

**MANAGING PRE-IMPLEMENTATION ACCEPTANCE IN  
THE ADOPTION OF NEW ENTERPRISE SYSTEMS**

**THE CASE OF A NEW FINANCIAL ADMINISTRATION  
SYSTEM FOR PUBLIC INSTITUTIONS IN THE  
REPUBLIC OF PANAMA**

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# CONTENTS

<b>CONTENTS .....</b>	<b>i</b>
<b>LIST OF FIGURES .....</b>	<b>iv</b>
<b>LIST OF TABLES .....</b>	<b>v</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>vii</b>
<b>CHAPTER 1</b>	
<b>INTRODUCTION .....</b>	<b>1</b>
1.1    General objectives .....	4
1.2    The setting of the analysis and data collection .....	4
1.3    Outline of the thesis .....	8
1.3.1    Chapter 2.....	8
1.3.2    Chapter 3.....	9
1.3.3    Chapter 4.....	11
1.3.4    Chapter 5.....	14
<b>CHAPTER 2</b>	
<b>PRE-IMPLEMENTATION ACCEPTANCE OF ENTERPRISE SYSTEMS: INDUCING THE FORMATION OF POSITIVE BELIEFS AND ATTITUDES IN EMPLOYEES.....</b>	<b>15</b>
2.1    Introduction .....	15
2.2    Theoretical background .....	17
2.3    Overview of the action research project .....	20
2.3.1    Diagnosing.....	20
2.3.2    Action Planning .....	21
2.4    Action taking and data collection .....	25
2.5    Evaluating the demonstrations.....	28
2.6    Specifying learning.....	33
2.7    Conclusions.....	35
<b>CHAPTER 3</b>	
<b>MEASURING THE PRE-IMPLEMENTATION ACCEPTANCE OF ENTERPRISE SYSTEMS.....</b>	<b>37</b>

3.1	Introduction .....	37
3.2	Theoretical foundations.....	38
3.2.1	The Theory of Reasoned Action (TRA) .....	38
3.2.2	The Theory of Planned Behavior (TPB) .....	39
3.2.3	Technology Acceptance Model (TAM) .....	41
3.2.4	The Unified Theory of Acceptance and Use of Technology (UTAUT).....	41
3.2.5	Comparison of theories.....	42
3.3	The Pre-implementation Acceptance Model.....	43
3.3.1	Baseline model – Model 1.....	44
3.3.2	The role of the expected consequences – Model 2 .....	46
3.3.3	Consequences on own work as mediator – Model 3.....	48
3.4	Data and method.....	49
3.5	Results.....	52
3.6	Conclusions and discussion.....	57

**CHAPTER 4**

<b>THE ROLE OF THE ORGANIZATIONAL CONTEXT IN SHAPING THE PRE-IMPLEMENTATION ACCEPTANCE OF ENTERPRISE SYSTEMS .....</b>	<b>59</b>	
4.1	Introduction .....	59
4.2	Theoretical background .....	60
4.2.1	Job satisfaction.....	61
4.2.2	Salary.....	63
4.2.3	Job tenure .....	63
4.2.4	Hierarchical position .....	63
4.2.5	Department and type of institution .....	64
4.3	Data and methodology .....	65
4.3.1	Measurement of job-related indicators.....	65
4.3.2	Measurement of the acceptance of enterprise systems .....	69
4.3.3	Reliability and validity tests of the acceptance constructs .....	71
4.4	Results.....	72

4.4.1	The role of job satisfaction.....	752
4.4.2	The role of salary .....	75
4.4.3	The role of job tenure .....	75
4.4.4	The role of hierarchical position .....	756
4.4.5	The role of department.....	78
4.4.6	The role of the type of institution .....	78
4.5	Discussion and Conclusion.....	81
<b>CHAPTER 5</b>		
<b>CONCLUSIONS .....</b>		<b>83</b>
5.1	Chapter 2 .....	84
5.2	Chapter 3 .....	85
5.3	Chapter 4 .....	87
5.4	Directions for further research .....	89
<b>DEUTSCHSPRACHIGE ZUSAMMENFASSUNG.....</b>		<b>91</b>
<b>BIBLIOGRAPHY .....</b>		<b>98</b>
<b>APPENDIX A – PARTICIPANTS PER INSTITUTION.....</b>		<b>105</b>
<b>APPENDIX B – SAFWEB EVALUATION.....</b>		<b>106</b>
<b>APPENDIX C – SAFWEB SUMMARY OF CONSTRUCTS .....</b>		<b>108</b>
<b>APPENDIX D – SUMMARY STATISTICS.....</b>		<b>109</b>
<b>APPENDIX E – COMMENTS OF PARTICIPANTS .....</b>		<b>112</b>
<b>APPENDIX F – RELIABILITY AND VALIDITY TESTS OF THE SAFWEB EVALUATION.....</b>		<b>116</b>
<b>APPENDIX G – COMMON METHOD VARIANCE TESTS .....</b>		<b>118</b>
<b>APPENDIX H – STANDARDIZED PATH COEFFICIENTS OF THE SATURATED MODEL .....</b>		<b>119</b>
<b>APPENDIX I – RELIABILITY AND VALIDITY TESTS OF THE PAM CONSTRUCTS .....</b>		<b>120</b>
<b>APPENDIX J – DESCRIPTIVE STATISTICS BY SALARY, JOB TENURE AND DEPARTMENT .....</b>		<b>122</b>
<b>ERKLÄRUNG NACH § 4 ABS. 1 PROMO .....</b>		<b>123</b>
<b>CURRICULUM VITAE .....</b>		Fehler! Textmarke nicht definiert.

## LIST OF FIGURES

Figure 2.1 Demonstrations as an antecedent of perceived usefulness and perceived ease of use during the pre-implementation phase .....	19
Figure 2.2 Sequence of events in the demonstrations.....	22
Figure 2.3 Summary of the answers to the SAFWeb Evaluation.....	32
Figure 2.4 Demonstration and satisfaction with the current system as antecedents of perceived usefulness and perceived ease of use during the pre-implementation phase	33
Figure 3.1 Comparison of theories .....	40
Figure 3.2 Relationships among the theories .....	42
Figure 3.3 Position of the PAM in the literature .....	43
Figure 3.4 Baseline model (Model 1) .....	46
Figure 3.5 Expected consequences as antecedents of acceptance (Model 2) .....	47
Figure 3.6 Pre-implementation acceptance model (Model 3) .....	48
Figure 4.1 Pre-implementation acceptance of enterprise systems .....	61
Figure 4.2 Job satisfaction moderates the acceptance of enterprise systems .....	62

## LIST OF TABLES

Table 2.1 Summary of the data sets.....	27
Table 2.2 Summary of the answers to the SAFWeb Evaluation .....	31
Table 2.3 Summary statistics of the SAFWeb Evaluation .....	32
Table 3.1 Item outer loadings .....	51
Table 3.2 Validity and reliability .....	52
Table 3.3 Fornell – Larcker Criterion analysis for checking discriminant validity .....	52
Table 3.4 Standardized path coefficients of the PAM.....	54
Table 3.5 Mediator analysis.....	56
Table 4.1 Descriptive statistics of participant salaries .....	65
Table 4.2 Descriptive statistics of participant job tenure .....	66
Table 4.3 Descriptive statistics of participant hierarchical position.....	66
Table 4.4 Descriptive statistics of participant departments .....	67
Table 4.5 Descriptive statistics of participant types of institutions .....	68
Table 4.6 Job Satisfaction Survey – summary of constructs .....	68
Table 4.7 Job Satisfaction Survey – descriptive statistics and alpha coefficients .....	69
Table 4.8 SAFWeb Evaluation – summary of constructs .....	70
Table 4.9 SAFWeb Evaluation – descriptive statistics and alpha coefficients .....	70
Table 4.10 Standardized path coefficients of the acceptance of enterprise systems by level of job satisfaction .....	73
Table 4.11 Standardized path coefficients using the two stage product indicator approach .....	74

Table 4.12 Descriptive statistics by hierarchical position .....	76
Table 4.13 One-way ANOVA and Kruskal-Wallis test (hierarchical position).....	76
Table 4.14 Parametric Bonferroni post-hoc tests to detect differences based on hierarchical position .....	77
Table 4.15 Non-parametric Mann Whitney post-hoc tests to detect differences based on hierarchical position .....	77
Table 4.16 Descriptive statistics by type of institution .....	79
Table 4.17 One-way ANOVA and Kruskal-Wallis test (type of institution) .....	79
Table 4.18 Parametric Bonferroni and Games-Howell post-hoc tests to detect differences based on the type of institution .....	80
Table 4.19 Non-parametric Mann Whitney post-hoc test to detect differences based on the type of institution .....	80

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# CHAPTER 1

## INTRODUCTION

The adoption of new enterprise systems is a top-down organizational innovation that causes important changes in the way employees are used to working. An innovation occurs mainly due to the recognition of a need or dissatisfaction with the current situation. While senior management may perceive there to be a need to adopt a new enterprise system in order to reduce costs, increase productivity, or enhance control and accuracy, employees who are satisfied with the current way of working may not understand how the new technology would improve their work situation.

The use of enterprise systems in organizations is mainly driven by compliance; that is, employees tend to use the new technology because they have to, and not because they are convinced of its value. In many cases, employees are notified about the implementation of the new enterprise system after the decision has already been made, which can be seen as an imposed and unexpected change. This, alongside the lack of awareness about the specific benefits of the enterprise system, may lead individuals to oppose change.

Several factors may predispose employees to resist the implementation of enterprise systems: The use of enterprise systems generates important changes in work procedures, and individuals may fear losing control of their work by switching to an unknown system or unfamiliar way of working (Kim and Kankanhalli, 2009). Using this technology is usually mandatory, and employees often lack the information to convince them that the enterprise system is necessary and will benefit their own work.

