.978	No
H4c	*COLL-PREC*	*SN*	*COLL – SN*	*PREC-SN*	*COLL-PREC*	*COLL - SN*	*T-Statistic*	*PREC – SN*	*T-Statistic*	
			0.124	**0.254**	0.667	-0.086	1.162	**0.331**	3.975	**Yes**
H4c	*COLL-MR*	*SN*	*COLL – SN*	*MR - SN*	*COLL-MR*	*COLL - SN*	*T-Statistic*	*MR - SN*	*T-Statistic*	
			0.124	**0.332**	0.419	-0.021	0.336	**0.341**	5.440	**Yes**
H6b	*LEGP-MR*	*SN*	*LEGP - SN*	*MR – SN*	*LEGP-MR*	*LEGP - SN*	*T-Statistic*	*MR - SN*	*T-Statistic*	
			0.180	0.332	0.522	0.011	0.178	0,326	5.039	No
H6b	*LEGP-PREC*	*SN*	*LEGP - SN*	*PREC – SN*	*LEGP-PREC*	*LEGP - SN*	*T-Statistic*	*PREC – SN*	*T-Statistic*	
			0.180	0.254	0.383	0.098	1.465	0,216	3.064	No
H7	*AC-MR*	*SN*	*AC - SN*	*MR– SN*	*AC-MR*	*AC - SN*	*T-Statistic*	*MR - SN*	*T-Statistic*	
			0.147	**0.332**	0.472	-0.014	0.222	**0.338**	5.290	**Yes**
H7	*AC-PREC*	*SN*	*AC - SN*	*PREC– SN*	*AC-PREC*	*AC - SN*	*T-Statistic*	*PREC – SN*	*T-Statistic*	
			0.147	0.254	0.364	0.062	1.012	0.231	3.650	No

The comparison of zero-order correlations and path coefficients in a trivariate model shows that there are two suppressors:

- COLL is a suppressor of PREC-SN and MR-SN
- A&C is a suppressor of MR-SN

The identification of the suppressor effects leads to a refinements of the rejection and acceptance of hypotheses in Table 35. The refined overview of supported hypotheses is shown in Table 38.

Table 38 Overview of Supported Hypotheses in Full Model

Nr.	*IV*	*DV*	*Path Coefficient*	*S.D.*	*T-Statistic*	*P-value*	*Significance*	*Hypothesis Supported?*
H1	MR	SN	0,270	0,076	3,549	0,0002	***	Yes
H2a	IP	PU	-0,103	0,065	1,579	0,0577	n.s.	No (~)
H2b	IP	PEOU	0,253	0,074	3,416	0,0004	***	Yes
H3a	PREC	PU	0,186	0,069	2,695	0,0037	**	Yes
H3b	PREC	SN	0,177	0,082	2,155	0,0160	*	Yes
H4a	COLL	PU	0,016	0,064	0,255	0,3995	n.s.	No
H4b	COLL	PEOU	0,116	0,089	1,306	0,0963	n.s.	No (~)
H4c	COLL	SN	-0,116	0,076	1,517	0,0652	n.s.	Suppressor of PREC & MR
H5	REW	SN	-0,064	0,078	0,816	0,2076	n.s.	No
H6a	LEGP	PEOU	-0,105	0,083	1,266	0,1033	n.s.	No
H6b	LEGP	SN	0,075	0,098	0,761	0,2236	n.s.	No
H7	A&C	SN	-0,009	0,083	0,113	0,4551	n.s.	Suppressor of MR
H8a	PU	BI	0,236	0,072	3,298	0,0005	***	Yes
H8b	PEOU	BI	0,047	0,076	0,627	0,2656	n.s.	No
H8c	SN	BI	0,198	0,06	3,281	0,0006	***	Yes
H8d	PEOU	PU	0,693	0,037	18,567	0,0000	***	Yes
H8e	SN	PU	0,077	0,044	1,743	0,0412	*	Yes

IV = Independent Variable, DV = Dependent Variable
* = Path coefficient significant at 0,05 level; ** = at 0.01; *** = at 0,001
(~) = border on significance in the range of 0,05 to 0,10

The interpretation of the suppressor effects can be challenging. Suppression effect is essentially a statistical effect. As such, there are similarities in the statistical relationship between three variables that can be interpreted as a suppression, mediation or a confounding effect (MacKinnon et al., 2000). Each can be identified by the change that they cause between an independent a dependent variable; the main differentiator between is the conceptual difference (MacKinnon et al., 2000). The conceptualization of the independent variables as influence tactics and the outcomes of this suppressor analysis raise the question how the influence tactics interact. In addition, the conceptual overlap between the different influence tactics could play a role in the suppression effects. Both identified suppressors, COLL and A&C, can be seen as a 'classic suppressors' in terms of Maassen & Bakker (2001). This means that they increase the path coefficient: COLL increases PREC-SN and MR-SN; A&C increases MR-SN. A closer review of conceptualization and the items of the suppressors indicates that they share conceptual overlap with influence tactics that they enhance. COLL and PREC share elements of assisting. COLL and MR could share an expert or managerial role as source. In addition, PREC and MR could have a collaborative nature. A&C and MR share a mildly coercive element and clear role of a manager. MR could also be supported by implicitly supported by A&C.

Trimmed Structural Model

In order to get a more parsimonious model from PLS with significant relationships, the research model with PLS results (Figure 12) is taken and the non-significant path coefficients with the smallest t-value are omitted one by one. In this way the model is 'trimmed' to obtain a model that can be interpreted in a more straightforward manner as the most salient effects remain in the model. As soon as all relationships became significant only three relationships of influence tactics remained:

- MR has a highly significant effect of 0,332 on SN
- PREC has a highly significant effect of 0,143on PU
- IP has a highly significant effect of 0,293 on PEOU

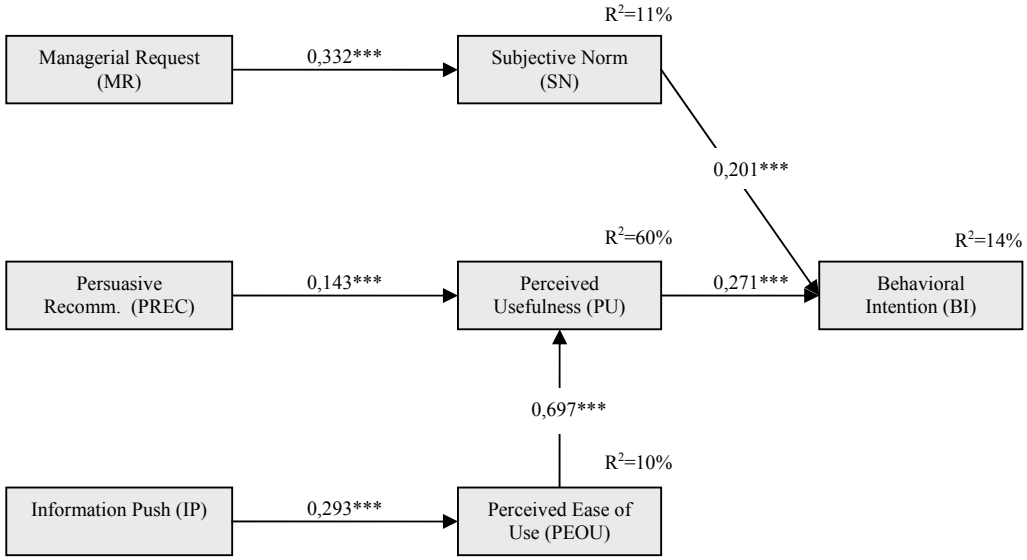
In addition, the structure of the EP adoption cognitions is limited to:

- SN with a highly significant effect of 0,201on BI
- PU with a highly significant effect of 0,271 on BI
- PEOU with a highly significant effect of 0,697 on PU

A model can show some bias when the independent variables that are included have a partial correlation with variables that are not included (Hair et al., 1998). In this case, the effect size may include the effect due to the partial correlation with the non-included variables. The trimmed model shows comparable effects as in the complete research model. The bias due to misspecification of the trimmed model compared to the complete research model is therefore considered to be minimal.

The trimmed model with PLS results is shown in Figure 13 and the path coefficients are shown in Table 39.

Figure 13 Trimmed Research Model with PLS results



*** = Path coefficient significant at 0,001 level

Table 39 Path Coefficients for Trimmed Research Model

Nr.	*IV*	*DV*	*Path Coefficient*	*Standard deviation*	*T-Statistic*	*P-value*	*Significance*	*Hypothesis Supported?*
H1	MR	SN	0,332	0,05	6,617	0,0000	***	Yes
H2b	IP	PEOU	0,293	0,053	5,565	0,0000	***	Yes
H3a	PREC	PU	0,143	0,045	3,189	0,0008	***	Yes
H8a	PU	BI	0,271	0,058	4,699	0,0000	***	Yes
H8c	SN	BI	0,201	0,058	3,489	0,0003	***	Yes
H8d	PEOU	PU	0,697	0,036	19,543	0,0000	***	Yes

* = Path coefficient significant at 0,05 level; ** = at 0.01; *** = at 0,001

10.4.3 Robustness for Sub Samples

The trimmed research model is estimated and bootstrapped for various sub samples to assess the robustness of the path coefficients. The following variables were used to make sub samples: random split sample, type of system (e-ordering or ES), sample (only when N>48), usage frequency, gender, education (EDU), experience (EXP) and age. This yields 16 sub samples. The findings for the path coefficients are that:

- SN → BI remains significant in 12 of the 16 sub samples
- PU → BI remains significant in 13 of the 16 sub samples
- PEOU → PU remains significant in all of the 16 sub samples and shows a fairly constant high path coefficient
- MR → SN remains significant in all of the 16 sub samples
- PREC → PU remains significant in 13 of the 16 sub samples
- IP → PEOU remains significant in 13 of the 16 sub samples

The findings provide confidence in the robustness of the all path coefficients. The path coefficients for the 16 sub samples are shown in Table 40.

Table 40 Path Coefficients for Sub Sample Models

	N	*SN -> BI*	*PU -> BI*	*PEOU -> PU*	*MR -> SN*	*PREC -> PU*	*IP -> PEOU*
Total	287	0,201***	0,271***	0,697***	0,332***	0,143***	0,293***
Random	144	0,156*	0,188*	0,710***	0,383***	0,169**	0,168 (n.s.)
EO	154	0,215**	0,426***	0,703***	0,356***	0,185***	0,279***
ES	133	0,196*	0,116 (n.s.)	0,702***	0,336***	0,100*	0,258***
Sample 1	103	0,269**	0,284**	0,714***	0,398***	0,130*	0,287**
Sample 3	81	0,228*	0,098 (n.s.)	0,603***	0,418***	0,267***	0,307**
Sample 5	48	0,163 (n.s.)	0,551***	0,683***	0,292*	0,196*	0,268 (n.s.)
Frequent	166	0,206 (n.s.)	0,289*	0,671***	0,368**	0,214*	0,343**
Infrequent	121	0,227*	0,240 (n.s.)	0,761***	0,315**	0,061 (n.s.)	0,201(n.s.)
Male	209	0,186**	0,191**	0,644***	0,363***	0,206***	0,325***
Female	67	0,284**	0,437***	0,815***	0,311*	0,078 (n.s.)	0,225 (n.s.)
EDU low	76	0,082 (n.s.)	0,348**	0,817***	0,414***	-0,004 (n.s.)	0,241*
EDU high	197	0,235***	0,237***	0,665***	0,302***	0,219***	0,312***
EXP low	102	0,172*	0,321***	0,629***	0,393***	0,207**	0,243**
EXP high	174	0,227**	0,231**	0,760***	0,303***	0,120**	0,321***
AGE low	125	0,172*	0,321***	0,629***	0,395***	0,207**	0,243**
AGE high	148	0,129 (n.s.)	0,237***	0,717***	0,329***	0,154**	0,186**
High		0,284	0,551	0,817	0,418	0,267	0,343
Low		0,129	0,188	0,603	0,292	0,100	0,186
Average		0,207	0,312	0,701	0,355	0,183	0,279

EDU is split at BSc level, where BSc is included in 'high'; AGE is split at 40, where 40 is included in 'high'.
* = Path coefficient significant at 0,05 level; ** = at 0.01; *** = at 0,001

The path coefficients also hold for the sample without data cleaning. See Table 41.

Table 41 Path Coefficients for Model without Data Cleaning

	N	SN -> BI	PU -> BI	PEOU -> PU	MR -> SN	PREC -> PU	IP -> PEOU
No data cleaning	446	0,261***	0,351***	0,873***	0,513***	0,072**	0,473***

Possible hierarchical structure in the data

Multi-level data is frequently encountered in social and behavioral science research. Multi-level data means that the data is 'nested' into groups, perhaps even on multiple levels. A common example to explain this phenomenon is pupils who are grouped into a class, who in turn are grouped in a school. Multi-level data arises when observations are drawn from a known "hierarchical structure". In this dissertation, the data could be seen as a two-level hierarchical structure, where the individuals (level 1) are a part of organizations (level 2).

Hierarchical structured data can cause problems in single level analysis, because the assumptions of independently and identically distributed variables are violated. The variables could be dependent within a group, here an organization. The reason for assuming that individuals from the same organization are likely to be more similar than people from different organizations is that they share common social and environmental characteristics.

Multi-level models recognize the existence hierarchies in data. Multi-level models explicitly take the dependency of outcomes of individuals within a group into account. They allow residual components at each level in the hierarchy. At each level, factors could account for a part of the variance. In the data of this dissertation, this would mean that residual variance is partitioned into a between-organization component, i.e. the variance of the organization-level residuals, and a within-organization component, i.e. the variance of the individual-level residuals.

Multi-level analysis of data has become more common with the introduction of specialized analysis software, e.g. HLM. For models with latent variables and SEM, as in this research, the analysis of multi-level data structures is less common and requires specific techniques.

According to Goldstein (1999) there may be different reasons for researchers to use a Multi-level analysis technique:

a) Multiple regression techniques, including SEM, treat the data as independent observations. Failing to recognize a hierarchical structure where the observations are not fully independent could lead to underestimated standard errors of regression coefficients, leading to an overstatement of statistical significance. This means that identified effects could be 'inflated'. Higher-level predictor variables are affected most by ignoring groups,

b) Organizational level effects can be estimated simultaneously with the effects of individual-level predictors. In regression analysis, an alternative way to account for group effects is to include dummy variables each group (e.g. ANOVA). In such a model, the effects of group-level predictors are confounded with the effects of the group dummy variables: it is not possible to separate effects due to observed and unobserved group characteristics. In a Multi-level model, the effects of both types of variable can be estimated.
c) Inferences beyond the samples could be limited in single level multiple regression techniques. The inferences in a model in which dummy variables are included should not be made beyond the groups in the sample. In a Multi-level model the groups in the sample are treated as a random sample from a population of groups.

For this research, the following rationale applies for each of the aforementioned reasons:

a) Influence tactics are all formulated on the individual level. Possible distortion of findings could then take place when organizational level factors affect both the independent variables, i.e. the influence tactics as well as the dependent variables, i.e. the TAM factors. Based on the literature review in Chapter 3 and Chapter 6, there is no direct indication from previous research that an organizational level factor simultaneously affects both the influence tactics as well as TAM. Practically, however, it is conceivable and even plausible that the organizational contextual does indeed affect both the experienced extent of an influence tactics and the general predisposition on TAM factors. Possible distortion can therefore not be ruled out completely.
b) In this research, there are no separate organizational level variables defined or measured. The exploration of explanatory organizational level variables falls beyond the scope of this dissertation.
c) Hox & Maas (2001) analyze robustness issues of two-level estimates with small samples. They analyze issues with the group size, i.e. the number of individuals in a group, the number of groups and the intra-class correlation, i.e. between-group correlation. The most important problem was found in the between-group part of the model where inadmissible estimates occurred when group level sample size is small (<50). The sample from a population of organizations is very small with only 6 organizations. This would make inferences across organization problematic.

Concluding from the previous discussion, multi-level analysis is not required to explore inferences across organizations and exploration of organizational factors. Multi-level analysis may, however, shed light on possible distortion due to the known two-level structure of the data between individuals and organizations. The question then rises how substantial these potential distortions are.

Leeuw & Kreft (1995), comment on multi-level modeling that is may be "an elegant conceptualization", but not always necessary. According to Leeuw & Kreft (1995), "traditional techniques perform as well, or better, if there are large groups and small intra-class correlations, and if the researcher is interested only in the fixed level regression coefficients." This is further supported by Julian (2001) who investigated ignoring Multi-level data structures in SEM. Results indicated that when variables exhibit minimal levels of intra-class correlation, the model/data fit statistic, the parameter estimators, and the standard error estimators are relatively unbiased.

In order to assess the potential bias due to ignoring the multi-level structure, the "inter-class correlation" (ICC) can be calculated. Following the procedure suggested by the centre of Multi-level modeling[14], first the whole sample is normalized, so that the mean is 0 and the total variance across the complete sample is 1. Next, the organizational-level variance "between-organizations" is calculated. This is the variance of the subsample means around the overall mean: 0,175. The remaining variance 0,815 is the individual level "within-organization". In this case, the variance that can be explained due to individual level factors is 82% and the variance that can be explained due to organizational level factors is 18%. In this case, the ICC is 0,18. This level of ICC is considered to be "between low and medium" by Maas & Hox (2004). In their study of the effect of different ICC levels, i.e. different variance distributions between the levels, and conclude that these levels show "surprisingly accurate estimates".