According to Abdinnour-Helm et al. (2003), regardless of how beneficial a technology might be, it will not have the desired results unless people engage in behaviors that support the implementation and use of the system. When change is imposed and poorly communicated, employees can become de-motivated and unwilling to perform effectively (Holbeche, 2006). Organizations facing strong opposition from many departments are more likely to delay the adoption of innovations, while organizations in which powerful departments support a potentially disruptive innovation can more easily introduce it (Jun and Weare, 2011). For these and other reasons, user resistance has been recognized as one of the main barriers for the implementation of new information systems (Kim and Kankanhalli, 2009).

*User resistance* is an adverse reaction to a proposed change, which may manifest itself in a visible, overt fashion, or in a less obvious, covert fashion (Hirscheim and Newman, 1988). However, user resistance is not always negative. In some situations resistance towards a new technology is due to the fact that employees recognize that the adoption of a new enterprise system might legitimately be counterproductive for work. Unlike senior management—who have a general perspective of what needs to be done in the organization as a whole—the employees are the experts in the specific tasks of their jobs. They can therefore more easily identify potential problems due to poor technology–task fit, which senior management might not see. It is thus important to obtain bottom-up feedback about the technology and to assess employees’ willingness to accept the technology before implementation takes place. If employees show negative attitudes towards the enterprise system, this is a warning sign that problems may arise during implementation. Such early planning helps to identify potential problems early on, allowing a smoother integration of the enterprise system into the organization.

In an attempt to help organizations reduce resistance, much research has focused on identifying the drivers of the acceptance of new technologies. The technology acceptance model (TAM; Davis et al., 1989) and the unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003) are the most influential theories in the user acceptance literature. These theories can be used to explain the individual-level acceptance of new technologies in both voluntary and mandatory usage contexts. It has been argued, however, that theories in the user acceptance literature apply more readily to situations in which the final user has the choice to adopt or reject the technology (Gallivan, 2001). The TAM and UTAUT measure acceptance in terms of the use of and intention to use the technology. While these are suitable dependent variables in voluntary-usage contexts, in the mandatory-usage context of enterprise systems it is assumed that employees will use the technology for compliance reasons. Therefore, the definition of acceptance of enterprise systems should go beyond the use of or intention to use the new technology, because the fact that employees use the enterprise system does not necessarily mean that they are convinced of its benefits.

In light of the limitations of the current theories in the user acceptance literature to explain the acceptance of enterprise systems, the present thesis studies this phenomenon with a focus on the pre-implementation phase. In the context of the present thesis *pre-implementation acceptance* is defined as employees’ willingness to adopt an enterprise system that replaces incumbent technologies in the organization and that changes the way in which employees are used to working. The *pre-implementation phase* is the earliest period of the introduction of a new technology in an organization. While at this stage the promoter of the innovation can influence certain individual-level factors that determine the acceptance of enterprise systems, there are

some contextual factors that affect acceptance over which the promoter of the innovation has very little influence. During the pre-implementation phase employees have little knowledge about the new technology; the promoter of the innovation can therefore positively influence the technology's acceptance by providing information upon which the initial beliefs and attitudes toward the enterprise system will be based. The theory of reasoned action (TRA; Ajzen and Fishbein, 1980) and the theory of planned behavior (TPB; Ajzen, 1985) demonstrate the critical role of initial beliefs in shaping the attitudes, behavioral intentions, and behavior of individuals. However, beliefs about the technology are not the only factor that shapes its acceptance. Since the adoption of enterprise systems affects the way in which employees are used to working, job-related indicators such as job satisfaction, salary, hierarchical position, length of job tenure, department, and type of institution are proposed in the present thesis as playing a role in whether employees are predisposed to accept or reject a new technology. Although the promoter of the innovation has little influence over these organizational factors, recognizing them during the pre-implementation phase allows the promoter of the technology and the senior management to design more specific communication interventions, thereby enhancing acceptance.

The present thesis contributes to the user acceptance literature by applying the main concepts of the TRA, TPB, TAM and UTAUT to understand, measure and foster the pre-implementation acceptance in the adoption of enterprise systems. In the present thesis, the pre-implementation acceptance of enterprise systems is covered through three single-author papers that analyze this phenomenon from three different perspectives. The first paper focuses on fostering the acceptance of enterprise systems, the second paper develops a model to measure and explain the acceptance of enterprise systems, and the third paper identifies the job-related indicators that relate to the acceptance of enterprise systems. The first paper is qualitative in nature and describes the way in which demonstrations were designed to contribute to the formation of positive beliefs in employees; this first paper also describes the process of gathering data to measure acceptance and identifies—in addition to demonstrations—satisfaction with the incumbent technology as a possible determinant of the salient beliefs of perceived usefulness and perceived ease of use of the new enterprise system. The second paper develops the pre-implementation acceptance model that adapts the TRA, TPB, TAM and UTAUT to the specific context of enterprise systems, and proposes the expected consequences of the implementation on own work and on others as two new antecedents of acceptance. The adapted model is tested empirically using Partial Least Squares – Structural Equation Modelling (PLS-SEM) on the data set gathered during the demonstrations. Finally, the third paper focuses on job-related indicators that the promoter of the innovation has little influence over, but that might affect the acceptance of enterprise systems. This third paper uses PLS-SEM to analyze the role of job satisfaction, and one-way MANOVAs to detect significant differences in the

acceptance of a new enterprise system based on the job-related indicators of salary, hierarchical position, length of job tenure, department, and type of institution.

As a whole, this thesis provides a general overview of the determinants of the pre-implementation acceptance of enterprise systems. It also enhances understanding about the relationships between the different factors that influence acceptance, creates awareness about the importance of the pre-implementation phase in determining the success or failure of implementation, and provides advice for organizations on how to foster acceptance. This thesis offers a new theoretical framework based on the user acceptance and social psychology literature, allowing a more accurate measurement of the acceptance of enterprise systems during the pre-implementation phase.

In the remainder of the present chapter the general objectives of the thesis are stated, followed by the setting of the analysis and data collection. The outline of the thesis is then explained, and a summary of each of the three core papers is presented.

### **1.1 General objectives**

This study seeks to contribute to the user acceptance literature and to enrich the understanding of the individual-level pre-implementation acceptance of enterprise systems by achieving the following objectives:

- (i) Identify the antecedents of the salient beliefs in the user acceptance literature, perceived usefulness and perceived ease of use of a new technology.
- (ii) Provide advice on how to promote the formation of positive beliefs and attitudes toward the adoption of new enterprise systems during the pre-implementation phase;
- (iii) Develop and empirically test an adapted model to measure employees' acceptance of enterprise systems during the pre-implementation phase.
- (iv) Identify the determinants of the pre-implementation acceptance of enterprise systems and explain the relationships among these determinants;
- (v) Create awareness about the role of organizational context in shaping the pre-implementation acceptance of enterprise systems; and
- (vi) Empirically test and identify the job-related indicators that relate to the pre-implementation acceptance of enterprise systems.

### **1.2 The setting of the analysis and data collection**

The data for this study were collected in the Republic of Panama with the support of the Ministry of the Economy and Finance. Although public institutions are some of the main adopters of information and communication technologies, there are very few contributions addressing the adoption of information systems in the public sector (Gallouj and Zanfei, 2013).

Enterprise systems for public institutions are centralized software packages that focus on the vertical reporting of cost information using an integrated system (Bjørnenak and Olson, 1999). Despite the heterogeneous nature of public institutions, enterprise systems are meant to be used as a common system across government institutions and departments to ensure that all users adhere to common standards, rules, and procedures, with a view to reducing the risks of mismanagement of public resources (Chêne, 2009). Enterprise systems are designed to follow the correct procedures for budgeting and government accounting, and to assure more accurate information and greater transparency.

Panama was chosen as the research site due to the link the author has with it, as a former implementer of enterprise systems of the Ministry of the Economy and Finances in the Republic of Panama. The author's former position at the ministry created a perfect collaboration opportunity between academia and the public sector to apply theoretical solutions to real problems and evaluate the results to advance the understanding in the user acceptance literature. In 2012, the Ministry launched the Financial Administration Solution (SAFWeb, in Spanish) for public institutions. SAFWeb is an internet-based software package that can be used to carry out the main financial functions of the budget, accounting, and treasury departments. The software automates budget execution and accounting functions to minimize the possibility of inconsistencies among departments. The adoption of such a technology is considered an innovation because it replaces incumbent systems and permanently changes organizational routines, assigning more responsibility to the accounting department, automating certain tasks, and creating new tasks. After implementation, the accounting, budget, and treasury departments that currently work with the separate old systems would use a single integrated system. In addition, SAFWeb enhances transparency, allowing the Court of Auditors and the Ministry of the Economy and Finance to have real-time access to institutions' financial information, something that is not possible using the current systems.

The implementation period during which civil servants learn how to use a new system and modify their routines to collaborate with other departments often involves increased workload, chaos, and stress. Unexpected problems can easily arise due to the interrelated nature of this change: For example, if something goes wrong in the early steps of a financial transaction, the payment to the supplier might be delayed. In an extreme case, if there is a software error message that prevents the recording of a transaction, the system will not allow the transaction to proceed to the next step until the previous steps are completed. It is therefore not surprising that the implementation of SAFWeb may find some resistance from potential adopters' institutions at all levels of the hierarchy.

The author of the present dissertation, together with the Ministry of the Economy and Finance, designed and implemented demonstrations to promote the formation of

positive beliefs and attitudes in the affected civil servants; at the same time, these demonstrations were used to collect the data necessary to conduct the present study. The Ministry identified 33 potential adopter institutions of SAFWeb in Panama City and invited them to participate in the demonstrations. Two institutions participated in a pilot study and 24 institutions (73% of the total potential adopters) participated in the demonstrations.

At the time of the demonstrations, the participant institutions were not yet scheduled to implement SAFWeb, so employees were uncertain about when they would implement the system. However, it was clear to all participants that once the decision to implement the system was taken they would be required to use the technology.

Demonstrations took place in September 2013 in the training room of the Directorate of National Accounting in the Ministry of the Economy and Finance of the Republic of Panama. Demonstrations were separated by institution to give participants the opportunity to ask specific questions related to their institutions. In total, 236 civil servants from 24 public institutions participated in the demonstrations.

The welcome speech to the demonstrations, as well as the written instructions for the questionnaires, both explained to participants that the Directorate of National Accounting considered them to be the best judges of the system because they would be the final users of SAFWeb if it were implemented. Further, the presenter informed participants that at the end of the demonstrations they would be given two surveys, and encouraged them to be honest in their evaluation. Participants were told that their answers to the surveys and their feedback would be used to make technical improvements to SAFWeb and to improve the implementation services offered by the ministry. Participants were assured that their anonymity would be protected, and that their home institutions would receive no feedback about their answers, not even aggregated information. It was expected that this explanation and assurance of anonymity would motivate the objectivity and honesty of participants in their answers to the surveys.

Data collection was completed using self-reported data from three surveys: a Registration Form, the Job Satisfaction Survey (JSS; Spector, 1985), and the SAFWeb evaluation. The registration form asked about demographic information, as well as job-related variables such as the length of job tenure, department, hierarchical position, and salary.

The Job Satisfaction Survey (JSS; Spector, 1985) assesses nine facets of job satisfaction and overall satisfaction: pay, promotion, supervision, fringe benefits, contingent rewards (i.e., performance-based rewards), operating conditions, coworkers, nature of work, and communication. The scale contains 36 items and uses a summed rating scale format. Each of the nine facet subscales is assessed using four items, and a total satisfaction

score is computed by combining all of the items (Spector, 1997). The answers to each item are given on a 6-point Likert-type scale from 1 to 6 where 1 is “strongly disagree” and 6 is “strongly agree.” The JSS was chosen for this study because it was specifically designed for human service, public, and nonprofit sector organizations (Spector, 1985). It is also free to use for research purposes and it is shorter than other scales that were considered for use, such as the Job Descriptive Index (JDI; Kihm et al., 1997) and the Minnesota Satisfaction Questionnaire (Weiss et al., 1967).

The original JSS scale is in English, and a Spanish translation was provided by Marion-Landais (1993). This Spanish translation was edited by the author of the present thesis, who is a Spanish native speaker from the Republic of Panama. The edited version of the scale was then proofread by one bilingual and two monolingual Panamanian civil servants working for the Ministry of the Economy and Finance in the Republic of Panama.

The SAFWeb pre-implementation evaluation contained 31 items assessing seven constructs: perceived ease of use, perceived usefulness, self-efficacy, expected consequences of the innovation, institutional influence, commitment intention, and attitude toward using the system. The author of the present study adapted 21 items from previously validated scales by Venkatesh et al. (2003), Moore and Benbasat (1991), and Taylor and Todd (1995); the author also developed nine original items for the constructs of *commitment intention* and *expected consequences of the implementation*. Michel et al.’s (2013) translation of the UTAUT to Spanish was used as basis for the SAFWeb evaluation, and the rest of the items were either translated from English to Spanish or developed directly in Spanish by the author of the present thesis. The Spanish version of the scale was then proofread by one bilingual and two monolingual civil servants working for the Ministry.

A pilot study was conducted with 12 civil servants from two public institutions, who attended a training on SAFWeb. The aim of the pilot study was to find out whether these employees had any difficulties in understanding the questionnaires. After analyzing the answers to the questionnaires from the pilot study, some positively worded items were converted to negatively worded items to reduce acquiescence bias (Spector, 1992). The response rate to the surveys was high. This can be explained by the fact that participants were in a natural environment, in a neutral institution and the importance of the participants’ answers to the questions was also impressed upon them from the very beginning of the demonstrations.

The registration form had no missing values because it was completed online immediately before the demonstration started, and could not be submitted until all mandatory blank fields had been filled in. Out of the 236 demonstration attendees, 230 successfully submitted the registration form. Six participants either arrived late to the

demonstration or encountered technical problems that prevented them from submitting the data. As the missing values for individual items on the Job Satisfaction Survey and the SAFWeb Evaluation were always below 10%, the mean-replacement method was used, allowing the author to preserve as much data as possible.

### **1.3 Outline of the thesis**

This thesis comprises three single-author papers that address the individual-level acceptance of enterprise systems during the pre-implementation phase.

#### **1.3.1 Chapter 2**

The second chapter is a qualitative paper that addresses the question of what can be done to promote the formation of positive beliefs and attitudes toward new enterprise systems during the pre-implementation phase. The existing TAM-based research has been criticized for repeatedly demonstrating that perceived usefulness and perceived ease of use are significant determinants of acceptance, but without informing readers as to how to influence those beliefs. The author in collaboration with the Ministry of the Economy and Finance design and implement demonstrations, with a goal of reducing the potential skepticism of civil servants in the Republic of Panama toward a new enterprise system for public institutions, SAFWeb. By the time of the study in 2013, the number of public institutions who had committed to implementing the system was small, and even these few scheduled implementations were postponed several times or even cancelled. The Ministry, together with the author, determined that one of the possible causes of this reticence to adopt the new system was a lack of knowledge about the benefits of SAFWeb.

This chapter describes how demonstrations were designed and implemented to persuade civil servants of the benefits of SAFWeb. The welcoming speech to the demonstrations fostered the honesty of participants by explaining to them that their feedback about and evaluation of the new technology would be used to improve SAFWeb. The theoretical portion of the presentation created awareness about the importance of change and provided information about the benefits and the consequences of implementation for the Ministry of the Economy and Finance the adopting institutions, and the different departments. Moreover, participants obtained hands-on experience registering sample transactions in SAFWeb with the guidance of the presenter. Immediately after the demonstrations, participants expressed their beliefs and attitudes toward the technology via the SAFWeb Evaluation survey.

The answer to each item on the SAFWeb Evaluation was given on a 7-point scale from 1 to 7, where 1 is the negative end of the scale “totally false” and 7 the positive end “totally true”. Most of the answers had scores between five and seven, showing that after the demonstrations the majority of the participants expressed positive beliefs and attitudes towards SAFWeb. Further, the SAFWeb Evaluation had a section where

participants could add unstructured comments about the system. Out of the 235 participants who answered the evaluation, 81 (34%) wrote comments, of which 56 (69%) were positive, 12 (15%) were skeptical and, 13 (16%) gave suggestions. While some participants expected that the technology would improve their work situation, others revealed worries about some of the changes in the work procedures that, to their mind, would generate problems during the implementation of the technology.

The written comments of the participants provided interesting insights into the antecedents of initial beliefs and attitudes towards a new technology. For instance, from the written comments, it was identified that satisfaction with the incumbent system might influence the way in which participants evaluate the new technology, with several participants evaluating the technology in comparison to the incumbent system. Employees who are dissatisfied with the current way of working might be more willing to adopt a better alternative than those who are satisfied with their current way of working. The demonstrations provided the information that allowed participants to form beliefs and attitudes toward the technology, and in some cases to even form a critical judgement about it. Some participants were able to identify potential threats posed by the technology that otherwise would have been discovered too late during the implementation process.

The findings in Chapter 2 support the hypothesis that early involvement through demonstrations is associated with the formation of sound, positive beliefs and attitudes toward implementation in employees with no previous experience with a new technology. Since the implementation of enterprise systems is a top-down innovation, such demonstrations allow for important bottom-up feedback from the end-users, who usually have a much clearer perspective of the reality of their jobs than their supervisors. The present study contributes to praxis by describing the way in which strategies were applied in the design and implementation of demonstrations to promote the formation of positive beliefs and attitudes toward a new enterprise system. These strategies could be applied to the design of demonstrations in other contexts. The study contributes to the user acceptance literature by identifying demonstrations and the satisfaction with the incumbent technology as antecedents of the perceived usefulness and perceived ease of use about new enterprise systems. This extends understanding about the determinants of the initial beliefs about new technologies and proposes new directions for further research in the user acceptance literature.

### **1.3.2 Chapter 3**

The third chapter addresses the question of how can the pre-implementation acceptance of enterprise systems be measured, and develops the pre-implementation acceptance model. The pre-implementation acceptance model (PAM) builds upon four key theories of the social psychology and the user acceptance literatures: the theory of reasoned action (TRA; Fishbein and Ajzen, 1975), the theory of planned behavior (TPB;

Ajzen, 1991), the technology acceptance model (TAM; Davis et al., 1989), and the unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003). These four models were chosen as the theoretical basis for the PAM due to their relevance in the user acceptance literature and their similarities. The TRA and TPB are key theories in social psychology, and served as the theoretical framework for the development of the two main theories in the user acceptance literature, the TAM and UTAUT. While the TRA and TPB can predict and explain almost any human behavior, the TAM and the UTAUT focus on explaining user acceptance of information systems.

The TAM and the UTAUT are well-suited for voluntary contexts in which the individual has the choice to adopt or reject the technology. These two theories measure acceptance with the actual use or the intention to use the technology. However, in the context of enterprise systems, employees are expected to use the technology for compliance reasons. Therefore, if employees are asked during the pre-implementation phase whether they intend to use the technology, most will probably answer in the affirmative, but only because they might feel that no matter what they answer, they will be mandated to use the enterprise system.

In order to address this limitation in the literature, Chapter 3 develops the PAM for use in this subfield of the user acceptance literature, applying the main constructs of the TRA, TPB, TAM, and UTAUT to the specific context of enterprise systems. Chapter 3 proposes three versions of the PAM. The baseline model uses the main constructs of the TRA to measure pre-implementation acceptance: (i) *attitude toward using the system* (i.e., the employee's positive or negative evaluation of using the system), (ii) *institutional influence* (i.e., the employee's perception that important others in the organization will support the use of the system), and (iii) *commitment intention* (i.e., the employee's intention to engage in activities that support the implementation of the enterprise system). In addition to these constructs, the baseline model adds the beliefs proposed by Davis et al. (1989) in the TAM as determinants of attitudes toward using the system: *Perceived usefulness*, the degree to which a person believes that using a particular system would enhance his or her job performance, and *perceived ease of use*, the degree to which a person believes that using a particular system would be free of effort.