Concluding from the preceding discussion, the individual level data may be drawn from different organizations and therefore show a two-level hierarchical structure. Ignoring this multi-level structure in the data analysis does not present any concerns for the outcomes. The low level of ICC provides support that, in the data analysis, the sample can be considered as a single group of individuals rather than six distinct groups of individuals.

[14] Center for Multi-level Modeling can be found at: http://www.cmm.bristol.ac.uk/

10.5 Discussion

Model findings

The trimmed model shows three distinct 'routes' in which influence tactics have an effect on BI:

- *MR has an effect on BI through SN.*
  This is consistent with the way in which the first hypothesis was argued in Chapter 8. The personal relationship of the manager and the target was proposed to have a greater role than the power associated with the managerial position. As such MR relies on a referent power rather than legitimate and coercive power bases. The underlying persuasion principle is thereby more liking then complying with authority. The PLS model does not give any insight into the reason why the effect of MR occurs. The personal aspect of the MR could lead to the effect on SN, as was argued in the hypothesis development. The role of some coercion or positional power might play a role.

- *PREC has an effect on BI through PU.*
  PREC was conceptualized as having a persuasive content and a subjective nature. The aim of convincing the target of the benefits of EP fits with the effect that the PLS model shows on PU. The effect of PREC was proposed to be manifested through primarily the social function of a referent as an advocator of the utility of EP. The utility focus of PREC matches the utility perception by the target that is apparent in the concept of PU. The subjective nature means that recommendations may be accepted from people, not only based on their actual expertise, but on the credibility which is attributed to them. A personal liking can contribute to this. Again, the PLS model does not shed light on why the effect occurs, but based on the conceptualization of PREC the referent power is more pronounced than the actual expertise. PREC can thereby be more effective from a 'close' peer than from a 'distant' expert, leading to identification and internalization.

- *IP has an effect on BI through PEOU and PU*
  The concept of IP was delineated from the other influence tactics as 'informative' rather that 'normative'. IP was proposed to be limited to factual information, where the 'sender' must rely on an expert power basis. The content of the information was suggested to relate to the characteristics and features of the system. This factual information could be used for creating or enhancing the notion of the usefulness as well as the ease of use of the system.

IP was therefore hypothesized to affect both PU and PEOU. The PLS model, however, shows that IP has an affect on PEOU and an indirect effect on PU through PEOU.

The three routes of the effect of influence tactics are accepted as the basis for supporting the hypotheses 1 (MR > SN), 2b (IP > PEOU), and 3a (PREC > PU).

The PLS test of the full research model reveals some insight on the remaining hypotheses. In the full model, the following additional effects showed significant path coefficients:

- PREC showed an effect on SN. This effect can be explained with the subjective nature of PREC and the importance of personal liking or referent power for PREC to achieve an effect. The findings in the full model indicates support for H3b (PREC > SN).
- SN showed an effect on PU. Within the EP adoption cognitions, the relatively small effect of 0,077 was found to be significant in the full research model. This is comparable to the findings by Venkatesh & Davis (2000).

The original TAM model, that served as a basis for the structure of the EP adoption cognitions, is supported by the PLS analysis, with both PU and SN showing a direct effect on BI. The effect of PU has been supported in nearly all TAM studies. The role of SN in TAM research has been less consistent (Schepers & Wetzels, 2007), however, its role is firmly embedded in the origins of TAM, i.e. TRA and TPB, and confirmed in many studies afterwards (e.g. Venkatesh & Davis, 2000). The mediation of the effect of PEOU through PU relationship has also been demonstrated in previous TAM research (Pituch & Lee, 2006; Jeyaraj & Lacity 2004).

Concluding from the discussion of the finding, the structure of the EP adoption cognitions is accepted and three influence tactic, MR, PREC and IP show an effect through respectively SN, PU and PEOU.

Model assumptions

The explained variance (R^2) of the EP adoption cognitions is relatively low in comparison to TAM studies. The trimmed model showed an R^2 of the end variable BI of14%. The R^2 of PEOU and SN are 10% and 11%. The R^2 of PU of 60% is quite substantial and comparable to other TAM studies. The trimmed and complete models hardly show any difference in the explained variables. The relatively low R^2 for BI leads to the idea of other variables affecting BI rather than the ones included in the structural model. In the research in Chapter 2 and 3, it has been shown that indeed

many other factors than the influence tactics affect the EP adoption cognitions. The prime objective of this part of the research was to establish the effect of Influence Tactics, not to achieve a high explanation of the end variables.

The relatively low explained variance of the EP adoption cognitions may lead to two questions that should be taken into account in the interpretation of the found relationships:

- Do confounding factors play a role?
- Is there any presence of multicollinearity in the independent variables?

The issue of confounding factors was already addressed in the design of the research model in Chapter 8. To briefly restate the argumentation made there: many factors have been found shown to affect either the influence tactics or the EP adoption cognitions. Factors that affect both have not been found. This can be explained by the notion that social influence theory and technology acceptance that have not been previously combined and therefore do not share overlapping construct. The lack of common predictors implies that there are no theoretical alternative explanations of the effect between independent and dependent variables. The robustness analysis in 10.4.3 provides additional support for limited confoundedness as the finding remain robust for different sub-samples.

One specific confounding factor that could play a role is due to common method bias. When a survey creates a common variance, then construct relationships could be inflated. This inflation could play an even greater role when respondents started guessing hypotheses and the underlying research model. This should have been minimized due to the randomization of items in the survey. Podsakoff and Organ (1986) and Lages & Lages (2004) suggest a diagnostic approach to uncover common method bias. Following this approach, a principal component factor analysis was run on all questionnaire items to uncover the existence of a single common method bias factor. The factor analysis yielded eight factors with eigenvalues exceeding 1,0 and the first factor explaining only 28% of the variance. The findings suggest that common method bias is not a real problem.

Multicollinearity should be taken into consideration when interpreting the results. When two or more independent variables are correlated, i.e. colinear, they both essentially share the same information. The effect of these variables on the dependent variables can then show multicollinearity. SEM allows interpretation even in the face of multicollinearity. The predictive variables only contain some redundancy and a possible joint effect. In reviewing the cross correlations between the constructs (see

Table 34), quite substantial correlations between the influence tactics can be noticed. The largest is the correlation of 0,707 between IP and PREC, followed by LEGP and AC. Both combinations of influence tactics are indeed conceptually related and their overlap and difference has already been discussed in Chapter 7 and 9. Hair et al. (1998) indicate that correlations amongst the latent variables of 0,8 could indicate a problem. None of the correlations exceed this threshold value.

The discussion of the model assumptions, the relatively low explained variance, the confounding factors, common method bias and multicollinearity do not hinder the acceptance of the estimated relationships.

10.6 Conclusion

In this Chapter the model of influence tactics and their effect on EP adoption cognitions were tested.

Six samples of empirical data were collected with a total with of 446 responses from direct users (response rate of 21%). The descriptive statistics show that the sample differ in terms of type of systems, user frequency, experience, gender, education, and age. Overall, the 'softer' influence tactics were experienced more, i.e. received a higher overall average score, than the harder ones.

In the data preprocessing, a total of 159 cases were deleted due to the response pattern, missing values or outliers, leaving a valid sample of a total of 287 cases. The remaining 287 cases were used for hypothesis testing using PLS, a variance based SEM technique.

The research model (Figure 11) and hypotheses (Table 24) have been used for PLS analysis. The measurement model, using the measurement scale developed in Chapter 9, provided additional support for the factor structure and reliability of the scales. The structural model provided path coefficient and their significance for each of the hypothesized relationships. An overview of the findings is shown in Table 42.

Table 42 Overview of Supported Hypotheses in Trimmed Model

Nr.	*IV*	*DV*	*Hypothesis*	*Hypothesis Supported? (Trimmed)*
H1	MR	SN	Managerial Request has a positive effect on Subjective norm	Yes
H2a	IP	PU	Information Push has a positive effect on Perceived Usefulness	No
H2b	IP	PEOU	Information Push has a positive effect on Performance Ease of Use	Yes
H3a	PREC	PU	Persuasive Recommendation has a positive effect on Perceived Usefulness	Yes
H3b	PREC	SN	Persuasive Recommendation has a positive effect on Subjective norm	No
H4a	COLL	PU	Collaboration has a positive effect on Perceived Usefulness	No
H4b	COLL	PEOU	Collaboration has a positive effect on Performance Ease of Use	No
H4c	COLL	SN	Collaboration has a positive effect on Subjective norm	No
H5	REW	SN	Reward has a significant positive effect on Subjective norm	No
H6a	LEGP	PEOU	Legitimate Pressure has a negative effect on Performance Ease of Use	No
H6b	LEGP	SN	Legitimate Pressure has a positive effect on Subjective norm	No
H7	A&C	SN	Appraisal & Control has a positive effect on Subjective norm	No
H8a	PU	BI	Perceived Usefulness has a positive effect on Behavioral Intention	Yes
H8b	PEOU	BI	Perceived Ease of Use has a positive effect on Behavioral Intention	No
H8c	SN	BI	Subjective Norm has a positive effect on Behavioral Intention	Yes
H8d	PEOU	PU	Perceived Ease of Use has a positive effect on Perceived Usefulness	Yes
H8e	SN	PU	Subjective Norm has a positive effect on Perceived Usefulness	No

IV = Independent Variable, DV = Dependent Variable
* =Path coefficient significant at 0,05 level; ** = at 0.01; *** = at 0,001

The full research model was 'trimmed' to a situation in which all relationships were significant. These relationships were found to be robust for different sub samples. The findings provide support for three routes to affect BI:

- MR has an effect on BI through SN.
- PREC has an effect on BI through PU.
- IP has an effect on BI through PEOU and then PU

The findings also provide an answer to the main research question

Q3 What is the effect of influence tactics on EP adoption cognitions?

- MR has a highly significant effect of 0,332 on SN
- PREC has a highly significant effect of 0,143 on PU
- IP has a highly significant effect 0,293 on PEOU

In the next chapter, conclusions are drawn for the entire dissertation.

Chapter 11 Conclusions

In the first chapter of this dissertation, the problem area was introduced. First of all, it was explained that EP has the potential to benefit purchasing processes and that realizing these benefits relies on creating user adoption. Secondly, it was shown that achieving this user adoption is challenging and that this challenge is only just being explored in EP research. Thirdly, it was shown that insights for creating EP user adoption can be extracted from extant IT adoption research and social influence research.

In this dissertation, the focus was set on an intra-organizational situation of contingent adoption. Adoption was thereby conceptualized as an individual cognitive process with EP as object. EP is defined as the use of Internet technology in the purchasing processes. Two types EP are considered: e-ordering and e-sourcing.
The research model for this dissertation was set to EP adoption cognitions as dependent variables; influence tactics as independent variables. Based on extant TAM research, the following EP adoption cognitions were recognized: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Subjective norm (SN), and Behavioral Intention (BI). All factors affecting the EP adoption cognitions are called external factors. Influence tactics are positioned within these external factors. Influence tactics were defined as proactive, targeted ways to alter cognitions and behavior. The main research question links influence tactics and EP adoption cognitions:

What is the effect of influence tactics on EP adoption cognitions?

This led to the following research questions:

Q1 *What external factors affect EP adoption cognitions?*
Q2 *What influence tactics affect EP adoption cognitions?*

These research questions have been answered throughout this dissertation. The findings are summarized in the next section and the results are synthesized in the research model. In section 11.2 the limitations of the research are discussed.

11.1 Answers to the Research Questions

Q1 What external factors affect EP adoption cognitions?

In Chapter 3 a theoretical exploration took place in which TAM literature was reviewed to uncover previously researched external factors. In Chapter 4 a practical orientation was conducted where external factors were analyzed throughout four case studies. The comparison of the findings in Chapter 5 revealed that the identified external factors and their effect in practice coincide to a large extent with previous theoretical findings. The combined findings, i.e. external factors from theory and practice, are shown in Figure 8.

The combined findings in Figure 8 provide an answer to the first research question.

Q2 What influence tactics affect EP adoption cognitions?

In Chapter 6, extant research on influence tactics was reviewed. There were 112 articles included in the review. The sampled articles were used to choose a theoretical classification to develop theoretical grounded hypotheses of their effect on the EP adoption cognitions. The following classification of influence tactics was chosen by Venkatesh et al. (1995): Request, Information, Recommendation, Promise, Threats and Legalistic Plea. This classification was not specifically developed for EP; therefore possible adaptation was evaluated.

In Chapter 7, the classification of Venkatesh et al. (1995) was used as a basis for a practical exploration of influence tactics. The influence tactics were revised in three rounds of empirical data collection to increase the applicability for EP adoption. The following revisions were made: redefinition of the influence tactics to integrate source characteristics, omission of Threats, and addition of Collaboration and Appraisal & Control. The new classification of influence tactics should be more exhaustive, parsimonious and non-redundant for this research.

The new classification encompasses the following seven influence tactics:

- Managerial Request (MR)
- Information Push (IP)
- Persuasive Recommendation (PREC)
- Collaboration (COLL)
- Reward (REW)
- Legitimate pressure (LEGP)
- Appraisal & Control (A&C)

An overview of the definitions of the influence tactics is shown in Table 21. The seven influence tactics provide an answer to the second research question.

Q What is the effect of influence tactics on EP adoption cognitions?

In Chapter 6, theoretical hypotheses for each of these influence tactics were derived from previous research using previous research and theory on power, influence processes and influence principles. The hypotheses are shown in Table 16. The highest effect was expected from request and information exchange.

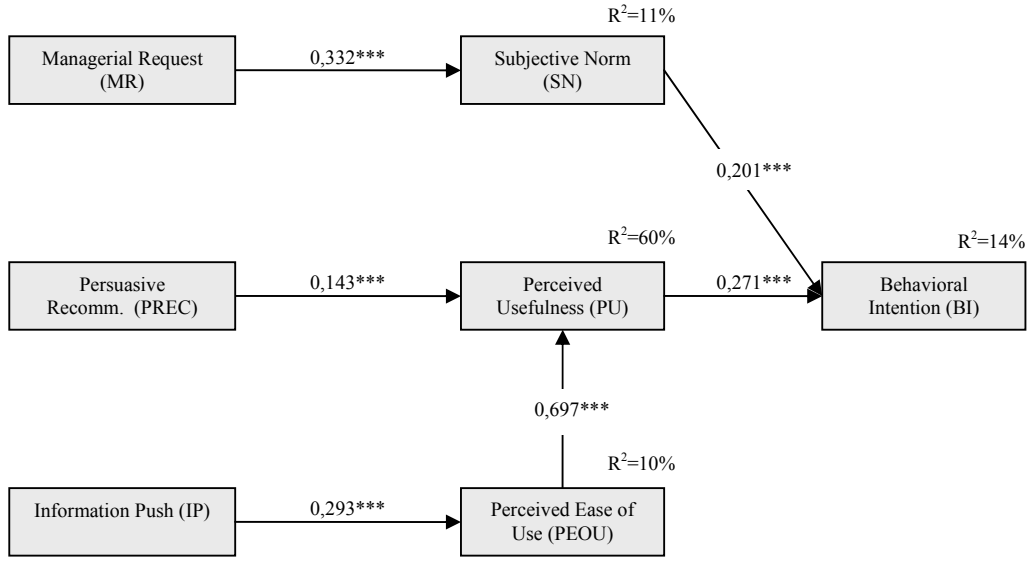
Besides the revision of the classification of influence tactics in Chapter 7, the round of empirical data collection was used to derive propositions from practice. These propositions from practice were integrated with the propositions from theory into a research model in Chapter 8. The research model is shown in Figure 11, and the accompanying hypotheses were shown in Table 24.

The hypotheses were tested in the subsequent chapters. First, a 24-item measurement scale for the seven influence tactics was developed in Chapter 9. Subsequently, six samples of empirical data were collected with a total of 446 responses from direct users (response rate of 23%). In the data preprocessing, a total of 159 cases were deleted due to the response pattern, missing values or outliers, leaving a valid sample of a total of 287 cases (valid response rate of 15%). The remaining 287 cases were used for hypothesis testing using PLS, a variance based SEM technique.

The PLS findings for the measurement model provided additional support for the factor structure and reliability of the scales. PLS findings for the structural model provided path coefficient and their significance for each of the hypothesized relationships. An overview of the findings was shown in Table 38.

The full research model was 'trimmed' to a situation in which all relationships were highly significant. In this model, MR, PREC, and IP showed an effect on SN, PU, and PEOU, respectively. The other influence tactics did not show a significant effect on the EP adoption cognitions in this data sample. The trimmed research model with the PLS results, i.e. path coefficients and significance, is shown in Figure 14.

Figure 14 Trimmed Research Model with PLS results



*** = Path coefficient significant at 0,001 level

These relationships were found to be robust for different sub samples. The findings provide support for three routes to affect BI:

- MR has an effect on BI through SN.
- PREC has an effect on BI through PU.
- IP has an effect on BI through PEOU and then PU

In the next Chapter, the research findings are discussed.