In the baseline model of the PAM, all of the constructs and relationships presented are supported by the TRA and TAM. Model 2 extends the baseline model with two new constructs developed by the author: *Consequences on own work*, which is the expected outcome of implementation in terms of day-to-day work, and *consequences on others*, which are the perceived externalities of the implementation. It is hypothesized that an employee who thinks that the implementation and the use of the system will bring positive consequences to his or her own job should also develop positive attitudes toward the use of the system. Therefore, consequences on own work is placed in the model as a direct determinant of the attitudes toward using the system. Similarly, it is hypothesized that perceived externalities of the technology might affect the institutional

influence. For instance, knowing the consequences others will receive from the technology would help the employee infer whether important others in the organization would support the use and implementation of the system.

The final version of the PAM, Model 3, proposes that the construct *consequences on own work* mediates the relationship between perceived usefulness, perceived ease of use, and attitudes toward use. According to this proposition, an employee who gains information about a new information system will initially form her beliefs about how useful or easy to use the system is. Those initial beliefs then help the employee anticipate the consequences of using the system in her day-to-day work. For instance, an employee who thinks that the system is difficult to use might think that using the system would not have positive consequences for her job. Thus, the construct *consequences on own work* is hypothesized to mediate the effects of perceived ease of use and perceived usefulness on attitude toward use.

The empirical analysis using Partial Least Squares – Structural Equation Modeling supported the three models, and revealed new and interesting relationships that have not yet been examined on the theoretical level. Attitudes towards using the system and institutional influence were found to explain more than 53% of the employees' commitment intention to support the implementation. Furthermore, the expected consequences of implementation on one's own work and on others were found to play an important role in determining the attitudes toward use and the institutional influence, respectively. The pre-implementation acceptance model is therefore successful in positioning the theoretical frameworks from social psychology and user acceptance literature to the specific context of enterprise systems, using the available theoretical information to both advance understanding about the antecedents of pre-implementation acceptance and to provide practical advice to practitioners.

### **1.3.3 Chapter 4**

Cooper and Zmud (1990) recognized the need to conduct more research in the area of information systems to explore the impact of contextual factors on multiple implementation stages. For this reason, the fourth chapter empirically tests whether there are significant differences in the pre-implementation acceptance of enterprise systems based on the job-contextual factors of job satisfaction, salary, length of job tenure, hierarchical position, department, and type of institution. These factors were chosen for the following reasons: First, the change management literature has found job satisfaction, satisfaction with salary, length of job tenure, and hierarchical position to have an impact on employees' acceptance of organizational change; however, little research has tested this impact on the acceptance of enterprise systems. Second, except for job satisfaction, all of the factors listed here are objective measures that are easily available to the organization (e.g., via the human resources department). Third, due to the disruptive nature of enterprise systems in the work place, it is worth looking into

whether the department and type of institution in which employees will adopt the enterprise system shape the way in which people react to a new technology during the pre-implementation phase.

Pre-implementation acceptance is measured with the three main constructs of the pre-implementation acceptance model (PAM): (i) The attitude toward using the system, (ii) institutional influence, and (iii) commitment intention. A Partial Least Squares – Structural Equation Modeling (PLS-SEM) analysis was conducted to determine whether the relationship between the *attitude toward using the system* and *commitment intention*, as well as the relationship between *institutional influence* and *commitment intention* are significantly stronger for highly satisfied employees than for unsatisfied employees.

As the total job satisfaction score is a continuous variable measured with the Job Satisfaction Survey (JSS), it was dichotomized into *highly satisfied* and *unsatisfied* participants based on median scores (Hair et al., 2014). The PLS-SEM analysis was then performed three times: using the whole sample, the unsatisfied subsample ( $n = 104$ ), and the highly satisfied subsample ( $n = 112$ ). In the three analyses the *attitude toward using the system* had a positive and significant relationship with *commitment intention*. However, the relationship between *institutional influence* and *commitment intention* was significant only for the whole sample and for the unsatisfied subsample; this relationship became insignificant for the highly satisfied subsample.

The differences in the path coefficients between the unsatisfied and the highly satisfied subsamples were found to be significant. This result suggests that the relationship between *attitude toward using the system* and *commitment intention* was indeed significantly stronger for highly satisfied employees than for unsatisfied employees. However, contrary to what was expected, the relationship between *institutional influence* and *commitment intention* was significantly weaker for highly satisfied employees than for unsatisfied employees.

Based on these findings, it can be inferred that compliance and consensus with others in the organization are important reasons for unsatisfied civil servants to commit to making implementation possible. For highly satisfied civil servants, institutional influence did not play a role in determining their commitment intention. It seems that having positive attitudes towards the use of the enterprise system is reason enough for highly satisfied employees to commit to implementation activities.

The second part of the analysis tests the differences in the scores of *attitude toward using the system*, *institutional influence*, and *commitment intention*, based on participants' salary, job tenure, hierarchical position, department, and type of institution. Since these job-related indicators are categorical, one-way MANOVAs were conducted for the analysis. While no significant differences were found in the

acceptance scores based on participants' salary, job tenure, or department, the one-way MANOVAS revealed significant differences based on the hierarchical position and the type of the institution. The follow-up tests—which employed the one-way ANOVA, as well as its non-parametric counterpart, the Kruskal-Wallis test—confirm these findings. The post-hoc tests revealed that supervisors and heads of departments had higher scores for *attitudes toward using the system* and *commitment intention* than rank-and-file participants. One interpretation for these differences in attitudes toward use and commitment intention is that supervisors gain more control with the new technology, as SAFWeb provides a platform through which supervisors can revise and authorize each entry completed by the civil servants under their supervision. However, rank-and-file employees might naturally see it as negative that the new technology allows supervisors to monitor everything what they do. Supervisors are responsible for getting things done and for solving potential problems in their departments, this responsibility awareness might explain the higher commitment intention of supervisors as compared to rank-and-file employees.

For type of institution, the post-hoc tests showed that participants who worked in central government institutions expressed lower attitudes toward using the system, institutional influence, and commitment intention compared to those working in decentralized institutions and municipalities. Based on these findings, it seems that the type of institution captures part of the organizational context in which implementation takes place, thereby shaping the way in which participants react to the implementation of the new enterprise system. A lack of technology fit, as well as differences in managerial policies and routines could be some reasons for the lower acceptance scores of civil servants working for central government institutions, as compared to those working for decentralized institutions or municipalities.

These findings enrich the knowledge base of the user acceptance literature by demonstrating that job satisfaction, hierarchical position, and type of institution were associated to the employees' predisposition to accept or reject a new enterprise system. This knowledge can inform better strategies to promote new technologies. For instance, if the Ministry of the Economy and Finance, the supplier of SAFWeb, knows in advance that civil servants working in central government institutions might express lower acceptance compared to civil servants working in decentralized institutions and municipalities, and that rank-and-file employees also express lower acceptance than supervisors, the ministry would adapt new strategies accordingly, and exert more effort to convince those employees who have the factors associated with higher resistance—e.g., rank-and-file employees working for central government institutions—about the benefits of the new technology.

In conclusion, the present study provides empirical evidence to encourage scholars to test the relationships between job-related indicators and the pre-implementation

acceptance of enterprise systems in different contexts. In the specific case of the acceptance of SAFWeb in the Republic of Panama, only job satisfaction, hierarchical position, and type of institution had significant relationships with acceptance; however, it cannot be inferred that these same job-related indicators play a role in the adoption of enterprise systems in the private sector or in other countries. Finally, organizations should consider the role of job-related indicators in the design of interventions to enhance user acceptance of enterprise systems.

#### **1.3.4 Chapter 5 – Conclusions**

The fifth chapter summarizes the main theoretical and practical contributions of the thesis, discusses the main findings, and, based on the knowledge obtained during the execution of the study, provides directions for further research.

## CHAPTER 2

# PRE-IMPLEMENTATION ACCEPTANCE OF ENTERPRISE SYSTEMS: INDUCING THE FORMATION OF POSITIVE BELIEFS AND ATTITUDES IN EMPLOYEES

### 2.1 Introduction

The implementation of enterprise systems constitutes a major organizational innovation that requires employees to learn how to use the technology and integrate it into their daily work routines. A normal reaction to such changes is resistance, which has been identified as a salient reason for the failure of new information systems (Kim and Kankanhalli, 2009). Hirscheim and Newman (1988) define *resistance* as an adverse reaction to a proposed change, which may manifest itself in a visible, overt fashion, or in a less obvious, covert fashion. Employees in the organization that is implementing a new enterprise system have to make an effort for the implementation to succeed. If they are resistant to change, it is possible that the adoption of the technology will be delayed; once the implementation has taken place, workers may use this new technology as an excuse for every difficulty encountered, inputting incorrect data and, for example, maintaining alternative sets of manual records (Hirscheim and Newman, 1988). This can increase time the organization needs to fully benefit from the productivity gains, cost reductions, and enhanced accuracy that enterprise systems provide.

Hirscheim and Newman (1988) identified a lack of involvement in change as one of the causes of user resistance. For this reason, they recommend user participation as an effective strategy to produce knowledge about the change and mitigate resistance. Similarly, Holbeche (2006) recognized that when change is imposed and poorly communicated, employees can become de-motivated and unwilling to perform effectively. It is therefore crucial that the promoter of the technology and senior management play a proactive role in designing interventions that foster the formation of positive beliefs and attitudes toward the enterprise system in the early stages of implementation.

Since initial beliefs about an object or individual play a critical role in shaping individual attitudes, behavioral intentions, and behavior (Ajzen and Fishbein, 1980; Ajzen, 1985), it can be inferred that initial beliefs are associated with the subsequent user resistance or acceptance of new enterprise systems. More specifically, the Technology Acceptance

Model (TAM; Davis, 1989) identifies two salient beliefs that determine the acceptance of new technologies: perceived usefulness and perceived ease of use. *Perceived usefulness* is the degree to which a person believes that using a particular system would enhance his or her job performance, while *perceived ease of use* is the degree to which a person believes that using a particular system would be free of effort (Davis et al., 1989). Although the TAM is one of the most influential theories in the user acceptance literature, Benbasat and Barki (2007) criticize TAM-based research, arguing that repeatedly demonstrating that certain beliefs are influential without understanding how to influence such beliefs is of limited value. They suggest investigating the antecedents of perceived usefulness and perceived ease of use in order to produce research that is able to provide advice.