Chapter 12 Discussion

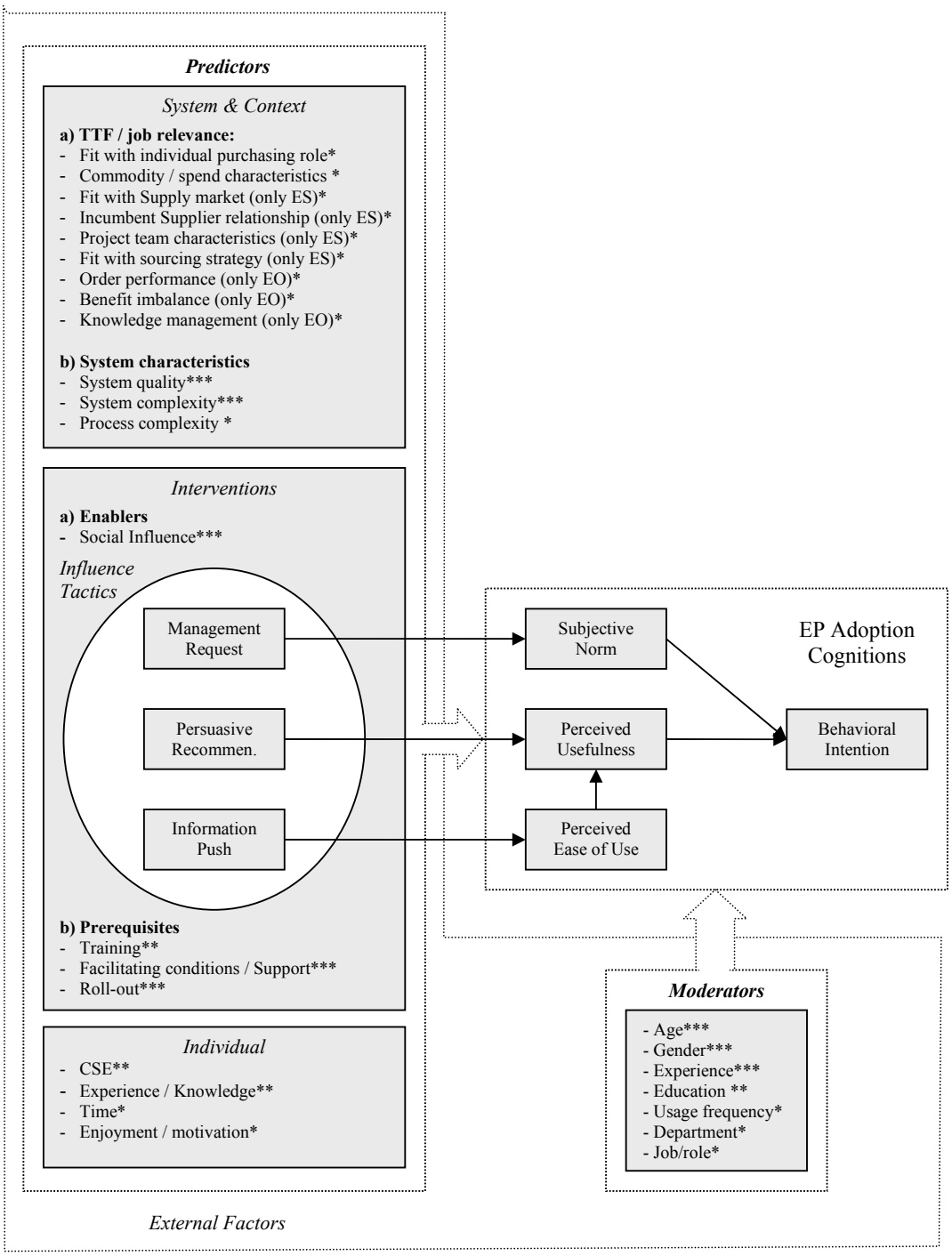
In this chapter the findings of the dissertation are discussed. The scientific implications are discussed in section 12.1. The practical implications are discussed in section 12.2. Some limitations can be identified which are discussed in section 12.3. Subsequently, several suggestions are made for future research in section 12.4. This chapter ends with some closing remarks for the entire dissertation.

The findings of this dissertation on three areas:

- the identification of external factors related to the EP adoption cognitions
- the identification of influence tactics amongst these external factors
- the effect of the influence tactics on the EP adoption cognitions

Before the results of this dissertation are discussed, the findings on the aforementioned three areas are summarized visually in Figure 15.

Figure 15 Research Model with Results



* = confirmed in theory (Chapter 3)
** = confirmed in practice (Chapter 4)
*** = confirmed in theory and practice (Chapter 3 & 4)

12.1 Scientific Implications

This dissertation provides an unprecedented link between influence tactics embedded in social influence theory and the EP adoption cognitions embedded in IT adoption theory. This dissertation provides insights into the effect of influence tactics on EP adoption cognitions. It thereby extends cognitive approaches towards individual adoption. Instead of focusing on additional factors to improve the explanatory power of adoption models, the toolset to manipulate cognitions takes up a central position.

This dissertation contributes to three theoretical domains:

- *EP Research*
  The topics concerning change management issues, individual adoption issues, interventions or influence tactics have not previously been researched for EP. This dissertation provides a novel step in this area. Both the insights concerning the effect of influence tactics as well as the identification of external factors for the EP adoption cognitions contribute to the exploration of adoption issues EP. Two other authors have recently ventured into this area. First of all, Arbin (2006) developed the EP Adoption and Usage Model. While the title would suggest a similar approach as in this research, her research focuses on contingencies such as the environment, previous experience with other systems, knowledge and experience, project management, communication, management support, relationships with suppliers and the status of the purchasing department. Secondly, the research of Brandon-Jones analyzes system and support factors to perceived service quality of EP (Brandon-Jones, 2006; Van Raaij et al., 2007). While more attention by scholars could be expected in the future, at this point in time, these are the only authors exploring the domain of EP adoption.

- *IT Adoption Research*
  Adoption is the most studied area within information systems literature. These studies are primarily concerned with understanding the innovativeness of the adopting organization or the characteristics of the technology. In addition, the objective is creating an understanding of the phenomenon of IT adoption, leading to a quest for predictive power and parsimony. The UTAUT is a proponent of such an effort. This research fits within the stream of adoption centered research, but takes on a different objective. The focus is not increasing predictive power but uncovering the effect of factors that are part of the toolset to increase EP adoption. This is not completely new, as many

others have included factors into their adoption models that can be seen as interventions (see Table 5); however, no articles, besides the work of Bhattacharjee and colleagues (1998, 2004), were found to use a systematic view to analyze the effect of a toolset. The influence tactics as a set of independent variables provides one of the ways in which this could be accomplished.

- *Social Influence Research*
  As mentioned in Chapter 2, this study fits within the research tradition of influence tactics in an interpersonal perspective with an agent and a target. The contribution to this field lies in the domain specific re-specification of a classification of influence tactics and the development of a measurement instrument for this classification. The new classification and measurement instrument integrate two streams within social influence research: the deductive based on overarching theory and inductive approach based on empirical enquiry. No research in the domain of social influences has been found that focuses on EP adoption or the adoption of any other IT system. A possible connection between these domains has been introduced by Chery & Wilkinson (2004). This study elaborates this connection and is the first work to demonstrate empirical results on the effect of influence tactics on a new set of dependent variable: the EP adoption cognitions.

12.2 Practical Implications

As mentioned in the introduction, the relevance of the replace study is based on the notion that creating user adoption of EP is beneficial when there is an unrealized value potential of EP. This occurs when EP is under-utilized in a given organizational setting and user population. Increasing acceptance and usage can be achieved by interventions. The effectiveness and efficiency of interventions directed towards raising usage levels gain benefit from more insight in the effectiveness of ways to alter EP adoption cognitions. This would limit 'trial-and-error' approaches or an 'overkill' of interventions wasting scarce time and resources. More focus can be achieved by targeting the ways to affect behavior based on their effectiveness in certain situations. By showing the effect of influence tactics on cognitions, this dissertation contributes to the selection of interventions that utilize certain influence tactics.

There are two ways in which managers could use the findings of this dissertation:

- using the results of this dissertation
- using the approach of this dissertation

Using the results of this dissertation

The key findings of this dissertation are summarized in the trimmed model with the PLS result (Figure 14) as well as in the research model with the results (Figure 15).

A four-step process is suggested to use the findings of this dissertation:

1. Make an initial prediction of the EP adoption cognitions using the predictive external factors related to context and system.
2. Define subgroups in the target population using the moderating external factors. Subgroups can have:
    a. A different level of sensitivity to external factors related to context and system. If these are known, the prediction of the EP adoption cognitions can be refined for subgroups.
    b. A different level of sensitivity to influence tactics. If this sensitivity is known, a specific EP adoption cognition can be targeted with the most effective intervention.
3. Determine the most suitable influence tactic for a subgroup and for a specific EP adoption cognition:
    a. Use Management Request to influence Subjective Norm
    b. Use Persuasive Recommendation to influence Perceived Usefulness
    c. Use Information Push to influence Perceived Ease of Use
4. Evaluate the chosen influence tactic on their effectiveness and iterate preceding steps if necessary.

Some caveats should be noted when applying the results of this dissertation in the aforementioned procedure:

- Research on the magnitude and significance of the predictive and moderating effects can contribute to the first and second step.
- Both the trimmed model with the PLS result (Figure 14) as well as the research model with the results (Figure 15) have a descriptive nature. Using the findings in prescriptive manner presumes that the effects show predictive validity for a specific application.
- Interpreting the conceptual nature of influence tactics may also prove to be difficult in practice.

Using the approach of this dissertation

An alternative way to using the findings of this dissertation is to apply the research model as an analytical framework and to use the measurement instrument as a diagnostic tool.

1. *Data collection: Diagnosis*
   A survey measuring the influence tactics and EP adoption cognitions can be conducted amongst a (potential) user community. The influence tactics can be measured with 24 items and the EP adoption cognitions with 17 items. Categorical questions could be added to segment the population.

2. *Data analysis: Select Influence Tactic & Target group*
   Examination of the results could show the distribution of scores on the EP adoption cognitions and the influence tactics across the population. The categorical question can be used to make divisions in the population and analyze the scores for these subgroups. If actual usage levels are measured, groups can also be specified according to their actual usage level.

   To determine the influence tactics that should be applied to raise EP adoption, the following three steps could be performed:
   - identify the most experienced influence tactics based on the direct responses
   - identify the most effective influence tactics based on the correlation of the responses on the influence tactics and the EP adoption cognitions
   - identify the underutilized influence tactics by comparing the extent to which it is experienced and its effectiveness

   It should be noted that influence tactics can only show an effect if they have been experienced by the respondents. The aforementioned approach could be repeated for different subgroups where different tactics have been applied. For instance, a trained group can be compared to a non-trained group. If one assumes generalizability of the effect across groups, the influence tactics that showed an effect in the trained group could be expected to show comparable effects for the non- trained group. This analysis should reveal underutilized influence tactics which are determined for different subgroups.

3. *Design: Specify Influence Tactics in Interventions*
   When underutilized influence tactics are determined for a different subgroup, they can be used to design interventions. One should take organizational resources, cost considerations, and situational contingencies into account.

After the diagnosis using the research model and instrument, the resulting interventions should be executed. Feedback on the actual results could cause iteration of the steps. This approach has been applied in one organization (Beerlage, 2006; Reunis et al., 2007).

In the discussion of possible implications, a few limitations of the research have already been touched upon. These are listed and explained in the next section.

12.3 Limitations

Several limitations to this research can be recognized related to the underlying assumptions, research model, and research approach.

Underlying assumptions

- The research assumes that the 'right' choice is made for a certain type of system in a specific situation. Many perceptions and sentiments of users may find their origin in the mismatch of the system and their application area. An example is the ongoing debate in literature on the applicability of e-auctions for different commodities or within existing buyer-supplier relationships. When the underlying assumption of applicability is violated, users may have good reason to be reluctant to embrace a new system.
- Another assumption along similar lines is that increasing adoption is, in fact, beneficial for the organization. Actual usage patterns of a system across a population in an organization could be more effective overall when a limited group of proficient users is in place rather than a larger group of occasional users that are less proficient. An example is when the 'spend through the system' is used as a performance criteria and spend volume is frantically pushed. This could lead to situations where expenditure is entered after-the-fact in an ordering system, thereby not taking advantage of the whole initial purpose of such a system, i.e. the workflow approval and invoice matching. A final example is that creating 'compliant' uncommitted usage in one role can have an effect later on in the process for other usage roles. When individuals see the system as a 'hurdle' to get their goods ordered and paid, they may be inclined to rush or skip through the requisition in the system.

- The influence-ability of the EP adoption cognitions is assumed. As mentioned in the introduction, efforts to influence individuals can take place in organizations during a roll-out of a new EP system. In such a situation, a dynamic process of technical, process, and organizational change may take place in which many other factors play a role overshadowing the influence tactics. Furthermore, if there is little uncertainty about the characteristics of the system, then the room to influence the perceptions of its utility and its ease of use may be limited in the first place. This may also be the case when people are well aware of the features of the system and the way to operate it. This was seen in the cases in Chapter 4 where users had already gained a substantial level of experience and expertise in the system, which diminished the extent to which others could influence perceptions. On the other hand, in the early stages of getting to learn a new system, it may result in higher influence-ability of the EP adoption cognitions, especially when there is some uncertainty and ambiguity. In addition, in any case the role of SN could still play a role.
- The assumption that influence tactics can be observed and remembered by the target. In the self-reported extent to which influence tactics are experienced, it does not necessarily reflect the actual amount that occurred. Besides possible selective recollection in a reflective research method, the respondents could have missed influence tactics simply because they did not attract their attention.
- Another assumption is the ability of (potential) users to be able to use the system. Technical and organizational issues could inhibit usage: e.g. access to internet, getting the right log-in code or usage rights or obtaining the right codes for commodities/general ledgers/projects. In Chapter 4, some prerequisites for usage are discussed in terms of resources: e.g. time, documentation, and support to learn how to operate the system. Specifically for EP systems, the role of supplier buy-in of the system can also be important. For instance, a buyer could be enthusiastic about running a competitive bidding event, e-RFx or e-auction, but could be inhibited by supplier buy-in. A discussion of the specific prerequisites for different forms of EP is provided by Harink (2003).

Research Model

- The research model portrays a positivistic perspective in which relationships between factors take up a central position. Here, causation is assumed (see Chapter 8). A phenomological or interpretevistic approach could yield a deeper understanding of why and how certain relationships occur. In addition,

causality could be established rather than assumed. The research model also assumes deterministic, unidirectional relationships of independent variables leading to dependent variables. In reality, feedback between the dependent and independent variables could occur. For instance, an agent could change his influence tactic of preference based on the effectiveness. Also feedback can occur: e.g. people using the system and then altering their perceptions based on their confirmation or disconfirmation of expectations. These feedback loops lead to system dynamical complexity. An alternative perspective for future research to abate this limitation is offered in section 12.4.2.

- Influence tactics are only part of the toolset that managers could use to increase adoption. Other interventions could include redefining processes, rearranging roles or tasks or system alterations. The effect of other interventions is not included in this research.
- All independent, external factors and influence tactics are assumed to be independent concepts. In reality, it is likely that many have cross-correlations. This may also be the case with the relationship between influence tactics and interventions. Influence tactics are seen as an alternative perspective to an enabling subset of interventions, while one could argue that they are, in fact, two different categories where the influence tactics underlie one or more interventions. The latter is then the mode of delivery of the tactics. In this view, a training session could utilize IP and PREC leading to cross-correlation between all three concepts.
- The effect of multiple influence tactics, either in conjunction or sequentially, cannot be ascertained from this research. In social influence theory, the effects of multiple tactics are just being explored.
- The research was aimed at establishing an effect of influence tactics rather than achieving high explanation of the end variables. The implications of this focus have already been discussed in Chapter 10.

Research Approach

- The use of multivariate techniques to estimate the model assumes normal distribution of the variance and linear relationships between constructs. More complex higher-order or non-linear, e.g. U-shaped relationships, could better model reality.
- The data collection in both the case studies as well as the survey research utilizes self reported, post-hoc measurements. These may cause the findings to be subjected to a recollection bias or socially desirable answering.

- Measurements are made at one point of time, which strictly does not measure the actual effect on cognitions. Causality is only assumed in the measurement of the degree of association, i.e. correlation.
- Assessing the effect of influence tactics in a post-hoc fashion assumes that they took place. In both the case and the survey research, the extent to which 'hard' tactics were experienced was limited. Consequently, the effects of these tactics could not be established in this research.
- The research is performed amongst Dutch (multi-national) organizations, with respondents coming primarily from The Netherlands (except for one case study in the US). In addition, the research only focuses on e-ordering and e-sourcing. The followed research approach, with strong emphasis on theoretical grounding and substantial empirical testing, should lead to some degree of generalizability of the findings of the effect of influence tactics and EP adoption cognitions beyond the research context.

The limitations lead to some suggestions for future research in the next section.

12.4 Suggestions for Future Research

Replication

- Replications could be performed to establish the robustness of the findings. This applies for both the research to identify external factors as well as the research on the effect of influence tactics. Other research settings could be explored, including other systems, like contract management or purchasing intelligence systems. In addition, replications in other geographical locations could be performed.
- Besides testing the effect of influence tactics, also external factors could be included to create an understanding of their interaction and/or the overall contribution towards explaining the variance.
- The same research question could be addressed with a different methodology or measures to facilitate a multi-trait multi-method analysis for the reliability of findings. A longitudinal approach could be adopted to uncover the way the effect of influence unfolds. A different research perspective could also provide additional insights on the research question. For instance, (Actor or Social) Network Analysis could uncover the way in which different individuals influence each other and how adoption spreads throughout a population.

- The conceptual basis for both influence tactics and EP adoption cognitions is quite generic, which would facilitate application of the concept of influence tactics and adoption cognitions to new domains.

Extending the research model

- The search for exhaustiveness in the external factors could be continued to unveil more moderators or predictive factors. More focus could be searched for in certain specific areas, e.g. the factors related to system quality and support (Van Raaij et al., 2007).
- The dependent variables used in this research are the EP adoption cognitions, i.e. TAM variables with BI as end variable. The conceptualization of adoption is thereby the *process of forming values on these cognitions.* In dealing with adoption other conceptualizations have been proposed. First of all, *stages* of adoption or diffusion could be used. Common diffusion approaches use the (absolute or relative) time of adoption. The adoption or diffusion progress can be measured by a percentage of available features or applications used. The rate of adoption uses the diffusion curve over time, often a percentage of adopters in a population. Secondly, *actual usage* can be used. This could be measured by in a binary fashion ('adopters' and 'non-adopters') or by the amount of usage, e.g. the frequency, intensity or 'depth' of use in terms of functionalities. This can include assimilation or infusion measures directed toward the extent to which a person or an organization exploits the full potential of an innovation. Besides the perceived or self-reported usage systems logs could be used to measure actual usage. Thirdly, the *outcome of adoption* could be used, including the (perceived) success of EP or (perceived) overall satisfaction or EP benefits.
- The research objective could also move from purely descriptive to more prescriptive research. In IT adoption theory, scholars have predominantly focused on increasing explanatory power and/or parsimony of cognitive adoption models. The link towards prescriptive insights to guide managerial actions has only been established sparingly. A notable exception is the research of Bhattacharjee (1998). A nearly unexplored research area remains for developing normative insights. While this research may be classified as descriptive, its findings or approach can be used to develop normative insights (see 12.2).

Besides replication and extensions, a more fundamental shift of research perspective is possible. Many of the limitations to this research can be attributed to the 'factor-based' positivist perspective in which the correlations between constructs take up a

central role. A factor perspective does not capture the time-variant nature of the effect of external factors and influence tactics on individual adoption processes. This process may include learning, gaining experience, habitualization, and adaptation as individuals progress through the stages of adoption. This process could be modeled in the stages defined by Rogers (1995): knowledge, persuasion, decision, implementation, and confirmation (see Chapter 2). Naturally, the process of the adoption does not necessarily follow such a linear approach (cf. Hultman et al., 2005). In every stage, the role of influences and external factors may differ. Active evaluation of the EP adoption cognitions is likely to be more pronounced in the early stages of the adoption process. The role of external factors on EP adoption cognitions may be captured in an alternative approach acknowledging the system dynamic complexity within an organizational setting. Such an approach would include feedback loops to model the phenomenon of EP adoption and can serve as an alternative perspective for future research on EP adoption.

12.5 Closing remarks

The research is by no means a definite and exhaustive work on the topic of influence tactics and EP adoption. As is shown in the previous section, the research opens up several avenues for future research. New questions arise from this work, both with a theoretical and more practical nature.

This dissertation may serve as early work in the connection of influence tactics and EP adoption cognitions and might inspire other researchers to continue on this lead. Other scholars are welcomed to further replicate, refine and expand the insights that have been brought forward in this dissertation.

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Appendix A Benefits of EP in theory

The emergence of EP

By the end of the nineties the internet hype also struck the purchasing domain, and a wide array of tools supporting the purchasing function started to emerge. Companies started to evaluate the consequences and applicability of internet in their purchasing processes and develop various strategies towards adopting this technology (Min & Galle, 2003). The first success stories showed major reductions of the total order cost (e.g. Attaran & Attaran, 2002), and renowned research institutes started making promises of internet rapidly changing the way business is conducted (e.g. Hope-Ross, 2001).

Although less radical than initially expected, a wide proliferation of different tools has taken place since the introduction of E-Procurement (EP). The first types of EP were e-ordering system based on a catalog. Nowadays, the pallet of tools has extended to e-tendering, e-auction, ERP integration, sourcing catalogs and collaborative tools. Not only the breadth of functional support, but also the application domain in terms of product types has extended. The focus has surpassed the non-product related goods, like the 'pencils and pens', moving towards products and services representing a higher value and complexity. A shift of focus from purely operational towards more strategic tools can be recognized. In addition the interdependence of different tools and the potential leveraging effect of combined tools is recognized. This leads to the notion that a wide process and product coverage of EP could lead to higher achieved and sustained benefits. Naturally, the major suppliers of EP solution, i.e. Ariba and SAP, are strong proponents of this wide application and speak of 'the path to value' and 'closed loop solutions'. At this point, the functional extension towards collaborative processes (e.g. new product development), integrating systems across the boundaries of the company and management information systems are still in its infancy. For the future of EP an increased leverage of existing applications, functional extensions and further automation of the complete buying process can be expected (Hope-Ross, 2001; Harink, 2003, Subramaniam & Shaw, 2004, Muffatto & Payaro, 2004). When functionalities are combined in an integrated suite, this is often referred to as Supplier Relationship Management (SRM). In short, internet applications in the purchasing function are rapidly evolving in both scope and are now moving towards the frontiers of the purchasing function.

Classification of EP benefits

The potential benefits of EP are widely recognized in literature. First of all, potential savings can be realized in the increased efficiency of operational processes that take place between supplier, purchaser, and the purchasing organization (Croom 2001; Kaplan & Sawney, 2000; Neef, 2001; Van Weele & Veth, 2001; Attaran & Attaran, 2002; De Boer et al., 2002; Davilla et al., 2003; Harink, 2003; Min & Galle, 2003; Narasimhan, 2003). The order lead-time can be reduced by either shortening the execution process or reducing the required process steps. Due to less human interaction and an increased process control, less human error takes place (e.g. Harink, 2003). Besides process efficiency also increased effectiveness on a tactical and strategic level can be realized This includes the usage of accurate and real-time information to leverage the negotiation process for sourcing contracts, which can lead to lower prices of products and services (Croom, 2001, Attran& Attran, 2002; Boer et al., 2002, Davila et al. 2003; Harink, 2003; Min & Galle, 2003; Presutti, 2003; Narasimhan, 2003, Harink, 2003; Skjoett-Larsen et al. 2003, Santema & Van de Rijt, 2003, Lancioni, 2003 Subramaniam & Shaw, 2004). An increased control yields higher contract compliance, i.e. reducing maverick or off-contract buying (e.g. Van Weele & Veth, 2001), and indirect benefits can be recognized, like an lower inventory and capital requirements (e.g. Davila et al., 2003), increased time for more strategic activities (e.g. Presutti, 2003), and increased transparency (e.g. Presutti, 2003). Even possible revenue effects, due to better agreements, collaboration, and increased control of suppliers, are recognized (De Boer et al., 2003).

Classification of EP Benefits

Category	*Subcategory*	*Supporting Authors*
Cost Savings	Personnel	Neef, 2001; Attaran & Attaran, 2002; De Boer et al., 2002; Martin & Hafer, 2002; Narasimhan et al., 2003; Min & Galle, 2003; Presutti, 2003; Harink, 2003.
	Material	Van Weele & Veth, 2001; De Boer et al., 2002; Martin & Hafer, 2002; Narasimhan et al., 2003; Min & Galle, 2003; Presutti, 2003; Harink, 2003.
	Inventory	Attaran & Attaran, 2002; Martin & Hafer, 2002; Narasimhan et al., 2003; Min & Galle, 2003.
	Search Costs	De Boer et al., 2002; Narasimhan et al., 2003 Subramaniam & Shaw, 2004; Harink, 2003.
	Evaluation Costs	Narasimhan et al., 2003.
	Working Capital Needs	Narasimhan et al., 2003; Presutti, 2003; Harink, 2003.
Time	Transaction Processing Time	Neef, 2001Van Weele & Veth, 2001 Attaran & Attaran, 2002Martin & Hafer, 2002; Narasimhan et al., 2003 Min & Galle, 2003; Presutti, 2003; Subramaniam & Shaw, 2004; Harink, 2003.
	Information Preparation Time	De Boer et al., 2002; Martin & Hafer, 2002; Narasimhan et al., 2003 Harink, 2003.
	Reduced Processing Delays	Attaran & Attaran, 2002; Narasimhan et al., 2003.
Flexibility	Collaboration Flexibility	Narasimhan et al., 2003; Min & Galle, 2003; Presutti, 2003; Subramaniam & Shaw, 2004.
	Increased Visibility	Narasimhan et al., 2003.
	Flexibility in Sourcing	Narasimhan et al., 2003; Presutti, 2003; Harink, 2003.
Consistency	Data Structure	Narasimhan et al., 2003.
	Data Accuracy	Attaran & Attaran, 2002; Neef, 2001; Narasimhan et al., 2003; Presutti, 2003.
	Streamlined Processes	Attaran & Attaran, 2002; Narasimhan et al., 2003; Min & Galle, 2003.
	Standardized Procurement Processes	Neef, 2001; Attaran & Attaran, 2002; Martin & Hafer, 2002; Narasimhan et al., 2003; Harink, 2003; Subramaniam & Shaw, 2004; Van Weele & Veth, 2001.

Appendix B Overview of IT adoption models

Overview of IT adoption models (based on Venkatesh et al., 2003)

Model & Explanation	*Core Constructs*	*Definitions*
Theory of Reasoned Action (TRA)		
Drawn from social psychology, TRA is one of the most fundamental and influential theories of human behavior. It has been used to predict a wide range of behaviors. Davis et al. (1989) applied TRA to individual acceptance of technology and found that the variance explained was largely consistent with studies that had employed TRA in the context of other behaviors.	Attitude Toward Behavior	"an individual's positive or negative feelings (evaluative affect) about performing the target behavior" (Fishbein & Ajzen 1975, p. 216).
	Subjective Norm	"the person's perception that most people who areimportant to him think he should or should not perform thebehavior in question" (Fishbein & Ajzen 1975, p. 302).
Technology Acceptance Model (TAM)		
TAM is tailored to IS contexts, and was designed to predict information technology acceptance and usage on the job. Unlike TRA, the final conceptualization of TAM excludes the attitude construct in order to better explain intention parsimoniously. TAM2 extended TAM by including subjective norm as an additional predictor of intention in the case of mandatory settings (Venkatesh & Davis 2000). TAM has been widely applied to a diverse set of technologies and users.	Perceived Usefulness	"the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989, p. 320).
	Perceived Ease of Use	"the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320).
	Subjective Norm	Adapted from TRA/TPB. Included in TAM2 only.
Motivational Model (MM)		
A significant body of research in psychology has supported general motivation theory as an explanation for behavior. Several studies have examined motivational theory and adapted it for specific contexts. Within the information systems domain, Davis et al. (1992) applied motivational theory to understand new technology adoption and use.	Extrinsic Motivation	The perception that users will want to perform an activity "because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions" (Davis et al. 1992, p. 112).
	Intrinsic Motivation	The perception that users will want to perform an activity "for no apparent reinforcement other than the process of performing the activity per se" (Davis et al. 1992, p. 112).
Theory of Planned Behavior (TPB)		
TPB extended TRA by adding the construct of perceived behavioral control. In TPB, perceived behavioral control is theorized to be an additional determinant of intention and behavior. Ajzen (1991) presented a review of several studies that successfully used TPB to predict intention and behavior in a wide variety of settings. TPB has been successfully applied to the understanding of individual acceptance and usage of many different technologies (Taylor and Todd 1995b). A related model is the Decomposed Theory of Planned Behavior (DTPB). In terms of predicting intention, DTPB is identical to TPB. In contrast to TPB but similar to TAM, DTPB "decomposes" attitude, subjective norm, and perceived behavioral control into its the underlying belief structure within technology adoption contexts.	Attitude Toward Behavior	Adapted from TRA.
	Subjective Norm	Adapted from TRA.
	Perceived Behavioral Control	"the perceived ease or difficulty of performing the behavior" (Ajzen 1991, p. 188). In the context of IS research, "perceptions of internal and external constraints on behavior" (Taylor and Todd 1995b, p. 149).

Combined TAM and TPB (C-TAM-TPB) This model combines the predictors of TPB with perceived usefulness from TAM to provide a hybrid model (Taylor and Todd 1995a).	Attitude Toward Behavior	Adapted from TRA/TPB.
	Subjective Norm	Adapted from TRA/TPB.
	Perceived Behavioral Control	Adapted from TRA/TPB.
	Perceived Usefulness	Adapted from TAM.
Model of PC Utilization (MPCU) Derived largely from Triandis' (1977) theory of human behavior, this model presents a competing perspective to that proposed by TRA and TPB. Thompson et al. (1991) adapted and refined Triandis' model for IS contexts and used the model to predict PC utilization. However, the nature of the model makes it particularly suited to predict individual acceptance and use of a range of information technologies. Thompson et al. (1991) sought to predict usage behavior rather than intention.	Job-fit	"the extent to which an individual believes that using [a technology] can enhance the performance of his or her job" (Thompson et al. 1991, p. 129).
	Complexity	Based on Rogers and Shoemaker (1971), "the degree to which an innovation is perceived as relatively difficult to understand and use" (Thompson et al. 1991, p. 128).
	Long-term Consequences	"Outcomes that have a pay-off in the future" (Thompson et al. 1991, p. 129).
	Affect Towards Use	Based on Triandis, affect toward use is "feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular act" (Thompson et al. 1991, p. 127).
	Social Factors	Derived from Triandis, social factors are "the individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social situations" (Thompson et al. 1991, p. 126).
	Facilitating Conditions	Objective factors in the environment that observers agree make an act easy to accomplish. For example, returning items purchased online is facilitated when no fee is charged to return the item. In an IS context, "provision of support for users of PCs may be one type of facilitating condition that can influence system utilization" (Thompson et al. 1991, p. 129).
Innovation Diffusion Theory (IDT) Grounded in sociology, IDT (Rogers 1995) has been used since the 1960s to study a variety of innovations, ranging from agricultural tools to organizational innovation (Tornatzky and Klein 1982). Within information systems, Moore and Benbasat (1991) adapted the characteristics of innovations presented in Rogers and refined a set of constructs that could be used to study individual technology acceptance. Moore and Benbasat (1996) found support for the predictive validity of these innovation characteristics (cf. Agarwal & Prasad 1998).	Relative Advantage	"the degree to which an innovation is perceived as being better than its precursor" (Moore and Benbasat 1991, p.195).
	Ease of Use	"the degree to which an innovation is perceived as being difficult to use" (Moore and Benbasat 1991, p. 195).
	Image	"The degree to which use of an innovation is perceived to enhance one's image or status in one's social system" (Moore and Benbasat 1991, p. 195).

	Visibility	The degree to which one can see others using the system in the organization (adapted from Moore and Benbasat 1991).
	Compatibility	"the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters" (Moore and Benbasat 1991, p. 195).
	Results Demonstrability	"the tangibility of the results of using the innovation, including their observability and communicability" (Moore and Benbasat 1991, p. 203).
	Voluntariness of Use	"the degree to which use of the innovation is perceived as being voluntary, or of free will" (Moore and Benbasat 1991, p. 195).
Social Cognitive Theory (SCT) One of the most powerful theories of human behavior is social cognitive theory . Compeau and Higgins (1995) applied and extended SCT to the context of computer utilization. Compeau and Higgins' (1995) model studied computer use but the nature of the model and the underlying theory allow it to be extended to acceptance and use of information technology in general.	Outcome Expectations—Performance	The performance-related consequences of the behavior. Specifically, performance expectations deal with jobrelated outcomes (Compeau and Higgins 1995).
	Outcome Expectations—Personal	The personal consequences of the behavior. Specifically, personal expectations deal with the individual esteem and sense of accomplishment (Compeau and Higgins 1995).
	Self-efficacy	Judgment of one's ability to use a technology (e.g., computer) to accomplish a particular job or task.
	Affect	An individual's liking for a particular behavior (e.g.,computer use).
	Anxiety	Evoking anxious or emotional reactions when it comes to performing a behavior (e.g., using a computer).

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Appendix C Articles included in Literature Review I

TAM article included in the literature review.