According to Venkatesh and Bala (2008), effective training interventions can mitigate negative reactions toward enterprise systems and help employees to form favorable perceptions about usefulness and ease of use of these systems. In the same vein, Amoako-Gyampah and Salam (2004) suggest that managers can proactively and directly influence beliefs about usefulness and ease of use through training, which both disseminates pertinent information about the enterprise system and allows users to interact with the technology, thereby obtaining first-hand information and experience.

Although training is considered a post-implementation intervention—because it is often conducted after a system has been implemented and is ready to be operated by potential users (Venkatesh and Bala, 2008)—the author of the present study suggests that training should instead be provided during the pre-implementation phase. The *pre-implementation phase* is the earliest period of the introduction of a new technology in an organization, before the senior management has decided when to adopt the enterprise system. At this stage, it is possible to influence the initial perceptions of individuals about the new technology by providing information upon which beliefs and subsequent attitudes will be based (Herold et al. 1995).

Few studies in the user acceptance literature provide advice on how to influence positively the perceived usefulness and perceived ease of use about a new enterprise system during the pre-implementation phase. In an attempt to fill this gap, the present study uses the action research method and survey data to find out whether demonstrations during the pre-implementation phase are associated with the formation of positive beliefs and attitudes toward a new enterprise systems. According to Baskerville (1999), *action research* is an established research method that produces highly relevant research results; this is due to the fact that it is grounded in practical action, aimed at solving an immediate problem situation while also informing theory.

The study was conducted with the support of the Ministry of the Economy and Finance in the Republic of Panama, the supplier of the new enterprise system for public institutions, SAFWeb. At the time of this study, the ministry was facing problems in gaining acceptance of SAFWeb among public institutions. Although the first four pilot implementations of SAFWeb took place at the end of 2012, the number of public institutions who committed to implementing the system in 2013 was small, and even these few scheduled implementations were postponed several times or even cancelled. Reacting to this, the author of the present study in collaboration with the Ministry designed and implemented demonstrations to foster the formation positive beliefs and attitudes toward the new technology, SAFWeb. Immediately following these demonstrations, participants were asked to express their beliefs and attitudes towards the technology via a survey. Note that Panama was chosen as the research site due to the link the author has, as a former implementer of enterprise systems in the Directorate of National Accounting of the Ministry of the Economy and Finance in the Republic of Panama. This created a perfect collaboration opportunity between academia and the public sector to apply theoretical solutions to real problems, and to evaluate the results through self-reported participant data.

This chapter proceeds as follows: Section 2.2 presents the theoretical background, Section 2.3 describes the structure of the demonstrations, Section 2.4 explains data collection, Section 2.5 evaluates the results, Section 2.6 discusses the practical implications of the research, and Section 2.7 concludes.

## **2.2 Theoretical background**

Rogers (2003) conceptualizes five stages in the innovation-decision process: (i) *knowledge*, the individual gets information about the innovation; (ii) *persuasion*, the person forms a favorable or unfavorable attitude towards the innovation; (iii) *decision*, the potential adopter chooses whether to adopt or reject; (iv) *implementation*, the adopter starts using the innovation, and (v) *confirmation*, the adopter uses the innovation on a continuous basis. The focus of the present study is the pre-implementation phase, more specifically, the knowledge and persuasion stages. While the knowledge stage commences when an individual is exposed to an innovation's existence and gains an understanding of how it functions, the persuasion stage is when individuals form their beliefs about the characteristics of the innovation (Rogers, 2003).

Herold et al. (1995) recognize that communication systems in organizations determine the information basis of beliefs and subsequent attitudes toward the upcoming change. They suggest that the pre-implementation attitudes toward a technology are the starting point that shape future implementation phases:

*The dynamic, time-dependent nature of attitudes suggests that early attitudes should not be ignored simply because they are likely to be modified later on. Rather, these early attitudes are important because they may shape early behaviors, which will shape future experiences, which will, in turn affect future attitudes, which will shape behaviors further along during the implementation process p. 160.*

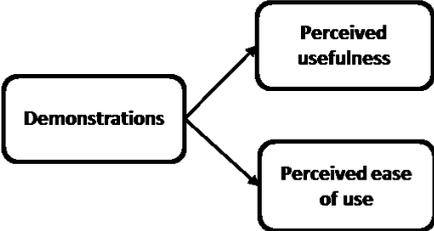
While positive pre-implementation attitudes towards a technology facilitate implementation success, negative pre-implementation attitudes may hinder it (Abdinnour-Helm et al., 2003; Herold et al., 1995). Herold et al. (1995) found that early pre-adoption positive attitudes towards a new technology are influenced by the belief that change is needed, that the training environment will be supportive, and that management respects the employees' rights. For this reason, Herold et al. recommend that organizations provide information early on in the implementation process—before the final selection of specific technologies is even made—about why current conditions are not acceptable, how the future is related to the use of new technologies, and what will be done to help individuals migrate to the new system.

Conversely, Abdinnour-Helm et al. (2003) found that higher levels of exposure to the technology and more involvement do not seem to dramatically change the attitudes of employees. This finding contradicts the suggestions made by Herold et al. (1995) that implementing communication strategies enhances pre-implementation attitudes toward technologies. However, Abdinnour-Helm's study was problematic for a number of reasons. First, the level of involvement was measured through the participation in one of four workshops. Second, consultants—as opposed to the researchers—decided the content of the four workshops, making it difficult to know what information was given in each workshop and how much exposure to the technology each group received. Third, only certain employees were selected by the top management to have the highest involvement in the workshops. This might have decreased the perception of choice among employees, especially for those who were only given the opportunity to participate in the workshops at the lowest level of involvement. Finally, the time gap between participating in the workshops and answering the surveys might have reduced the effect of the levels of involvement. The bigger the time gap between an intervention and answering surveys, the more people need to recall past information and other sources of information (e.g., communication between colleagues), which can impact their reported original beliefs and attitudes. For these reasons it might be misleading to conclude that the level of involvement does not relate to the attitudes of employees.

Although Herold et al. (1995) and Abdinnour-Helm et al. (2003) do focus on the pre-implementation acceptance of new technologies, there are still some limitations, which the present study attempts to address. For instance, while Herold et al. (1995) found that pre-implementation beliefs influence attitudes toward the technology, they did not

study participation in trainings or workshops as antecedents of those beliefs. Abdinnour-Helm et al. (2003) studied the effect of participation in workshops as an antecedent of pre-implementation beliefs; however, the lack of control in the design of the workshops, the pre-selection of participants to certain workshops, and the time gap between participating in the workshop and answering the survey indicate a need for further research to confirm their findings. Finally, these two studies do not use the main constructs proposed in the technology acceptance model, the perceived ease of use and perceived usefulness in the measurement of pre-implementation acceptance.

Several studies have provided empirical evidence regarding the association between training and beliefs about perceived ease of use and perceived usefulness. In one study, Agarwal and Prasad (1999) found that participation in training on an information technology innovation was positively associated with usefulness beliefs about that innovation. However, they did not find any association between participation in training and perceived ease of use. Amoako-Gyampah and Salam (2004) found significant empirical support for the assertion that training improves beliefs about the benefits of enterprise systems, and that these beliefs directly influence the perceived ease of use and the perceived usefulness of the technology. Since trainings are considered a post-implementation intervention (Venkatesh and Bala, 2008), the present study proposes demonstrations as a pre-implementation intervention, which is expected to be positively associated with the early formation of beliefs of perceived ease of use and perceived usefulness (see Figure 2.1).



**Figure 2.1 Demonstrations as an antecedent of perceived usefulness and perceived ease of use during the pre-implementation phase**

Demonstrations are an early type of training that occurs during the pre-implementation phase. During the pre-implementation phase, employees have little or no information about the new enterprise system. Thus, the demonstrations provide the very first information and practical experience upon which initial beliefs about the technology will be based. For this reason, senior management has a huge influence during the pre-implementation phase, because they can control the information that will shape the beliefs and expectations of employees about a new enterprise system. Such advance planning through demonstrations allows organizations to take a proactive role in fostering the positive beliefs that will subsequently determine the acceptance of enterprise systems, as opposed to a merely reactive role in response to employee resistance.

## **2.3 Overview of the action research project**

The Ministry of the Economy and Finance of the Republic of Panama is the supplier of the enterprise system SAFWeb; this system was intended be implemented in all the public institutions that, at the time of the present study, still used old and unintegrated systems. As the Ministry noticed that there was considerable skepticism from potential adopter institutions about the benefits of SAFWeb, the author of the present study, arranged with the Ministry to design and implement demonstrations before the target public institutions were scheduled to implement SAFWeb. These demonstrations were designed to foster the formation of positive beliefs and attitudes toward the enterprise system. It was further agreed that during the demonstrations the author would gather survey data from participants, with which to conduct the present study. This created an excellent research opportunity, which both benefitted the Ministry to enhance acceptance of SAFWeb and contributed to the understanding of the antecedents of user acceptance.

The Directorate of National Accounting in the Ministry provided all the facilitating conditions necessary to conduct the present study. The author worked together with the staff from different departments in the Directorate to understand the functionality of SAFWeb. Based on this more in-depth understanding of SAFWeb, the author prepared the theoretical presentation and the practical exercises that would be executed by the participants during their interaction with the system. The demonstrations were designed in collaboration with the staff of the Directorate, which also provided support in proofreading the surveys that would be used to gather the data.

Unlike most action research methods, in which data are based on interviews and observations made by the researcher, the author of the present study gathered the data using surveys. The surveys allowed obtaining qualitative information from written comments of participants to find new insights about acceptance. The survey data made it also possible to conduct the empirical analysis in the following two chapters. Although it is usual that action research projects execute several cycles of the action research method (diagnosing, action planning, action taking, evaluation, and specifying learning), due to time constraints this study conducted one cycle of the stages, which will be explained in the following five sections.