Nr.	*Author*	*Journal*	*Context*	*System*	*Step*		
					1	*2*	*3*
1	Agarwal & Prasad (1999)	DS	organization	GUI interface		x	x
2	Agarwal & Prasad (2000)	IEEE	professionals	C language	x	x	x
3	Agarwal & Prasad (1998)	DSS	organization	expert system app		x	x
4	Amoaka-Gympah & Salam (2004)	IM	large global organization	ERP system			x
5	Brosnan (1999)	CHB	undergraduate students	word processing		x	
6	Burton-Jones & Hubona (2005)	DoAIS	professionals, admin.	word processing , mail	x	x	
7	Chau & Hu (2001)	DS	professionals	telemedicine technology			x
8	Chau & Hu (2002)	IM	physicians	telemedicine technology			x
9	Dishaw & Strong (1999)	IM	programmers		x	x	
10	Doll et al. (1998)	DS	students	word / graphic / DB	x	x	
11	Gefen & Keil (1998)	DoAIS	employees	expert system			x
12	Gefen & Straub (1997)	MISQ	knowledge workers	e-mail		x	x
13	Hong et al. (2001)	JMIS	students	digital library	x	x	x
14	Hu et al. (2003)	IM	teachers	Microsoft PowerPoint	x	x	x
15	Igbaria et al. (1997)	MISQ	employees	personal computing	x	x	x
16	Igbaria et al. (1995)	JMIS	mba students	microcomputer usage			x
17	Karahanna & Straub (1999)	IM		e-mail			x
18	Lederer et al. (2000)	DSS	work newsgroups	www work related tasks			x
19	Liaw & Huang (2003)	CHB	students	search engines	x	x	x
20	Liaw et al. (2006)	CHB	medical students	search engines		x	
21	Lippert & Forman (2005)	IEEE	SC members	collaborative network		x	x
22	Lucas & Spitler (1999)	DS	brokers, sales assistants	mainframe subsystems	x		
23	Mathieson et al. (2001)	DoAIS	Mgt. Accountants	bulletin board system			x
24	McFarland & Hamilton (2004)	CHB	profit organizations		x	x	x
25	Ong & Lai (2004)	CHB	six intern. companies	e-learning		x	
26	Ong et al. (2004)	IM	organizational	e-learning		x	x
27	Straub et al. (1997)	IM				x	
28	Taylor & Todd (1995a)	MISQ	students	university computing		x	x
29	Taylor & Todd (1995b)	ISR	business school students	computing resource		x	x
30	Teo et al. (2003)	IJHCS	students	virtual learning			x
31	Thong et al. (2002)	IJHCS	students	digital library	x	x	x
32	Venkatesh & Davis (1996)	DS	MBA Students	graphics / WP / Lotus	x	x	
33	Venkatesh & Davis (2000)	MS	organization	various systems	x	x	x
34	Venkatesh et al. (2002)	DS				x	
35	Morris et al. (2005)	IEEE	employees	new software app		x	x
36	Venkatesh & Morris (2000)	MISQ	employees	data mgt / info retrieval		x	x
37	Venkatesh (2000)	ISR	organizations	various systems		x	
38	Venkatesh et al. (2003)	MISQ	employees	various systems	x	x	x
39	Wu et al. (2007)	CHB	organization	EUC users	x	x	x
40	Yi & Hwang (2003)	IJHCS	students	blackboard system		x	

Appendix D Interview protocol

Kennismaking & uitleg context				***Schaal***
Individual				***Schaal***
1		**Naam**		*open*
2		**Departement**		
3		**Inkoop rol**		*open*
4		Verantwoordeling voor wat voor inkoop**categorie?**		*open*
5		(geographischel) **positie** in de organisatie?		*open*
6		**leeftijd**		*getal*
7		**geslacht**		*man/vrouw*
8		**(relevante) ervaring**		*open*
EP Adoptie cognities				***Schaal***
9	a	**Verwachtingen van resultaat**		
			Ik zou het systeem nuttig vinden in mijn werk	1 (neg) - 7 (pos)
			Gebruik van het system helpt mij om mijn taken sneller af te ronden	1 (neg) - 7 (pos)
			Gebruik van het systeem verhoogd mijn productiviteit	1 (neg) - 7 (pos)
			Als ik het systeem gebruik, verhoog ik de kansen op toekomstige salarisverhoging	1 (neg) - 7 (pos)
			Ik verhoog de kwalitiet van de resultaten van mijn werk	1 (neg) - 7 (pos)
			Doordat ik het systeem gebruik heb ik nu meer controle over m'n werk	1 (neg) - 7 (pos)
	b	**Waarom?**		*open*
			Welke prestatie verwacht je verder dat het systeem levert?	*open*
10	a	**Verwachtingen van gebruiksgemak**		
			Mijn interactie met het systeem vind ik duidelijk	1 (neg) - 7 (pos)
			Het is makkelijk voor mij om goed te worden in het gebruik van het systeem	1 (neg) - 7 (pos)
			Ik vind het sytsteem makkelijk te gebruiken	1 (neg) - 7 (pos)
			Het leren gebruiken van het systeem is makkelijk voor mij	1 (neg) - 7 (pos)
			Gebruik van het systeem kost te veel tijd van mijn normale bezigheden	1 (neg) - 7 (pos)
	b	**Waarom?**		*open*
11	a	**Sociale invloed**		
			Mensen die mijn gedrag beinvloeden vinden dat ik het systeem zou moeten gebruiken	1 (neg) - 7 (pos)
			Mensen die belangrijk voor me zijn vinden dat ik het systeem zou moeten gebruiken	1 (neg) - 7 (pos)
			Senior management van dit bedrijf is behulpzaam in het gebruik van het systeem	1 (neg) - 7 (pos)
			In het algemeen is deze organisatie ondersteunend geweest voor het gebruik van het systeem.	1 (neg) - 7 (pos)
			Mijn directe baas steunt het gebruik van het systeem voor mijn werk	1 (neg) - 7 (pos)
	b	**Waarom?**		*open*
12	a	**Intentie voor systeem gebruik**		
			Ik ben van plan om het systeem in de komende 2 maanden te gebruiken	1 (neg) - 7 (pos)
			Ik voorspel dat ik het systeem in de komende 2 maanden gebruik	1 (neg) - 7 (pos)
			Ik heb gepland om het systeem in de komende 2 maanden te gebruiken	1 (neg) - 7 (pos)
	b	**Waarom?**		
			Inschatting van eigen IT bekwaamheid (efficacy)?	1 (neg) - 7 (pos)
			Spanning / ongemakkelijk gevoel met systeem gebruik (anxiety)?	1 (neg) - 7 (pos)
EP Gebruik				**Schaal**
13	a	**Gebruik**		
			Hoe vaak / diep gebruik je het systeem momenteel?	*open*

		Gebruik je het systeem zoals het bedoeld is?	*open*
		Welk gevoel komt bij je op als je het systeem op dit moment gebruikt?	*open*

Interventies / invloedstactieken			**Schaal**
14	a	**Eerdere activiteiten om de acceptatie en het gebruik te stimuleren?**	
		Management interventies	*open*
		Communicatie	*open*
		Demonstratie	*open*
		Zien van prestatie bij anderen	*open*
		Afdwingen	*open*
		Training	*open*
		Betrokkenheid	*open*
		Reductie van gevolgen van risico's (bv. Beginnersfouten)	*open*
		Belonen	*open*

System & Context			**Schaal**
15		**Context**	
		resources om het systeem te gebruiken.	*open*
		kennis om het systeem te gebruiken	*open*
		hulp bij problemen met het systeem	*open*
		Het gebruik van het systeem pas binnen mijn werk-stijl	*open*
16		**Systeem**	
		…het systeem	*open*
		…de technische implementatie	*open*
17		**Overig**	
		…het 'change management' stuk (het stimleren van acceptatie)	*open*
		…dit interview	*open*

Tot slot			
		Dank voor de tijd en bijdrage aan het project.	
		Vervolg	
		Volgende meeting	
		Terugkoppeling resultaten	

Appendix E Case Study Data analysis

The theoretical review reveals that:

- Older individuals have a stronger relationship of PEOU and SN on BI
- Females have a stronger relationship of PEOU and SN on BI
- Highly educated individuals have a stronger relationship of PU and PEOU and SN on BI
- Higher experience attenuates the affect of PU, PEOU, and SN.

The case studies have shown the following average score on the EP adoption cognitions for different subgroups:

Data from the second E-ordering case

Age

Data	*Young (< 40y)*	*Old (> 40y)*	*Total*
N	12	8	20
PU	5,03	3,43	4,39
PEOU	4,87	4,46	4,71
SN	3,71	4,13	3,88

Gender

Data	*Male*	*Female*	*Total*
N	11	11	22
PU	4,05	4,72	4,39
PEOU	4,35	4,97	4,66
SN	3,31	4,28	3,80

Experience

Data	*low*	*med*	*high*	*Total*
N	6	9	7	22
PU	4,55	4,38	4,09	4,33
PEOU	4,97	4,69	4,29	4,64
SN	3,78	3,24	4,43	3,77

Cluster

Data	*Marketing*	*Operations*	*Support*	*Total*
N	7	6	10	23
PU	4,37	4,13	4,37	4,31
PEOU	4,79	4,68	4,58	4,67
SN	4,34	3,01	3,84	3,78

Role

Data	*mgt*	*operational*	*tact*	*Total*
N	3	19	1	23
PU	5,00	4,24	3,60	4,31
PEOU	4,20	4,76	4,40	4,67
SN	3,27	3,83	4,20	3,78

Frequency

Data	*high*	*med*	*low*	*Total*
N	6	8	4	18
PU	3,90	4,80	4,35	4,40
PEOU	4,78	4,74	4,00	4,59
SN	4,09	3,75	3,48	3,80

Training

Data	*ja*	*nee*	*Total*
N	13	9	22
PU	4,08	4,71	4,34
PEOU	4,52	4,91	4,68
SN	4,24	3,06	3,76

Data from the second E-Sourcing case

Age

Data	*<30*	*30-40*	*40-50*	*>50*	*Total*
N	2	5	2	2	11
PU	4,92	4,97	4,58	4,33	4,77
PEOU	3,80	5,08	4,60	4,20	4,60
SN	4,80	3,44	4,10	4,70	4,04

Gender

Data	*female*	*male*	*Total*
N	5	8	13
PU	5,07	4,27	4,57
PEOU	4,28	4,65	4,51
SN	4,64	3,93	4,20

Experience

Data	*high*	*med*	*low*	*none*	*Total*
N	2	1	5	4	12
PU	4,42	4,83	5,30	3,70	4,58
PEOU	4,90	3,80	4,16	4,60	4,40
SN	2,60	5,00	4,60	4,25	4,18

Function

Data	*CPM*	*PM*	*Sr.Intern.Buyer*	*Sr. Buyer*	*Buyer*	*Total*
N	1	1	2	2	7	13
PU	4,80	2,17	4,83	3,67	5,07	4,57
PEOU	4,00	4,00	5,10	5,40	4,23	4,51
SN	6,20	4,00	2,60	4,30	4,37	4,20

Role

Data	*mgt*	*tact*	*Total*
N	2	11	13
PU	3,48	4,77	4,57
PEOU	4,00	4,60	4,51
SN	5,10	4,04	4,20

Category

Data	*FM*	*HR*	*IT Infra*	*Total*
N	3	1	9	13
PU	5,22	5,00	4,31	4,57
PEOU	3,67	5,40	4,69	4,51
SN	4,93	2,60	4,13	4,20

Spend

Data	*BAS*	*BIS*	*FM*	*HR*	*IT*	*non-IT*	*OPSIT*	*telecom*	*Total*
N	1	3	4	1	1	1	1	1	13
PU	2,83	4,22	5,12	5,00	4,50	4,33	4,50	5,17	4,57
PEOU	5,00	4,13	3,75	5,40	5,80	4,80	5,00	5,20	4,51
SN	4,20	5,00	5,25	2,60	4,40	2,20	3,00	2,20	4,20

Attitude

Data	*pos*	*med*	*neg*	*Total*
N	10	2	1	13
PU	4,63	5,17	2,83	4,57
PEOU	4,52	4,20	5,00	4,51
SN	4,22	4,10	4,20	4,20

Usage

Data	*high*	*novice*	*none*	*Total*
N	1	5	5	11
PU	4,33	4,80	4,83	4,77
PEOU	4,80	4,72	4,44	4,60
SN	2,20	3,84	4,60	4,04

Sourcing frequency

Data	*high*	*med*	*low*	*Total*
N	5	7	1	13
PU	4,77	4,28	5,67	4,57
PEOU	4,96	4,26	4,00	4,51
SN	3,20	4,80	5,00	4,20

Appendix F Predictors of Adoption Factors for E-Ordering and E-Sourcing

Predictive External Factors for E-Ordering

EP Adoption Cognition	*Category of External Factors*	*Subcategory of External Factors*	*N (*)*	*Explanation / Example*
PU	Fit with individual purchasing role	Usage role	9	Direct users value the system as a 'tool' to support their sourcing strategy and process. Indirect users value aspect as control, accountability and knowledge management
		Job relevance	14	Relevance of the 'output' of using the system for a persons job.
		Expected usage frequency	23	The expected intensity of usage of the system, e.g. for placing orders.
	Spend characteristics	Quality of catalogs	36	The extent to which the catalogs are built up and contains the items of preference
		Coverage of catalogs	24	The extent to which the catalogs cover relevant spend
		Need for additional specification	17	The level to which an order requires additional specification (e.g. free text)
	Order performance	Approval flow throughput	18	The time between a request and actual order issued to a supplier
		Order throughput	8	The time between the order to a supplier and receipt of the good(s) / service(s)
		Invoice throughput	13	The time between the receipt of good(s) / service(s) and invoice settlement
	Benefit imbalance	Recognition of company benefit	7	The extent to which organizational benefits are recognized and accepted above personal nuisance.
	Knowledge management	Process control	8	The extent to which (own) activities can be monitored
		Reporting	5	The extent to which reports can be made.
PEOU	System quality	Interface	31	The way in users can interact with the system.
		Search function	27	The ease of searching the required goods or services.
		System flexibility	6	How versatile the system is to support different ordering processes
	System complexity	User interaction	8	The intensity of user interaction with the system required to operate the system.
		Fit with users expectations	14	How straightforward the system is for users (recognizable process / forms).
		Ease to learn	20	The ease to learn the different functionalities and 'business rules' of the system.
		Expected breadth of usage	12	The extent to which all different functionalities of the system will need to be used.
		Expected frequency of usage	23	The extent to which all different modules and functionalities of the system will need to be used.
	Process complexity	Process standardization	4	The level to which the ordering process is standardized.
		Business rules	8	Rules that limit the usage possibilities (e.g. maximum budget)
		Process workflow	19	The amount of steps and activities defined and supported by the system. A too complex (approval) workflow limits the acceptance.
		Management of exceptions	11	The way in which exceptions or errors are dealt with.
	Time	Time to learn	7	The time available to take 'the first step' in using

				the system.
	Enjoyment / Motivation	Personal contact	4	The lack of personal contact with suppliers.
		Motivation	3	General work motivation.
	System resources	Security	1	Security of the system.
		System performance	25	The speed and up-time of the system
	Knowledge resources	Teaching material	17	Resources to learn how to operate the system.
		Reference material	13	Reference resources (e.g. manual)
	Support	Process support	12	A (system matter) expert who is able to advice on the usage of the system in a purchasing situation.
		Technical Support	4	An expert who is able to help operation the system and/or assist with technical problems.
SN	Expert	Recommendation / advice	3	Internal or external expert recommending system usage
	Management	Functional Line	5	Social pressure through purchasing management.
		Hierarchical line	18	Social pressure (or lack of) through hierarchical (business line) management.
	Peers	Direct peers	27	Social influence from peers with the same function within the same organization
		Indirect peers	2	Social influence from peers with another function and/or outside the organization

(*) = The amount of times that this (sub)category is mentioned in the 43 interviews in the first and second e-ordering case study

Predictive External Factors for E-Sourcing

EP Adoption Cognition	*Category of External Factors*	*Subcategory of External Factors*	*N (**)*	*Explanation / Example*
PU	Fit with individual purchasing role	Usage role	6	Direct users value the system as a 'tool' to support their sourcing strategy and process. Indirect users value aspect as control, accountability and knowledge management
		Job relevance	7	Relevance of the 'output' of using the system for a persons job.
		Cost focus	3	Buyers with a cost saving focus tend to value the sourcing system more.
	Commodity characteristics	Specifiability	6	The extent to which the commodity can be specified in advance of a sourcing event.
		Measurability	5	The extent to which supplier evaluation criteria can be measure in a quantitative manner.
		Level of supplier interaction	5	When a lot of supplier interaction is required as an input for specification. This occur in innovative sourcing situations or new product development (NPD) with supplier involvement.
		Direct / Indirect	8	Direct good or services that are directly
		Business impact	4	Goods / services with a higher impact attract more attentions in managing
	Fit with Supply market	Amount of possible suppliers	9	The amount of possible suppliers enables the use of more competitive sourcing events.
		Competitor rivalry in supply market	10	The extent to which supply market competitiveness can be leveraged in a sourcing event.
		e-Readiness of the supply market	5	The supplier readiness limits the applicability of the system. Some industries and regions require more effort to 'onboard' the suppliers.
	Incumbent Supplier relationship	Incumbent supplier relationship	7	The impact of a sourcing event on an existing supplier relationship.
		Switching cost	3	Additional change efforts to actually switch

				suppliers diminish expected performance. Buyers do recognize a benchmark or negotiation purpose when switching suppliers is not an option.
	Project team characteristics	Amount of internal stakeholders	4	The amount of people who are involved in specifying a demand .
		Level of distributed specification	5	When the involved people in an event are dispersed geographically; gathering input electronically can be valued more.
	Fit with sourcing strategy	Relationship focus	7	The level to with relationship aspects play a role in the sourcing process limit the performance perceptions.
		Repeatability	5	Frequent (smaller) events can be repeated more easily by 'copying' previous events.
		Proneness to auction	6	The attitude specifically towards the use of electronic reversed auctions. Some people, who are not very familiar with the whole sourcing system, only see it as an auctioning tool.
		Ethics	2	Some buyers are concerned about ethical issues in using the system or are worried that suppliers will bring up ethical points of concern.
PEOU	System quality	Interface	9	The way in users can interact with the system.
		System flexibility	12	How versatile the system is to support different sourcing processes.
	System complexity	User interaction	3	The intensity of user interaction with the system required to operate the system.
		Fit with users expectations	8	How straightforward the system is for users.
		Ease to learn	13	The ease to learn the different functionalities of the system.
		Expected breadth of usage	7	The extent to which all different modules and functionalities of the system need to be used.
		Expected frequency of usage	2	The extent to which all different modules and functionalities of the system need to be used.
	Process complexity	Process standardization	6	The level to which sourcing process are standardized or requires mental effort to define.
		Process workflow	3	The amount of steps and activities defined and supported by the system. A too complex workflow limits the acceptance.
	Time	Time to learn	8	The time pressure for sourcing projects can put off 'the first step' in using the system.
	Enjoyment	Personal contact	3	The lack of personal approach / contact
		Motivation	1	General work motivation.
		'Kick'	2	The 'fun' / 'kick' of running an auctioning event.
	System resources	Security	3	Security of the system.
		System performance	6	The speed and up-time of the system
		System compatibility	4	Ease of using the system in combination with other IT systems. e.g. importing Excel sheets.
	Knowledge resources	Teaching material	6	Resources to learn how to operate the system.
		Reference material	3	Reference resources (e.g. manual)
		Templates	2	The extent to which predefined templates are available.
	Support	Process support	13	A (system matter) expert who is able to advice on the usage of the system in a sourcing situation.
		Technical support	8	An expert who is able to help operation the system and/or assist with technical problems.
SN	Project members	e-willingness	4	A buyers take all stakeholders in a sourcing project into account in their decision to use the system. Some internal stakeholders may object (e.g. due to security issues).
	Expert	Recommendation	11	Internal or external expert recommending system