### **2.3.1 Diagnosing**

SAFWeb is an internet-based software package that includes the main financial functions of the budget, the accounting, and the treasury departments. The software automates budget execution and accounting functions to minimize the possibility of inconsistencies among departments. The adoption of such a technology is considered an innovation because it replaces incumbent systems and permanently changes organizational routines, assigning more responsibility to the accounting department,

automating certain tasks, and creating new tasks. The departments of accounting, the budget, and the treasury that currently work with separate obsolete systems would use a single integrated system after implementation. It is therefore expected that the implementation of SAFWeb will encounter some resistance from potential adopters' institutions at all levels of the hierarchy.

In January and February 2013, civil servants of the Directorate of National Accounting visited potential adopter institutions of SAFWeb in Panama City and its surroundings to diagnose the acceptance of SAFWeb. During the visits, the staff of the directorate noticed that civil servants were very skeptical about how SAFWeb would improve their current work situation. The consequences of that skepticism were already manifest by the time of the present study. Although SAFWeb is free of charge for the adopting institutions, the number of public institutions who committed to implement the system was small, and even these few scheduled implementations were postponed several times or even cancelled. Since scholars such as Hirscheim and Newman (1988) and Holbeche (2006) have identified that lack of information and lack of participation in change is one of the main causes of resistance. The author of the present study inferred that one of the possible causes of this inertia was a lack of knowledge about the concrete benefits of SAFWeb.

### **2.3.2 Action Planning**

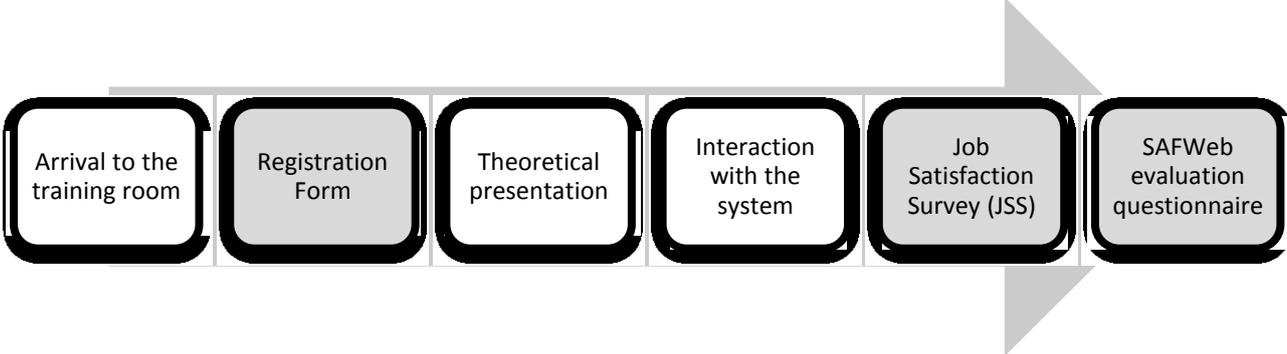
Herold et al. (1995) recommend the use of communication strategies to persuade individuals of the benefits of change during the pre-adoption phase, before any decision about the adoption of the technology has been made. Accordingly, SAFWeb demonstrations were designed to achieve the following objectives:

- Create awareness about the system and its benefits,
- Provide information to civil servants about the need to adopt SAFWeb,
- Positively influence civil servants' perceptions about the new technology and enhance their willingness to implement it in their institutions,
- Receive feedback from the civil servants about improvements to the system so that it would better fit their organizational needs, and
- Gather individual-level data on personal characteristics, job-related variables, and acceptance of the system.

For a better understanding of the structure of the demonstrations, Figure 2.2 illustrates the sequence of events.

First, civil servants arrived at the training room and took a seat in front of a computer. Each place had a folder with instructions and two questionnaires: the Job Satisfaction Survey (JSS) and the SAFWeb evaluation questionnaire. The instructions stated that the

Directorate of National Accounting was carrying out a study to identify the needs and perceptions of the future users of SAFWeb, with the purpose of improving the services offered by the Directorate. Participants were then asked to fill out the registration form displayed on their computer. The form included demographic and job-related questions such as their department, hierarchical position, salary, and length of job tenure. Once all participants submitted the registration form, the theoretical presentation started, followed by the interaction with the system. At the end of the demonstrations, participants were asked to answer the job satisfaction questionnaire and the SAFWeb evaluation questionnaire.



**Figure 2.2 Sequence of events in the demonstrations**

The gray squares represent the instruments used for data collection

The design of the demonstrations applied the following seven strategies:

**Inducing a rational attitude:** Petty, Cacioppo, and Schumann (1983) found that a critical feature of persuasion is that an attitude change is based on a diligent consideration of information that a person feels is central to the true merits of an issue or product. Personal relevance and involvement manipulations induce effortful information processing, which leads to the formation of strong attitudes (Petty, Cacioppo and Schumann, 1983; Kardes, 1988; Petty and Cacciopo, 1990). The willingness of an audience to be objective is an important step in gaining its acceptance, and asking people to be careful and objective motivates them to think harder (Zimbardo and Leippe, 1991).

According to these suggestions, the welcoming speech to the demonstration attempted to trigger a rational attitude in participants by informing participants about the study and of the ministry’s interest in obtaining feedback to improve SAFWeb and the services of the Directorate of National Accounting. Participants were asked to act as judges of SAFWeb and to be as objective as possible, as their answers to the evaluations at the end of the demonstration would be used to improve the software. Participants were also informed that no feedback would be given to their own institutions.

**Reducing status quo bias:** Status quo bias can manifest as inertia, a preference to stay with the incumbent course of action despite the existence of better alternatives or incentives to change (Polites and Karahana, 2012). This inertia may be due to the fact that individuals prefer not to lose control of their work by switching to an unknown system or unfamiliar way of working (Kim and Kankanhalli, 2009). Polites and Karahana (2012) recognize that uncertainty about the benefits of alternative systems may lead individuals to stick to the incumbent system. Further, Herold et al. (1995) find that one's belief that change is necessary is related to positive pre-adoption attitudes. Thus, in order to reduce status quo bias, individuals must be aware that change is essential.

Following these recommendations, the first thirty minutes of the demonstrations consisted of a theoretical presentation that aimed to reduce the status quo bias of civil servants by providing information about

- The reasons for and importance of change for the Ministry of the Economy and Finance and the adopter institutions,
- Explanations about what would change after the implementation of SAFWeb, which incumbent systems SAFWeb would replace, and what the new transactional flow processes would be, and
- The benefits of implementation for the adopter institutions; the departments of Accounting, the Budget, and the Treasury; and for employees' day-to-day work.

The theoretical presentation sought to sell the benefits of the system and to clarify the consequences of implementation as much as possible. The objective was to make participants less uncertain about the technology and to make them desire to implement SAFWeb in their institutions.

**Providing first-hand experience:** Cognitive response theory predicts that people with more first-hand experience with an object or individual should be more influenced by one kind of message than those with less experience (Zimbardo and Leippe, 1991). Attitudes formed by direct experience tend to be held more confidently than those formed indirectly, and experiments have confirmed that behavior is predicted more accurately from attitudes that are held more confidently (Aiken, 2002; Ajzen, 1988). Moreover, Venkatesh (1999) argues that practical experience gained through trial use and training may help reduce uncertainty and create favorable attitudes towards the technology in question.

After the theoretical presentation, participants were asked to use SAFWeb to register an example of credit purchase order and to execute all the steps up to the issuance of a fictitious check. Regardless of which department civil servants came from, they all were asked to go through the functions for all modules, with the guidance of the presenter. The presenter explained step by step what the users had to do in the system and what

resources could consult to verify the accuracy of the information they had entered. The interaction with the system took approximately one and a half hours. Participants were assisted to make sure that they kept pace with the presenter, and had the opportunity to ask questions at any time during the demonstration.

**Generating repeated exposure:** Empirical evidence has shown that in attempts to change attitudes by means of persuasive communications, repeated exposure of an individual to an object or individual enhances his or her attitude toward it (Zajonc, 1968; Harmon-Jones and Allen, 2001; Cox and Cox, 2002). Attitudinal enhancement produced by means of exposure will be more readily effected for novel objects than for familiar ones (Zajonc, 1968). According to Zimbardo and Leippe (1991), repeated exposure alone creates positive affect, probably because people feel less uncertain toward known objects, which contributes to that basic sense of control and predictability that individuals seem to need at their most fundamental level.

In order to create repeated exposure, the interaction with the system during the demonstrations followed the same structure as the usual trainings employees receive before a new technology is fully integrated in the organization. In the trainings, civil servants receive specialized practical hours in the module concerning their department, but in the demonstrations, participants interacted with the system for a short period of time and were given an overview of the main functionalities of all the modules. The first interaction with SAFWeb usually occurs in the formal training, about one month before the implementation. However, the demonstrations anticipated participants' need for first-hand experience to reduce their anxiety later on during the formal trainings.

**Suggesting scarcity:** The perception that something is scarce and difficult to obtain triggers the application of the principle of scarcity, which makes individuals value and want to own what which is of limited availability (Zimbardo and Leippe, 1991; Lynn, 2010; Verhallen, 1994; Cialdini, 2001). Empirical tests have found strong support for the fact that a product with limited availability due to market forces is evaluated as more costly and unique than an alternative that has unlimited availability (Lynn, 2010; Verhallen, 1994). According to Cialdini (2001), it is possible to harness the scarcity principle with the organizational equivalents of limited time, limited supply, and one-of-a-kind offers.

It is difficult to activate the principle of scarcity for a technology such as SAFWeb, as it is free of charge for the adopting institutions; therefore, limited ministry resources was used as the argument. To communicate this scarcity, the final slides of the demonstration emphasized that, due to the limited resources of the ministry, it was not possible to implement SAFWeb in all public institutions simultaneously. Therefore, those institutions that wanted to implement this tool should send a letter of interest to the ministry as soon as possible to ensure availability. The author of the present study

expected that the argument of limitation of resources would activate the principle of scarcity.