	/ advice		usage.
Management	Functional Line	5	Social pressure through purchasing management.
	Hierarchical line	6	Social pressure through hierarchical (business line) management.
Peers	Direct peers	14	Social influence from peers with the same function within the same organization
	Indirect peers	1	Social influence from peers with another function and/or outside the organization

(**) = The amount of times that this (sub)category is mentioned in the 27 interviews in the first and second e-sourcing case study

Appendix G Possible Theoretical Perspectives

Theory		*Description*	*Prime Source*	*IT / EP e.g.*	*Evaluation*
Information Processing Theory (IPT)	$\rightarrow$ B	IPT focuses on the way in which information is 'chunked' and processed. This includes the in-take of information, performing operations to change form and/or content, storing, recalling and generating responses to it.	Miller et al. (1960), Galbraith (1977).	Stock &Tatikonda (2004), Premkumar et al. (2005), Cooper & Wolfe (2005)	Medium. Central role of information, but no explicit change agent
Media Richness Theory (MRT)	$\rightarrow$ B	MRT deals with the way in which communication messages reduces uncertainty and equivocality from the receiver.	Daft & Lengel (1984)	Kahai & Cooper (2003)	Medium: only form of intervention
Argument theory / rethoric	$\rightarrow$ B	Description of techniques of argumentation to obtain approval by others for opinions, by putting forward hypotheses intended to justify the standpoint. Argumentation is primarily verbal.	Perelman (1969),		Low: Only persuasive content.
Elaboration Likelihood Model (ELM)	A $\rightarrow$ B	ELM assumes two basic ways of processing information and evaluate appropriate behavior: a central and peripheral route. A central route requires a high need for input for cognition or 'elaboration'. People tend to critically evaluate arguments and make an informed judgment about the target behavior. The peripheral route requires minimal elaboration and relies on 'cues' that may be related to the information source (e.g., source credibility, source likeability, trustworthiness) or the presentation (e.g., reiteration, image).	Petty and Cacioppo (1986)	Bhattacharjee & Sanford (2006)	Medium: Focus on how to attract attention and choosing the 'right' route.
Social Influence Theory (SIT)/ persuasion	A $\rightarrow$ B	Social influence refers to the (deliberate) attempts to change a receiver's thoughts, feelings, or behaviors. Persuasion, a specific case of influence, relies on communication to change attitudes. Social influence is embedded in the concepts of power, which is the potential to exert social influence.	French & Raven (1957)		High: The role of information, power bases, sender and receiver are included.
Social cognitive theory (SCT)	A $\rightarrow$ B	SCT explains how people acquire and maintain certain behavioral patterns through interactions betweens environment, people, and behavior. It also provides the basis for intervention strategies (Bandura, 1997).	Bandura (1997, 2001)	Compeau et al. (1999); Liaw et al. (2006)	Medium: Human-Societal focus; constant interaction.
(Adaptive) Structuration theory (AST)	A $\leftrightarrow$ B	AST is based on Giddens' structuration theory, and deals with the production and reproduction of the social systems through actors' use of rules and resources in interaction.	Giddens (1984) DeSanctis & Poole (1994), Orlikoski (2000)	Orlikowski (2000); Pozzebon & Pinsonneault (2005)	Medium: Focus on evolution of structures
Social Network Theory (SNT) / Actor Network Theory (ANT)	ΣA $\rightarrow$ B	SNT and ANT all build on the concept of nodes connected by ties. Nodes are the individual actors within the networks, and ties are the relationships between the actors. SNT focuses on how the social structure of relationships around a person, group, or organization affects beliefs or behaviors.	Granovetter (1973), Burt (1992), Freeman et al. (1992)	Walsam, Sahey (1999)	Low: Focus on effect of social structures

Appendix H Influence Tactics Scales

Nr	*Instrument*	*Year*	*Description*	*Items & Dimensionality*	*Relevance*
1	Consumer Susceptibility to Interpersonal Influence.	1989	The Consumer Susceptibility to Interpersonal Influence scale measures several aspects of consumer susceptibility. Both normative influences (e.g. value expressive and utilitarian) and informational influences are considered.	12 items (7 points, Likert-type scale) which reflect 2 correlated dimensions of susceptibility to interpersonal influence.	low
2	Consumer Susceptibility to Reference Group Influence.	1977	The Consumer Susceptibility to Reference Group Influence defines three components of reference group influence: 1) informational; 2) utilitarian; and 3) value expressive.	14 statements (4-point). There are 5 items each for the informational and value expressive dimensions, and 4 items for the utilitarian dimension.	low
3	Impression Management Scale-10 Item Version	1990	The Impression Management Scale (10 Items) asks subordinates how often they had engaged in a particular behavior during the past six weeks.This is a shortened version of Subordinate Influence Tactics Scale.	10 items (7-point, Likert-type scale). It has two sub scales: supervisor-focused (the subordinate did personal favors for and praised the supervisor); and self-focused (the subordinate created the impression that he/she is a nice, polite person).	low
4	Influence of Others on Academic and Career Decisions Scale	2001	The Influence of Others on Academic and Career Decisions Scale (IOACDS) was designed to assess the degree and type of role model influences on students' academic and vocational decisions.	15 items (5-point, Likert-type scale). It has two subscales: support/guidance and inspiration/modeling. It may be used for a variety of purposes in career counseling practice. Reliability and validity are discussed.	low
5	Influence Strategies Exercise.	1991	A tool for understanding how people influence others. It is self-scoring and provides feedback on nine commonly used strategies in management. Participants receive feedback from their own self-perceptions and from how others perceive them.		high
6	Influence Style Survey.	1983	A measure of a change agent's style of handling or bringing about change in an organization under stressful and non-stressful conditions. Also contains a profile form to identify the target's capacity level for change. Influence styles include directing, coaching, supporting and delegating.	4 dimensions	med

7	Influence Styles Inventory	1997	The Influence Styles Inventory (ISI) helps identify and examine managers' styles and strategies used in approaching day-to-day problems.	12 brief cases of a particular management problem situation in which a manager might try to influence another person. For each case, respondents select one of two possible actions.	med
8	Influence Tactics Scale	1982	The Influence Tactics Scale was designed to measure tactics used by people at work to influence their superiors, co-workers, and subordinates.It has three forms one each for bosses, co-workers and subordinates.	58 items (5-point, Likert-type scale). There are 8 dimensions of influence: assertiveness, ingratiation, rationality, sanctions, exchange, upward appeals, blocking and coalitions.	high
9	Influence Tactics Scale - Revised	1990	The Influence Tactics Scale - Revised is a shortened version of (Influence Tactics Scale) designed to measure how subordinates influence their superiors.	18 items (5-point, Likert-type scale), 3 each for 6 of the subscales: ingratiation, exchange, rationality, assertiveness, upward appeal, and coalitions.	med
10	Interaction Influence Analysis.	1980	The Interaction Influence Analysis provides a means of systematically observing transactions between leaders and followers by breaking leadership events into behavioral elements that make up observable segments.	Nr. of uses of 9 types of behaviors are plotted in a matrix: directing, closed/open questioning supporting, attentive listening, accepting, rational responding, nonattentive listening, rejection, and irrational responding.	low
11	Interpersonal Influence Inventory	1983	Designed to help individuals assess their interpersonal influence style. Statements are based on an assertive behavior model that suggests a mix of open and candid behavior coupled with degree of consideration for others.	4 influence patterns: hostile aggressive, assertive, manipulative aggressive, and passive behavior.	low
12	Interpersonal Influence Inventory	2004	The Interpersonal Influence Inventory (III) measures the behaviors that individuals use when they attempt to influence others. The III is suitable for use with all employees at all levels of the organization. It can be self-administered and self-scored.	40 items (5-point, Likert-type scale). 4 dimensions: assertive behavior; passive behavior; concealed aggressive behavior; and openly aggressive behavior.	med
13	Leadership Influence Strategies Questionnaires.	1986	The purposes of this instrument are: to give individuals information about the strategies that they typically use to influence others; and to help individuals identify opportunities to strengthen their strategies for influencing others. Self-administered and by at least others.	Rating scale response ranges from one to five.	high
14	Power and Influence in Group Settings.	1989	Departmental power (the relative importance of a department in general to an organization).	Multi-item scales(5 point) for 9 sources of power and influence.	High

15	Power and Influence in Group Settings.	1989	Power and Influence in Group Settings measures nine types of individual power and influence operating in organizational buying		High
16	Profiles of Organizational Influence Strategies.	1982	Measures the way people influence one another upward, downward, and laterally in organizations.	33 statements in which respondents determine how they attempt to influence subordinates.	High
17	Subordinate Influence Tactics Scale	1990	The Subordinate Influence Tactics Scale asks subordinates how often they had engaged in a particular behavior during the past three months.	24 items (7-point, Likert-type scale), 3 sub scales: job-focused, supervisor-focused, and self-focused	Med
18	Survey of Influence Effectiveness	1994	The Survey of Influence Effectiveness (SIE) assesses how well an individual influences people around them, including their manager, customers, and colleagues.	The SIE measures each influence tactic that an individual uses, in terms of frequency, appropriateness, and effectiveness.	high
19	Visibility/Credibility Inventory: Measuring Power and Influence.		Serves as a guide and aid in exploring, understanding, and discussing power and influence in a group.		med

Appendix I Sources included in Literature Review II

	Author(s)	*Sourc*
1	Aguinis & Adams (1998)	Organization Management23
2	Ammeter et al. (2002) \	Leadership Quarterly
3	Anderson & Berdahl (2002)	Journal of Personality And Social Psychology
4	Atuahene-Gima & Li (2000)	The Journal of Product Innovation Management
5	Barbuto (2000)	Leadership Quarterly
6	Barbuto et al. (2002a)	Journal of Social Psychology
7	Barbuto et al. (2002b)	Psychological Reports
8	Barbuto & Scholl (1999)	Psychological Reports
9	Barbuto et al. (2001)	Psychological Reports
10	Barbuto & Moss (2006)	Journal of Leadership Organizational Studies
11	Barry, B. (2001)	chapter
12	Barry & Fulmer (200 4)	Academy of Management Review
13	Blickle (2000a)	Psychological Reports
14	Blickle (2000b)	Journal of Applied Social Psychology
15	Bruins (1999)	Journal of Social Issues
16	Bruins et al. (1999)	European Journal of Social Psychology
17	Buttner & McEnally (1996)	Sex Roles
18	Cable & Judge (2003)	Journal of Organizational Behavior
19	Caldwell & Burger (1997)	Personality And Social Psychology Bulletin
20	Carli (1999)	Journal of Social Issues
21	Castro et al. (2003)	Journal of Leadership Organizational Studies
22	Cendon & Jarvenpaa (2001)	Journal of Strategic Information Systems
23	Charbonneau (2004)	Leadership and Organization Development Journal
24	Chelariu et al. (2006)	Journal of Business Research
25	Cialdini, R.B. (2001)	book
26	Dulebohn & Ferris (1999)	Academy of Management Journal
27	Dulebohn et al. (2004)	Organizational Analysis
28	Dulebohn et al. (2005)	Organizational Analysis
29	Egri et al. (2000)	Journal of International Management
30	Eiser et al. (2006)	Leadership In Action
31	Emans et al. (2003)	Applied Psychology-An International Review
32	Enns et al. (2003a)	Information & Management
33	Enns et al. (2003b)	MIS Quarterly
34	Enns & Mcfarlin (2005)	Human Resource Management
35	Enns et al. (2001)	Journal of Strategic Information Systems
36	Erdogan & Liden (2006)	Journal of Organizational Behavior
37	Farmer & Maslyn (1999)	Journal of Management
38	Farmer et al. (1997)	Journal of Organizational Behavior
39	Farrell & Schroder (1996)	Industrial Marketing Management
40	Fu et al. (2004)	Organizational Dynamics
41	Fu & Yukl (2000)	Leadership Quarterly
42	Goebel et al. (2006)	Journal of Business Research
43	Guerin (1995)	The Journal of Social Psychology
44	Gupta & Case (1999)	Leadership Organization Development Journal
45	Harris & Ogbonna (2006)	Human Resource Management
46	Higgins & Judge (2004)	Journal of Applied Psychology
47	Higgins et al. (2003)	Journal of Organizational Behavior
48	Hinkin & Schriesheim (1990)	Human Relations
49	Hochwarter et al. (2000)	Educational And Psychological Measurement
50	Hooijberg & Choi (2001)	Administration Society
51	Hu & Sheu (2005)	Industrial Marketing Management
52	Karahanna & Watson (2006)	IEEE Transactions On Engineering Management
53	Kellermann (2004)	Communication Research
54	Kennedy et al. (2003)	chapter
55	Kim et al. (2005)	Academy of Management Review
56	Kipnis, D. (2001)	Journal of Applied Social Psychology
57	Koslowsky & Stashevsky (2005)	International Journal of Manpower
58	Lai (2007)	Industrial Marketing Management
59	Lam (1997)	Journal of Managerial Psychology

60	Lamude et al. (2000)	Psychological Reports
61	Lee & Bohlen (1997)	Engineering Management Journal
62	Lee & Sweeney (2001)	Engineering Management Journal
63	Leong et al. (2006)	International Journal of Cross Cultural Management
64	Lord (1995)	Academy of Management Best Papers Proceedings
65	Lueger et al. (2005)	Organization Studies
66	Markham (1998)	Journal of Product Innovation Management
67	Mcdonald & Gooding (2005)	Southern Business Review
68	McFarland et al. (2002)	Journal of Psychology
69	Moss et al. (2005)	Psychological Reports
70	Moss & Barbuto (2004)	Psychological Reports
71	Noypayak & Speece (1998)	Journal of Managerial Psychology
72	O'neil (2003)	Public Relations Review
73	Orpen (2000)	Psychology
74	Payan & McFarland (2005)	Journal of Marketing
75	Payan & Nevin (2006)	Journal of Business Research
76	Poppe et al. (1999)	Journal of Social And Personal Relationships
77	Rahim et al. (2001)	International Journal of Conflict Management
78	Raven et al. (1998)	Journal of Applied Social Psychology
79	Rind & Kipnis (1999)	Journal of Social Issues
80	Seifert et al. (2003)	Journal of Applied Psychology
81	Shim & Lee (2001)	IEEE Transactions on Engineering Management
82	Simpson & Mayo (1997)	Journal of Business Research
83	Somech & Drach-Zahavy (2002)	Journal of Organizational Behavior
84	Steensma et al. (2003)	Journal of Collective Negotiations In The Public Sector
85	Strutton & Pelton (1998)	Journal of Business Research
86	Tepper et al. (2006)	Journal of Management
87	Thacker (1999)	Perceptual And Motor Skills
88	Thacker & Wayne (1995)	Journal of Management
89	Tikoo (2002)	Journal of Retailing
90	Tjosvold & Sun (2001)	International Journal of Conflict Management
91	Tjosvold et al. (2003)	Group Dynamics-Theory Research And Practice
92	Tjosvold et al. (2005)	Journal of Social Psychology
93	Van Knippenberg & Steensma (2003)	Applied Psychology-An International Review
94	Van Knippenberg et al. (1999)	Journal of Applied Social Psychology
95	Venkatesh et al. (1995)	Journal of Marketing
96	Vescio et al. (2003)	Journal of Personality And Social Psychology
97	Vigoda & Cohen (2002)	Journal of Business Research
98	Vredenburgh & Brender (1998)	Journal of Business Ethics
99	Wayne et al. (1997)	Personnel Psychology
100	Wolfe & Mcginn (2005)	Group Decision And Negotiation
101	Xin & Tsui (1996)	The Leadership Quarterly
102	Yammarino et al. (2005)	Leadership Quarterly
103	Yukl & Falbe (1990)	Journal of Applied Psychology
104	Yukl (1989)	Journal of Management
105	Yukl & Tracey. (1992)	Journal of Applied Psychology
106	Yukl et al. (2005)	Journal of Organizational Behavior
107	Yukl et al. (1993)	Group Organization Management
108	Yukl & Falbe (1991)	Journal of Applied Psychology
109	Yukl et al. (2003)	Applied Psychology-An International Review
110	Yukl et al. (1995)	Group Organization Management
111	Yukl (2006)	book
112	Yukl et al. (1996)	Journal of Applied Psychology