**Increasing the perception of choice:** Cohen (1960) found that under conditions of low perceived choice, the more relative deprivation individuals suffered, the more negative were their attitudes toward the project. Individuals who freely decide to engage in an unpleasant behavior will tend to have relatively high satisfaction than individuals who had no choice; for attitude-discrepant behavior to produce an uncomfortable state of dissonance that is later eliminated by attitude or behavior change, people must perceive that they freely chose to perform that behavior (Brehm, 1980; Zimbardo and Leippe, 1991). Further, the weaker the inducement, the more the attitude will change in the direction of the induced compliant behavior, as strong inducements (e.g., threats, bribes, begging, money) are obvious justifications that eliminate any sense of freedom to choose (Brehm, 1980; Zimbardo and Leippe, 1991).

In many cases, employees are notified about change after the adoption decision has already been made. In such situations the perception of choice is low, and change is seen as imposed and unexpected. Inviting civil servants to participate in the demonstrations before it has been decided whether the institution will implement SAFWeb and when the implementation would occur should increase the perception of choice. In order to enhance further the perception of choice, at the end of the demonstrations civil servants were informed about the requirements for implementing the system and the next steps in case their institution was interested in implementing the system. It was emphasized that the implementation of SAFWeb would depend on their ability as institution to meet the technical and organizational requirements for its adoption.

**Getting feedback:** Abdinnour-Helm et al. (2003) suggest that no matter how well change is explained, one need to consider employees' perceptions of what they have been told to make sure that they understand things as one had intended. Asking civil servants about their beliefs and attitudes towards the system allows the acceptance of the system to be evaluated, and potential threats to the implementation process to be diagnosed.

The feedback from participants was obtained using self-reported data on three surveys that will be explained in the following section.

## **2.4 Action taking and data collection**

Demonstrations took place in September 2013 in the training room of the Directorate of National Accounting in the Ministry of the Economy and Finances of the Republic of Panama. The invitations stated the date, time, and place of the demonstration and

asked for the participation of the administrative director, collaborators, and supervisors of the departments of Finance, Accounting, Budget, and Treasury, as well as any other civil servants the administration thought should participate in these demonstrations. Demonstrations were separated by institution to give participants the opportunity to ask specific questions related to their institutions. In total, 236 civil servants from 24 public institutions participated in the demonstrations (see Appendix A).

Data collection was completed using self-reported data from three surveys: a Registration Form, the Job Satisfaction Survey (JSS), and the SAFWeb evaluation. The registration form gathered demographic information and job-related variables such as length of job tenure, department, hierarchical position, and salary. The SAFWeb pre-implementation evaluation contains 31 items assessing seven constructs: Perceived ease of use, perceived usefulness, self-efficacy, expected consequences of the innovation, institutional influence, commitment intention, and attitude toward using the system. See Appendix B and C for item wording and summaries of the constructs. The constructs can be defined as follows:

- *Perceived ease of use* is the degree to which a person believes that using a particular system would be free of effort (Davis et al., 1989).
- *Perceived usefulness* is the degree to which a person believes that using a particular system would enhance his or her job performance (Davis et al., 1989).
- *Self-efficacy* is the judgment of one's ability to use a technology to accomplish a particular job or task (Venkatesh et al., 2003).
- *Expected consequences of the innovation* are the perceived externalities of the technology.
- *Institutional influence* is the degree to which an individual perceives that important others in the organization believe he or she should use the new system (adapted from Venkatesh et al.'s 2003 definition of *social influence*).
- *Commitment intention* is the strength of employees' willingness to exert efforts that support the implementation of the new enterprise system in spite of the difficulties that might arise (adapted from Ajzen's 1988 definition of *intention* and Gollwitzer's 1993 definition of *commitment*).
- *Attitude toward use* is an individual's positive or negative feeling about performing the target behavior (Davis et al., 1989).

It is important to mention that *expected consequences of the innovation* and *commitment intention* are constructs developed by the author. The expected consequences of innovation are included because the perceived externalities of the technology might influence the attitude towards its adoption. For instance, if an employee is not very convinced about the benefits his or her department would obtain from the technology, knowing the benefits other departments will receive from it might enhance his or her own willingness to adopt the system. *Commitment intention* was

included to measure further the acceptance of the technology: If individuals have positive attitudes towards the technology, they are expected to be willing to engage in activities that make implementation possible.

As job satisfaction seems to directly and positively affect attitude toward organizational change (Chih et al., 2012; Yousef, 1999; Iverson, 1996), the job satisfaction of participants was measured through the Job Satisfaction Survey (JSS; Spector, 1985). The Job Satisfaction Survey assesses nine facets of job satisfaction and overall satisfaction: Pay, promotion, supervision, fringe benefits, contingent rewards (i.e., performance-based rewards), operating conditions, coworkers, nature of work, and communication. The scale contains 36 items and uses a summed rating scale format. Each of the nine facet subscales is assessed using four items, and a total satisfaction score is computed by combining all of the items (Spector, 1997). The answers to each item range from 1 to 6 where 1 is “strongly disagree” and 6 “strongly agree.” The JSS was chosen for this study because it was specifically designed for human service, public, and nonprofit sector organizations (Spector, 1985). It is also free to use for research purposes and it is shorter than other scales such as the Job Descriptive Index (JDI; Kihm et al., 1997) and the Minnesota Satisfaction Questionnaire (Weiss et al., 1967).

Table 2.1 summarizes the variables of each survey questionnaire used during the SAFWeb demonstrations. There are small differences in the number of observations because a few participants did not complete all three surveys.

<b>A</b>	<b>B</b>	<b>C</b>
<b>Registration Form</b>	<b>Job Satisfaction Survey</b>	<b>SAFWeb Evaluation</b>
Sample: 230	Sample: 235	Sample: 235
Participant ID	Participant ID	Participant ID
Gender	Pay	Perceived ease of use
Age	Promotion	Perceived usefulness
Institution	Supervision	Expected self-efficacy
Department	Fringe benefits	Expected consequences
Position	Contingent Rewards	Institutional influence
Time in current position	Operating Conditions	Commitment intention
Salary	Coworkers	Attitude towards use
Highest academic degree	Nature of work	
Specialization of studies	Communication	
Job Tenure	Total Satisfaction	
Previous working experience		
Direct experience with other systems		
Indirect experience with other systems		

**Table 2.1 Summary of the data sets**

Women were overrepresented in the sample (72%). The average worker was 44 years old and had 13 years of job tenure. It was confirmed that participants had no previous experience with SAFWeb and that only 14% of the sample had had direct experience with another enterprise system offered by the ministry. Appendix D presents the summary statistics of the variables listed in Table 2.1. Note that in the present chapter, only the descriptive data obtained from the SAFWeb evaluation will be used. The data set will be exploited further in later chapters of the present thesis.

## 2.5 Evaluating the demonstrations

The SAFWeb Evaluation had a section where participants could add any comments they had about the system, its implementation, or the demonstrations. Out of the 235 participants, 81 (34%) wrote comments. These comments were classified as positive, skeptical, and offering suggestions (See Appendix E for the complete list of comments). After the demonstrations, the majority of participants who wrote a comment each expressed positive beliefs and attitudes towards the technology. This was confirmed with the written comments, most of which were positive 56 (69%), 12 (15%) were skeptical and, 13 (16%) gave suggestions. Immediately after the demonstrations, participants expected the technology to help them improve their work situation, which is a positive sign of the pre-implementation acceptance of SAFWeb:

*“This system is and will be excellent if it is implemented in my institution because it is precise and the records would be done faster and with more reliability. I was fascinated with SAFWeb, excellent.”*

However, other participants revealed worries about how SAFWeb might not adapt to the complexity of their institutions:

*“I consider the system to be excellent, but it would need to include some modifications to fit the needs of our institution, which is very complex.”*

This concern is very common in the case of enterprise systems in the public sector because it is difficult to design one-size-fits-all software that perfectly fits the needs of each public institution. Institutions are therefore asked to adapt their administrative procedures as much as possible to the established procedures in the system.

In order to reduce the possibility of errors, SAFWeb automates—among many other processes—the process of making accounting entries. It thereby somewhat reduces

individuals' freedom of choice, so as to increase the accuracy of the information. This loss of choice generated some skepticism:

*"I like the system a bit, and why only a bit, because I don't think people should work like robots, because the capacity to analyze should not be removed from people who like to think, analyze. This is my humble opinion."*

Potential threats of implementing the system were also identified:

*"The process of budget commitment is missing, without this we are forced to use a parallel system and budget reconciliations, this means more work for the budget analysts and more delays to approve and record the expenditures. The assignation of the budget items in the documents is missing; the system gives the responsibility to the accounting department."*

This is a typical example of a process that is not crucial for the developer of the system because the final objective is to keep the budget execution in balance with the accounting records. However, for rank-and-file employees, the omission of this process becomes a problem. In order to monitor budget availability, the budget department needs to have control over the assignation of budget items to transactions. Therefore, if the system does not give this option, a parallel system will be needed. This participant also expresses his dissatisfaction with the fact that the responsibility of assigning budget items is given in the system to the accounting department, and not to the budget department.

Several participants also compared their incumbent system and current work situation with the proposed new technology:

*"Definitely this tool would help us not to stay until late preparing the financial statements, because we currently use the Raman software, and for the volume of information that we manage in our institution, it has become very slow and there are no operators who maintain the system."*

*"I am from the accounting department and it takes me time to enter the data and then to do my accounting records. I think it would be better to use this tool in comparison to the one we have now, which even creates duplicates sometimes. I prefer a thousand times SAFWeb to Raman."*

From their comments, it can be inferred that some participants are dissatisfied with the incumbent system; as a result, when a better alternative is presented to them, they develop positive attitudes towards it. The participants' comments give an interesting insight into the antecedents of initial beliefs and attitudes towards a new technology. If employees are satisfied with their incumbent system, it might be more difficult to persuade them of the benefits of a new enterprise system. However, in situations in which employees are unhappy with the current technology, they will have additional reasons to accept change and perceive the new technology as useful and easy to use. The answers to each item in the SAFWeb evaluation were given on a 7-point scale from 1 to 7, where 1 is the negative end of the scale and 7 the positive end (see Table 2.2)

In looking at Table 2.2, please note that for all constructs, most of the answers had scores between five and seven, showing that immediately after the demonstrations, the civil servants who participated to the demonstrations generally expressed positive beliefs and attitudes towards SAFWeb. Since the missing values were in all cases below 10%, the mean replacement method was used to preserve as much data as possible.