Appendix J FGD Notes Page

Questionnaire

Effect van invloedtactieken

Invloedstactieken: **Doel:** **Cognitie:** **Bron:**

	1e keer Vaker/ dieper	PE EE SI FC	Mgr. Expert Peer	Opm.
• Verzoek • Informatie uitwisseling • Aanbeveling • Belofte • Dreiging • Legalistische invloed • Andere, nl….	2 x Score: 1=niks 2=weinig 3=redelijk 4=veel 5=erg veel	Verdeel 100%	Verdeel 100%	

TUDelft

Discussie

Effect van invloedtactieken

- **Welke invloedstactieken zijn effectief?**
- **Op wat voor cognitieve elementen hebben ze effect?**
- **Van welke bron komen effectieve invloedstactieken?**

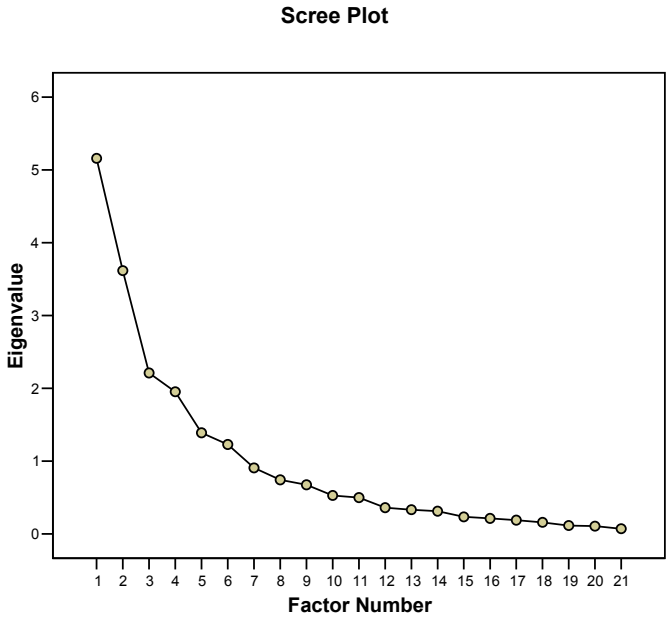
- **Effect van gecombineerde invloedstactieken?**
- **Effect van tegenstrijdige invloedstactieken (positief & negatief)?**
- **Effect van invloedstactieken achter elkaar?**

TUDelft

Appendix K Factor Analysis

	I experienced…
PREC1	a source who persuaded me to accept his/her opinion through convincing arguments
PREC2	a manager who attempted to change my perspective by explaining how my behavior affects the big picture
PREC3	an expert who made it clear that by following his/her recommendation(s), our business would benefit
PREC4	a source who converted me by countering initial hesitation and concerns
PREC5	someone who inspired me to use the system
PREC6	a source who described the workings of the system with enthusiasm and conviction
MR1	a manager who asked me to use the system
MR2	a manager who requested compliance with his/her suggestion(s)
MR3	a manager who requested to accept his/her ideas on system usage
MR4	a manager who asked me politely to use the system
MR5	a manager who requested cooperation in implementing his/her suggestion(s)
MR6	a manager who stated his / her wishes without implying any consequences of compliance or non-compliance
IP1	someone who explained the characteristics of the system
IP2	someone who presented information related to the various options of the system
IP3	a source who presented me with information to support my system usage
IP4	a source who demonstrated 'tips & tricks' for using the system
IP5	an expert who gave me instructions on how to operate the system
IP6	a source who provided evidence that the system would increase my performance
Coll1	collaboration with an expert to apply the system in a new purchasing process
Coll2	a joint effort with an expert to determine the suitability of the system in my working context
Coll3	a cooperative effort with a manager to identify opportunities of using the system
Coll4	an expert who provided help in applying the system in my work
Coll5	a manager who sought my opinion on the suitability of the system in my purchasing situation
Coll6	joint specification of the system with an expert for my specific purchasing situation
Rew1	a manager who made promises to give something back in return for specific actions on my part
Rew2	a manager who offered an award or prize for best application of the system
Rew3	a manager who implied that those who complied with him / her would be rewarded
Rew4	a manager who offered to give me something I want in exchange for doing what he/she wants
Rew5	a manager who emphasized what s/he would offer in return for my cooperation in adopting the system
Rew6	a manager who indicated that s/he will do a favor in return for helping him/her.
Leg. P1	a manager who referred to his/her authority to gain my compliance on a particular issue
Leg. P2	a manager who used sections of company rules and policies as a "tool" to get me to agree to his / her demand(s)
Leg. P3	a source who "reminded me" of our obligations stipulated in our company's rules and procedures
Leg. P4	a manager who stated that s/he was within their right to push system compliance
Leg. P5	a manager who made a point to refer to company policies when attempting to influence my actions
Leg. P6	a manager who used his/her authority to ensure that I accomplish my duties
A&C1	a manager who assessed my results of using the system
A&C2	a manager who provided feedback on my performance in using the system
A&C3	a manager who monitored my system usage
A&C4	a manager who included system usage in my job performance reviews
A&C5	a manager who set key performance indicators for adopting the system in my work

						Skewness		Kurtosis	
	N	*min*	*max*	*mean*	*SD*	*Stat.*	*Std. E*	*Stat.*	*Std. E*
PREC1	48	1	7	4,10	1,433	-,054	,343	-,530	,674
PREC2	49	1	6	3,63	1,537	-,207	,340	-1,063	,668
PREC3	48	1	7	4,21	1,458	-,508	,343	-,233	,674
PREC4	48	1	6	3,67	1,358	-,262	,343	-,427	,674
PREC5	49	1	7	4,55	1,515	-,870	,340	-,027	,668
PREC6	48	2	7	5,19	1,266	-1,091	,343	,902	,674
MR1	48	1	7	3,67	1,693	,194	,343	-,733	,674
MR2	49	1	7	3,49	1,401	,282	,340	-,445	,668
MR3	49	1	5	2,80	1,323	,393	,340	-,951	,668
MR	49	1	7	3,24	1,465	,094	,340	-,639	,668
MR5	48	2	7	4,08	1,350	,059	,343	-,522	,674
MR6	48	1	6	3,65	1,618	-,022	,343	-1,147	,674
IP1	48	1	6	4,65	1,345	-1,229	,343	,996	,674
IP2	49	2	7	4,80	1,241	-,753	,340	,296	,668
IP3	49	2	7	4,63	1,202	-,439	,340	-,312	,668
IP4	49	1	7	4,53	1,356	-,852	,340	,414	,668
IP5	49	1	7	4,45	1,473	-,508	,340	-,547	,668
IP6	49	1	6	4,31	1,489	-,790	,340	-,287	,668
COLL1	48	1	7	4,46	1,473	-,812	,343	,086	,674
COLL2	48	1	7	4,38	1,511	-,523	,343	-,080	,674
COLL3	48	1	7	3,79	1,557	,010	,343	-,964	,674
COLL4	49	1	7	4,69	1,388	-,640	,340	-,087	,668
COLL5	48	1	7	4,23	1,505	-,370	,343	-,284	,674
COLL6	48	1	7	4,31	1,626	-,284	,343	-,698	,674
REW1	45	1	5	2,71	1,424	,489	,354	-1,033	,695
REW2	45	1	5	2,18	1,173	,787	,354	,089	,695
REW3	45	1	5	2,33	1,087	,728	,354	,017	,695
REW4	44	1	5	2,39	1,104	,573	,357	-,234	,702
REW5	45	1	6	2,60	1,268	,744	,354	,678	,695
REW6	45	1	6	2,13	1,179	1,209	,354	1,618	,695
LEGP1	45	1	5	2,69	1,258	,482	,354	-,852	,695
LEGP2	45	1	6	2,96	1,445	,554	,354	-,449	,695
LEGP3	45	1	5	3,02	1,390	,171	,354	-1,295	,695
LEGP4	44	1	6	2,48	1,406	1,075	,357	,768	,702
LEGP5	45	1	7	3,56	1,470	,245	,354	-,474	,695
LEGP6	45	1	7	2,56	1,645	1,019	,354	,155	,695
A&C1	44	1	6	3,07	1,421	,384	,357	-,542	,702
A&C2	45	1	6	3,67	1,595	-,230	,354	-1,184	,695
A&C3	45	1	6	3,11	1,496	,186	,354	-1,113	,695
A&C4	45	1	5	2,67	1,398	,476	,354	-1,102	,695
A&C5	45	1	6	3,27	1,452	-,164	,354	-1,139	,695



Total Variance Explained

Factor	*Initial Eigenvalues*			*Extraction Sums of Squared Loadings*		
	Total	*% of Variance*	*Cumulative %*	*Total*	*% of Variance*	*Cumulative %*
1	5,159	24,564	24,564	4,831	23,003	23,003
2	3,616	17,219	41,784	3,295	15,689	38,692
3	2,211	10,530	52,313	1,887	8,985	47,677
4	1,953	9,298	61,612	1,594	7,593	55,270
5	1,389	6,614	68,225	1,062	5,055	60,325
6	1,228	5,849	74,075	,912	4,343	64,669
7	,907	4,320	78,395			
8	,743	3,536	81,931			
9	,674	3,211	85,143			
10	,528	2,514	87,657			
11	,499	2,374	90,031			
12	,360	1,715	91,747			
13	,332	1,583	93,329			
14	,312	1,485	94,814			
15	,234	1,116	95,930			
16	,213	1,013	96,944			
17	,190	,903	97,847			
18	,159	,757	98,604			
19	,115	,547	99,151			
20	,107	,509	99,660			
21	,071	,340	100,000			

Extraction Method: Principal Axis Factoring.

Rotated Factor Matrix(a)

	Factor					
	1	*2*	*3*	*4*	*5*	*6*
PREC3	,235	-,066	,108	,135	,405	,145
PREC5	,081	-,149	,132	,228	,689	-,138
PREC6	-,117	-,037	,304	,089	,839	,184
MR2	,168	,233	,044	-,150	-,091	,768
MR3	,120	,040	,312	,072	,028	,678
MR4	,055	-,001	-,087	-,053	,130	,627
IP2	,088	,015	,887	,125	,122	,016
IP4	,003	,080	,654	,035	,156	,058
IP5	,031	,024	,606	,390	,288	,116
COLL1	,151	,039	,207	,534	,348	-,175
COLL2	,114	,094	,000	,883	,212	-,042
COLL6	,177	-,172	,311	,597	,035	-,028
REW2	,799	,026	-,021	,037	,062	,038
REW3	,744	,286	,023	-,019	,324	,086
REW4	,711	,199	,200	,167	,017	,145
REW5	,831	,010	,059	,170	-,040	,144
REW6	,745	,168	-,030	,080	-,023	,020
LEGP2	,075	,833	-,031	-,024	-,220	,106
LEGP3	,274	,797	,079	-,175	,020	-,109
LEGP5	,012	,783	,117	,299	-,177	,134
LEGP6	,391	,685	-,011	-,094	,202	,230

Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 7 iterations.

Appendix L Descriptive Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes(a,b)	
				Count	Percent	Low	High
BI1	271	5,656827	1,571841	17	5,90	15	0
BI2	273	5,677656	1,649012	15	5,21	18	0
BI3	171	5,789474	1,667018	117	40,63	11	0
ATT	286	4,171329	1,703047	2	0,69	0	0
PU1	286	4,531469	1,573037	2	0,69	12	0
PU2	281	4,11032	1,647054	7	2,43	0	0
PU3	284	3,894366	1,615769	4	1,39	0	0
PU4	285	4	1,598855	3	1,04	0	0
PU5	283	4,141343	1,626843	5	1,74	0	0
PU6	283	4,113074	1,5782	5	1,74	0	0
PEOU1	283	4,222615	1,502923	5	1,74	0	0
PEOU2	287	4,317073	1,539851	1	0,35	0	0
PEOU3	283	4,077739	1,602624	5	1,74	0	0
PEOU4	283	4,5053	1,514401	5	1,74	0	0
PEOU5	284	3,792254	1,537221	4	1,39	0	0
PEOU6	285	3,838596	1,424849	3	1,04	0	0
SN1	283	4,674912	1,449005	5	1,74	8	0
SN2	282	4,673759	1,473353	6	2,08	8	0
PREC3	284	3,507042	1,707379	4	1,39	0	0
PREC5	284	3,53169	1,641678	4	1,39	0	0
PREC6	286	3,832168	1,669062	2	0,69	0	0
MR2	285	3,45614	1,606218	3	1,04	0	8
MR3	284	3,408451	1,715261	4	1,39	0	0
MR4	283	3,837456	1,769043	5	1,74	0	0
IP1	283	3,487633	1,609708	5	1,74	0	0
IP2	285	3,54386	1,664355	3	1,04	0	0
IP4	285	3,57193	1,69067	3	1,04	0	0
IP5	286	3,699301	1,775209	2	0,69	0	0
COLL1	285	3,010526	1,722846	3	1,04	0	0
COLL2	285	2,975439	1,706273	3	1,04	0	12
COLL6	285	2,905263	1,599342	3	1,04	0	0
REW2	165	2,151515	1,613986	123	42,71	0	0
REW3	272	1,911765	1,368979	16	5,56	0	7
REW4	270	1,833333	1,304126	18	6,25	0	45
REW5	269	1,981413	1,369861	19	6,60	0	4
REW6	288	2,003472	1,456688	0	0,00	0	8
LEGP2	282	2,397163	1,635372	6	2,08	0	0
LEGP3	285	2,694737	1,674626	3	1,04	0	0
LEGP5	283	2,551237	1,606731	5	1,74	0	0
LEGP6	283	2,40636	1,562264	5	1,74	0	0
AC1	285	2,529825	1,66678	3	1,04	0	0
AC3	285	2,487719	1,639313	3	1,04	0	0
YEAR	288	3,493056	1,605724	0	0,00	0	0
FREQ	288	4,34375	2,420131	0	0,00	0	0
EXP	277	4,722022	1,714807	11	3,82	11	0
GENDER	277	1,754513	0,431155	11	3,82	.	.
EDU	278	1,956835	0,813873	10	3,47	0	13
AGE	274	5,708029	1,820359	14	4,86	0	0

a Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

b . indicates that the inter-quartile range (IQR) is zero.

Summary

Research Motivation
E-Procurement (EP) is the use of Internet technology in purchasing processes. EP has the potential to improve these processes making them more efficient and effective. Realizing the benefits of EP relies on creating user adoption. User adoption occurs when the intended users embrace the new way of working. When the overall user adoption of EP systems lags behind or when it takes a long time to build momentum, attractive business cases can 'evaporate'. For a certain organization and selected EP system, the question is not how the concept of EP can deliver value but how more of the potential value can be achieved through more and better usage. In this case, the key lies in understanding specific ways to realize user adoption.

Achieving user adoption is challenging. The 2006 Aberdeen EP Benchmark report mentions that "[...] user adoption [...] remains the most challenging aspect of an e-procurement deployment. [...] It has become increasingly clear that change management issues related to e-procurement are far from insignificant and remain as a major if not the major hurdle to a broad and successful deployment."

The concept of user adoption has been widely studied in different fields as a cognitive process. In the field of information technology (IT), work on adoption has been sparked by the seminal work of Davis (1989), who introduced the Technology Acceptance Model (TAM). This model gave rise to research aimed at replicating, refining and extending the TAM. The TAM is a well established model that shows the relation of cognitions explaining adoption. TAM is used in this dissertation to define the following EP adoption cognitions:

- Perceived Usefulness (PU)
- Perceived Ease of Use (PEOU)
- Subjective Norm (SN)
- Behavioral Intention (BI)

EP adoption can be created by influencing the EP adoption cognitions. On a more general level, the competence of altering cognitions and consequently behavior is the key to effective leadership and management. In social psychology, a substantial amount of attention has been given towards ways to affect cognitions of others by researching influence tactics. Influence tactics are proactive, targeted ways to alter

cognitions and behavior between a source and a target. The main research question for this dissertation links influence tactics and EP adoption cognitions:

What is the effect of influence tactics on EP adoption cognitions?

Research Findings

In the first part of this dissertation, external factors, i.e. all factors that affect the EP adoption cognitions are explored to create an understanding as to how influence tactics fit amongst them. Extant IT adoption research was reviewed and then clustered in predefined categories. In addition, a practical orientation was conducted where external factors for two types EP, E-Ordering (EO) and E-Sourcing (ES), were analyzed throughout four case studies. The comparison of the findings revealed that the identified external factors in practice coincide to a large extent with previous general theoretical findings. The following external factors were identified:

- Predictors related to System & Context
    - Task technology fit / job relevance
    - System characteristics
- Interventions
    - Enablers, including social influence / social information exchange
    - Prerequisites, including training, facilitating conditions / support and roll-out
- Individual
    - Computer self efficacy
    - Experience / knowledge
    - Time
    - Enjoyment / motivation
- Moderators
    - Age
    - Gender
    - Experience
    - Education
    - Usage frequency
    - Department
    - Job/role

The combined results of the theoretical and empirical exploration of external factors provide support for a wide range of factors related to context & system and individual influencing the EP adoption cognitions. For the interventions, on the contrary, the overall findings of the effects are not clear. For the remaining set of interventions with

an enabling effect, two aspects of the way in which an effect is realized were identified: a) the role of power bases and b) the importance of social information exchange. The remaining ambiguity about the actual effect of enabling interventions gave rise to the introduction of influence tactics as an alternative view on the enabling toolset that can be used to manipulate the EP adoption cognitions.

In the second part of this dissertation, influence tactics are identified. Extant research on influence tactics is reviewed to choose a theoretical classification and to develop theoretical grounded hypotheses of their effect on the EP adoption cognitions. The following theoretical classification of influence tactics is chosen by Venkatesh et al. (1995): Request, Information Exchange, Recommendation, Promise, Threats and Legalistic Plea. This classification was revised in three rounds of empirical data collection. A case study and two rounds of focus group discussions were performed to increase the applicability for EP adoption. The following revisions were made: redefinition of the influence tactics to integrate source characteristics, omission of an influence tactic, and addition of two new influence tactics. The new classification comprises the following seven influence tactics:

- Managerial Request (MR)
- Information Push (IP)
- Persuasive Recommendation (PREC)
- Collaboration (COLL)
- Reward (REW)
- Legitimate pressure (LEGP)
- Appraisal & Control (A&C)

In the third part of this dissertation, the effect of influence tactics on EP adoption cognitions is established to answer the main research question. The following sources were used to derive hypotheses for the effect of each of the influence tactics: previous research, theory on power, influence processes and influence principles, three rounds of empirical data collection. A total of twelve hypotheses were proposed linking the influence tactics to the EP adoption cognitions. In addition, five hypotheses from previous TAM research on the relations between the EP adoption cognitions were included.

The hypotheses were tested using survey research. First of all, a 24-item measurement instrument for the seven influence tactics was developed and tested in a separate sample. Subsequently, six samples were collected at different companies with a total of 446 responses from direct EP users (response rate of 21%). In the data preprocessing, a total of 159 cases were deleted due to the response pattern, missing

values or outliers, leaving valid sample a total of 287 cases. The remaining 287 cases were used for hypothesis testing using PLS, a variance based SEM technique.

The PLS analysis yielded results for the measurement and the structural model. Findings for the measurement model provided additional support for the factor structure and reliability of the measurement instrument. Findings for the structural model provided a path coefficient and their significance for each of the hypothesized relationships.

The full research model was 'trimmed' to a situation in which all relationships were significant. In this model, MR, PREC, and IP showed an effect on SN, PU, and PEOU respectively. The other influence tactics did not show a significant effect on the EP adoption cognitions in this data sample. These relationships were found to be robust for different sub samples. The findings provide support for three routes to affect BI:

- MR has an effect on BI through SN
- PREC has an effect on BI through PU
- IP has an effect on BI through PEOU and then PU

These three routes provide an answer to the main research question. The routes show the effect of influence tactics on EP adoption cognitions.

Research Contribution

This dissertation provides an unprecedented link between influence tactics from social influence theory and EP adoption cognitions from IT adoption theory. It provides insights in the effect of influence tactics on EP adoption cognitions. It thereby extends cognitive approaches towards individual adoption. Instead of focusing on additional factors to improve the explanatory power of adoption models, the toolset to manipulate cognitions takes up a central position. This dissertation makes contributions to the following fields:

- *EP research*. Adoption issues are just being explored in EP research. Both the insights concerning the effect of influence tactics as the identification external factors for the EP adoption cognitions contribute to the exploration of adoption issues within purchasing and for EP in particular.
- *IT adoption research*. Adoption is the most studied area within information systems literature. These studies are primarily concerned with understanding the innovativeness of the adopting organization or the characteristics of the technology. The focus for this dissertation does not lie on increasing predictive power, but on factors that are part of the toolset to increase EP adoption. This is not completely new as many others have included factors into their adoption

models that can be seen as interventions. The influence tactics as a view on this toolset has not previously been researched.

- *Social influence research.* This dissertation fits within the research tradition of influence tactics in a dyadic interpersonal perspective with an agent and a target. The contribution to this field lies in the domain specific re-specification of a set of influence tactics and the development of a measurement instrument for this domain. No research in the domain of social influences has been found that focuses on EP adoption or the adoption of any other IT system. A possible connection between these domains has been previously introduced. This dissertation elaborates this connection and is the first work to demonstrate empirical results on the effect of influence tactics on EP adoption cognitions.

The research is by no means a definite and exhaustive work on the topic of influence tactics and EP adoption. The research opens up several avenues for future research to further replicate, refine and expand the insights that have brought forward in this dissertation.

Nederlandse samenvatting

Onderzoeksmotivatie

E-Procurement (EP) is het gebruik van internet technologie in inkoopprocessen. EP heeft de potentie om deze processen efficienter en effectiever te maken. Het bereiken van de voordelen van EP hangt af van het realiseren van de acceptatie en gebruik van gebruikers. Acceptatie en gebruik wordt adoptie genoemd. Adoptie vindt plaats wanneer beoogde gebruikers de nieuwe manier van werken accepteren en toepassen. Wanneer de totale gebruikersadoptie van EP systemen achterblijft of wanneer het een lange tijd duurt voordat het op een acceptabel niveau komt, dan kunnen aantrekkelijke business cases verdampen. Voor een bepaalde organisatie en een geselecteerd EP systeem is de vraag niet zo zeer hoe EP als concept waarde kan toevoegen, maar eerder hoe de potentiële waarde er uit gehaald kan worden door meer en beter gebruik. In dit geval is het nodig om te begrijpen wat manieren zijn om gebruikersadoptie te verkrijgen.

Het realiseren van gebruikersadoptie is lastig. Het 2006 Aberdeen EP Benchmark rapport concludeert dat "[...] gebruikersadoptie het meest uitdagende aspect is van een e-procurement uitrol. [...] Het is steeds duidelijker geworden dat verandermanagement zaken gerelateerd aan e-procurement verre van onbelangrijk zijn. Ze blijven een belangrijke, zo niet de belangrijkste, horde voor een brede en succesvolle uitrol." (vertaling door de auteur)

Het concept van gebruikersadoptie is veelvuldig bestudeerd in verschillende wetenschappen als een cognitief proces. In het domein van informatie technologie (IT) is het onderzoek naar adoptie begonnen met de bekende publicatie van Davis (1989) waarin hij het Technology Acceptance Model (TAM) introduceerde. Dit model is sindsdien in vervolgonderzoek herhaald, verfijnd, en uitgebreid. Het TAM is een breed geaccepteerd model dat de relaties laat zien van cognities die adoptie verklaren. TAM is gebruikt in dit proefschrift om de volgende EP adoptie cognities te definiëren:

- Verondersteld nut
- Verondersteld gebruiksgemak
- Subjectieve norm
- Gedragsintentie

EP adoptie kan bereikt worden door de EP adoptie cognities te beïnvloeden. In een bredere context neemt het vermogen om cognities en daarmee gedrag te beïnvloeden

een centrale positie in voor leiderschap en management. In sociale psychologie is er veel aandacht besteed aan manieren waarop cognities beïnvloed kunnen worden door onderzoek naar invloedstactieken. Invloedstactieken zijn proactieve, gerichte manieren om cognities te beïnvloeden tussen een zender en een ontvanger.
De hoofdvraag voor dit proefschrift verbindt invloedstactieken en de EP adoptie cognities:

Wat is het effect van invloedstactieken op EP adoptie cognities?

Onderzoekbevindingen
In het eerste deel van dit proefschrift is onderzoek verricht naar externe factoren. Dit zijn alle factoren die een effect hebben op de EP adoptie cognities. Deze worden onderzocht om een beeld te krijgen hoe de invloedstactieken hier tussen passen. Eerder IT adoptie onderzoek is onderzocht en gegroepeerd in vooraf bepaalde categoriën. Daarnaast is er praktijkonderzoek uitgevoerd voor twee typen EP, namelijk E-Ordering (EO) and E-Sourcing (ES) in vier praktijkstudies.
De vergelijking tussen theorie en praktijk laat zien dat de externe factoren in de praktijk grotendeels overeenkomen met eerdere bevindingen uit IT adoptie theorie. De volgende factoren zijn geïdentificeerd:

- Voorspellende factoren gerelateerd aan systeem & context
    - Taak technologie aansluiting / werk relevantie
    - Systeem karakteristieken
- Interventies
    - Sociale invloed / sociale informatie uitwisseling
    - Randvoorwaarden, inclusief training, faciliterende conditions / ondersteuning en uitrol.
- Individu
    - Computer kundigheid
    - Ervaring / kennis
    - Tijd
    - Plezier / motivatie
- Moderatoren
    - Leeftijd
    - Geslacht
    - Ervaring
    - Opleiding
    - Gebruiksfrequentie
    - Afdeling
    - Taak/rol

De gecombineerde resultaten van het theoretisch- en praktijkonderzoek naar externe factoren biedt ondersteuning voor factoren die te maken hebben met context & system en het individu. Voor de interventies zijn de bevindingen niet duidelijk. Voor interventies met een positief effect zijn er twee aspecten naar voren gekomen over de manier waarop een effect van een interventie wordt bereikt: a) machtbasis speelt een rol en b) sociale informatie uitwisseling is belangrijk. De onduidelijkheid over het effect van interventies zorgt voor de introductie van invloedstactieken. Dit geldt als perspectief op de middelen die kunnen worden ingezet om EP adoptie cognities te beïnvloeden.

In het tweede deel van dit proefschrift zijn invloedstactieken onderzocht. Eerder onderzoek naar invloedstactieken is onderzocht om een theoretische classificatie te kiezen en een theoretische basis te vormen voor het ontwikkelen van hypothesen. De volgende theoretische classificatie van invloedstactieken door Venkatesh et al. (1995) is gekozen: Verzoek, Informatie uitwisseling, Aanbeveling, Belofte, Dreiging en Legitiem verzoek. Deze classificatie is herzien op basis van drie ronden praktijkonderzoek. Een gevalstudie en twee rondes van focus groepsdiscussies zijn uitgevoerd om de toepasbaarheid voor EP adoptie te vergroten. De volgende revisies hebben plaatsgevonden: herdefinitie van de invloedstactieken om kenmerken van de zender mee te nemen, achterwege laten van één invloedstactiek en de toevoeging van twee nieuwe invloedstactieken. De nieuwe classificatie omvat de volgende zeven invloedstactieken:

- Managementverzoek
- Informatie delen
- Aanbeveling
- Collaboratie
- Beloning
- Legitieme druk
- Beoordeling & Controle

In het derde deel van dit proefschrift zijn de effecten van invloedstactieken op de EP adoptie cognities onderzocht om de hoofdvraag te beantwoorden. De volgende bronnen zijn gebruik om hypotheses van de effecten van invloedstactieken op de EP adoptie cognities te ontwikkelen: eerder onderzoek naar invloedstactieken, theorieën over machtsbronnen, invloedsprocessen en invloedsprincipes, en de drie ronden van praktijkonderzoek naar invloedstactieken. In totaal zijn er twaalf hypothesen voorgesteld waarin invloedstactieken een effect hebben op de EP adoptie cognities. Daarnaast worden vijf hypotheses tussen de EP adoptie cognities uit eerder TAM onderzoek meegenomen.

De hypothesen zijn getest door middel van vragenlijsten. Als eerste stap is er een meetinstrument ontwikkeld met 24 vragen om de zeven invloedstactieken te kunnen meten. Dit instrument is getest met een aparte steekproef. Vervolgens zijn er zes steekproeven verzameld bij verschillende bedrijven wat heeft geresulteerd in een totale respons van 446 directe EP gebruikers (antwoordpercentage van 21%). In het opschonen van de data zijn 159 respondenten verwijderd als gevolg van respons patroon, missende waarden of extreme waarden. Hierdoor bleven er 287 datapunten over voor het testen van de hypothesen. Dit is gebeurd met PLS, een variantie gebaseerde SEM techniek.

De PLS analyse heeft resultaten laten zien voor een meet- en structureel model. De bevindingen voor het meetmodel geven verdere ondersteuning aan de factor structuur en betrouwbaarheid van het meetinstrument. De bevindingen van het structureel model geven de coefficienten en hun significantie voor de voorgestelde relaties.

Het onderzoekmodel is gesnoeid tot er alleen significante relaties overbleven. In dit model laten management verzoek, aanbeveling en informatie delen een effect zien op respectievelijk sociale norm, verondersteld nut en verondersteld gebruiksgemak. De andere invloedstactieken lieten geen significant effect zien. De gevonden relaties bleken robuust te zijn voor verschillende sub-steekproeven. De resultaten bieden ondersteuning voor drie routes om een gedragsintentie te beïnvloeden:

- Managementverzoek heeft een effect op gedragsintentie via sociale norm
- Aanbeveling heeft een effect op gedragsintentie via verondersteld nut
- Informatie delen heeft een effect op gedragsintentie via verondersteld gebruiksgemak en vervolgens verondersteld nut

De drie routes geven een antwoord op de hoofdvraag van dit proefschrift. De routes laten het effect zien van invloedstactieken op EP adoptie cognities.

Onderzoeksbijdrage

Dit proefschrift laat een nieuwe relatie zien tussen invloedstactieken uit sociale psychologie en EP adoptie cognities tactics uit IT adoptie theorie. Het laat het effect zien van invloedstactieken op EP adoptie cognities. Daarmee is het een uitbreiding van de cognitieve aanpakken om individuele adoptie te onderzoeken. In plaats van het richten op meer factoren om het verklarend vermogen te verbeteren richt dit proefschrift zich op de middelen die kunnen worden ingezet om cognities te beïnvloeden. Dit proefschrift maakt een bijdrage aan de volgende gebieden:

- *EP onderoek*. Adoptievraagstukken zijn nog nauwelijks bestudeerd in EP onderzoek. Zowel inzicht met betrekking tot de invloedstactieken als de identicatie van externe factoren voor de EP adoptie cognities draagt bij het onderzoek naar adoptievraagstukken in inkoop en EP.
- *IT adoptie onderzoek.* Adoptie is het meest bestudeerde gebied binnen IT literatuur. Deze studies richten zich voornamelijk op het begrijpen van innovativiteit van organisaties of karakteristieken van een nieuwe technologie. De nadruk in dit proefschrift is niet het vergroten van voorspellende waarde, maar het effect van middelen om EP adoptie te verhogen. Dit is niet helemaal nieuw gezien meerdere onderzoekers factoren hebben meegenomen in hun adoptie modellen die als interventies gezien kunnen worden. Het perspectief met invloedstactieken is nog niet eerder gedaan.
- *Sociale invloed onderzoek.* Dit proefschrift past in een onderzoekstraditie naar invloedstactieken in een dyadisch interpersoonlijk perspectief tussen een bron en ontvanger. De bijdrage aan dit veld is de domein specifieke specificatie van een set van invloedstactieken en de ontwikkeling van een meetinstrument hiervoor. Geen eerder sociale invloed onderzoek is gevonden dat zich richt op het effect van invloedstactieken op EP adoptie cognities of andere IT adoptie. Een mogelijke connectie tussen beiden domeinen is al eerder voorgesteld. Dit proefschrift is de eerste uitwerking hiervan ondersteund met empirisch onderzoek.

Dit onderzoek is noch een definitief noch een uitputtend werk op het gebied van invloedstactieken en EP adoptie. Het onderzoek opent verschillende richtingen voor vervolgonderzoek waarin de bevindingen gerepliceerd, verfijnd en uitgebreid kunnen worden.

Curriculum Vitae

Marc Reunis (1979) holds an MSc degree in Industrial Engineering and Management Science from the Eindhoven University of Technology. During his studies, Marc acted as a president of an investment club, president of a student association and also served in the university student counsel. He also organized study trips to London and New York. Towards the end of his studies he specialized in IT management and carried out an internship at a software manufacturer in India. He wrote his MSc thesis on the adoption of E-Procurement. While he was working on his MSc thesis, he co-founded Young Purchasing Students, an association to support knowledge sharing amongst students in the field of purchasing and supply management, now with over 150 members. After his graduation in 2003, Marc started working as a management trainee at Mitsubishi in Japan. Besides international exposure, this provided a practical introduction to purchasing processes.

In June 2004 Marc turned back to academia to pursue his PhD at the Delft University of Technology. He received a scholarship from the NEVI Research Stichting (NRS) to continue the line of research initiated in his MSc thesis in the field of change management and technology adoption. He conducted his PhD research in close collaboration with large Dutch multi-national organizations. During his PhD research, Marc became an active member of the Dutch purchasing community, speaking at NEVI conferences, organizing workshops and developing a competition on innovation in procurement. Meanwhile, at the Delft University of Technology, he set-up and delivered a course in Purchasing Management. This resulted in a book with the best papers as well as spin-off courses in Uganda. Marc is proud to have supervised ten students in their MSc work. Marc has published over 35 papers in periodicals, books, conference proceedings and the Journal of Purchasing & Supply Management. He presented his research findings at conferences in Slovenia, US, France, Denmark, Italy, UK and The Netherlands.

Marc is currently self-employed. He co-founded a techno-starter providing services for congestion and travel time predictions. Clients include Schiphol-KLM, ANWB-TNO and an international traffic data vendor.

Dit proefschrift is mede mogelijk gemaakt door de NEVI Research Stichting (NRS).

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