The software SmartPLS version 2.0 (Ringle et al., 2005) was used for the instrument validation. To test the internal consistency of the items, a confirmatory factor analysis was conducted to give the item outer loadings. These loadings need to be higher than 0.70 to demonstrate internal consistency, and items below 0.40 must be deleted (Hair et al., 2014). Accordingly, items *eou\_2*, *usefulness\_9*, and *conseq\_19* were excluded from the analysis (See Appendix F). After deleting these three items, the reliability and the validity of the constructs were verified. The Average Variance Extracted (AVE) in all constructs was above 0.50, which indicates that the constructs explain more than one-half of the variance observed in their items (Fornell and Larcker, 1981). The factors thus demonstrate sufficient convergent validity. Reliability was estimated using the Composite Reliability. These values were higher than the recommended 0.70, which indicates that the measures are reliable. To test for discriminant validity, the square root of the AVE (on the diagonal of Table F3 in Appendix F) was compared to all inter-factor correlations. Since the diagonal values were larger than other correlation values between the constructs, all factors demonstrate adequate discriminant validity (Fornell and Larcker, 1981).

Construct	1		2		3		4		5		6		7		N/A		n
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	
<b>Ease of use</b>																	
eou_1	0	0%	0	0%	1	0%	15	6%	117	50%	42	18%	50	21%	10	4%	235
eou_2	9	4%	8	3%	7	3%	12	5%	90	38%	23	10%	79	34%	7	3%	235
eou_3	3	1%	0	0%	8	3%	19	8%	104	44%	43	18%	51	22%	7	3%	235
eou_4	0	0%	0	0%	2	1%	13	6%	87	37%	49	21%	80	34%	4	2%	235
<b>Usefulness</b>																	
usefulness_5	0	0%	0	0%	1	0%	20	9%	88	37%	51	22%	72	31%	3	1%	235
usefulness_6	0	0%	0	0%	1	0%	17	7%	83	35%	55	23%	73	31%	6	3%	235
usefulness_7	0	0%	0	0%	3	1%	16	7%	81	34%	53	23%	75	32%	7	3%	235
usefulness_8	0	0%	0	0%	1	0%	22	9%	71	30%	57	24%	77	33%	7	3%	235
usefulness_9	11	5%	7	3%	6	3%	19	8%	86	37%	20	9%	78	33%	8	3%	235
usefulness_10	0	0%	0	0%	1	0%	13	6%	74	31%	41	17%	98	42%	8	3%	235
<b>Self-efficacy</b>																	
selfeff_11	8	3%	5	2%	24	10%	36	15%	91	39%	41	17%	16	7%	14	6%	235
selfeff_12	6	3%	1	0%	13	6%	27	11%	106	45%	44	19%	24	10%	14	6%	235
selfeff_13	4	2%	5	2%	30	13%	34	14%	94	40%	34	14%	15	6%	19	8%	235
selfeff_14	4	2%	9	4%	25	11%	37	16%	81	34%	39	17%	21	9%	19	8%	235
<b>Consequences</b>																	
conseq_15	0	0%	0	0%	2	1%	12	5%	76	32%	49	21%	91	39%	5	2%	235
conseq_16	0	0%	0	0%	0	0%	15	6%	67	29%	44	19%	101	43%	8	3%	235
conseq_17	0	0%	0	0%	0	0%	12	5%	75	32%	43	18%	99	42%	6	3%	235
conseq_18	1	0%	0	0%	4	2%	17	7%	67	29%	51	22%	88	37%	7	3%	235
conseq_19	17	7%	9	4%	16	7%	41	17%	92	39%	14	6%	35	15%	11	5%	235
conseq_20	0	0%	0	0%	6	3%	17	7%	95	40%	41	17%	69	29%	7	3%	235
<b>Inst. Influence</b>																	
instinf_21	0	0%	0	0%	4	2%	34	14%	70	30%	46	20%	78	33%	3	1%	235
instinf_22	0	0%	0	0%	0	0%	33	14%	75	32%	43	18%	79	34%	5	2%	235
instinf_23	1	0%	0	0%	1	0%	39	17%	68	29%	45	19%	75	32%	6	3%	235
instinf_24	1	0%	0	0%	1	0%	38	16%	66	28%	48	20%	75	32%	6	3%	235
<b>Commitment</b>																	
commint_25	8	3%	8	3%	16	7%	22	9%	75	32%	19	8%	82	35%	5	2%	235
commint_26	0	0%	0	0%	1	0%	9	4%	80	34%	39	17%	101	43%	5	2%	235
commint_27	4	2%	0	0%	4	2%	13	6%	85	36%	41	17%	81	34%	7	3%	235
<b>Attitude</b>																	
attitude_28	0	0%	0	0%	0	0%	9	4%	66	28%	52	22%	100	43%	8	3%	235
attitude_29	0	0%	0	0%	2	1%	7	3%	88	37%	66	28%	61	26%	11	5%	235
attitude_30	0	0%	0	0%	0	0%	7	3%	80	34%	68	29%	69	29%	11	5%	235
attitude_31	0	0%	0	0%	0	0%	7	3%	81	34%	57	24%	82	35%	8	3%	235

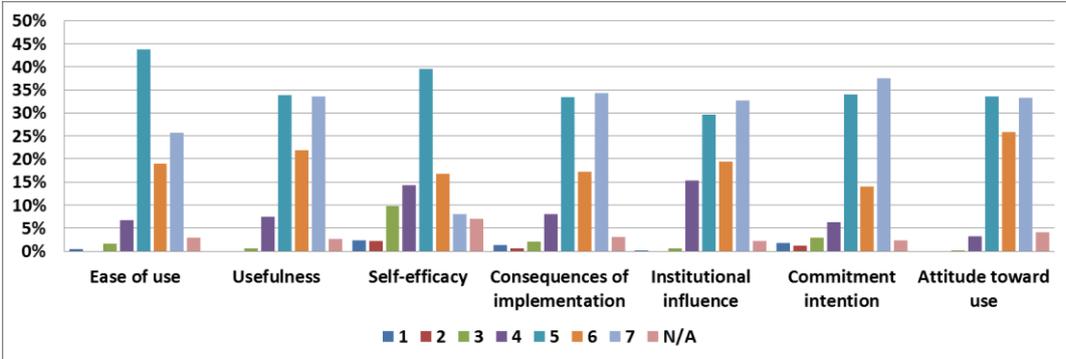
**Table 2.2 Summary of the answers to the SAFWeb Evaluation**

Table 2.3 presents the summary statistics of the SAFWeb evaluation. The means of six out of the seven constructs were above 5.5 and the lowest mean was that of self-efficacy.

Constructs	Obs	Mean	Std.Dev.	Min	Max
Perceived ease of use	234	5.615	0.859	4	7
Perceived usefulness	234	5.833	0.927	3	7
Self-efficacy	228	4.833	1.023	1	7
Expected consequences	232	5.904	0.902	4	7
Institutional Influence	233	5.691	1.042	4	7
Commitment intention	233	5.705	1.022	4	7
Attitude toward using the system	230	5.900	0.863	4	7

**Table 2.3 Summary statistics of the SAFWeb Evaluation**

Since it can be misleading to infer that participants to demonstrations expressed positive beliefs and attitudes based only on the means, Figure 2.3 presents the percentages of the aggregated answers that each construct received in the seven-point scale. As can be observed in Figure 2.3, most of the participants evaluated their perceptions of the enterprise system’s usefulness and ease of use with the highest scores: 5, 6, and 7. This is evidence of a positive relationship between the information and experience participants gained during the demonstrations and their evaluations, as participants had little or no knowledge about SAFWeb before attending the demonstrations.



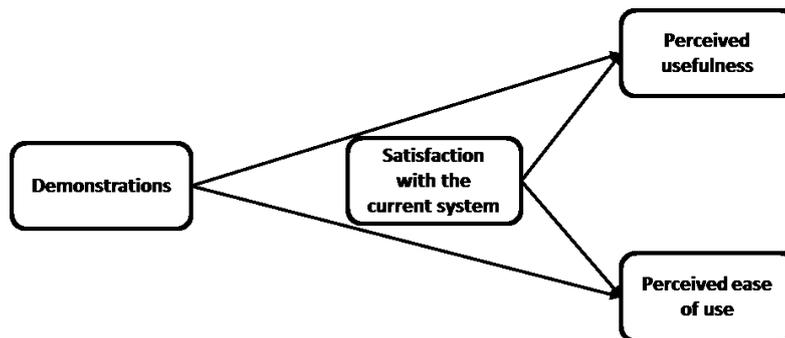
**Figure 2.3 Summary of the answers to the SAFWeb Evaluation**

Another factor that could be related to these positive evaluations of SAFWeb is the dissatisfaction with the incumbent technology. Since, in their written comments, some participants expressed their opinion about SAFWeb in comparison with the poor performance of the incumbent technology, it can be inferred that dissatisfaction with the incumbent technology might also be positively associated with high evaluations of

SAFWeb, especially the usefulness and ease of use. To sum, demonstrations and satisfaction with the current system are two antecedents that are associated with the positive beliefs and attitudes toward the technology that participants expressed.

## 2.6 Specifying learning

The results of this research project support the hypothesis that early involvement through demonstrations is related to the generation of well-established, positive beliefs and attitudes in employees towards previously unknown or little-known technology. The present study offered the same demonstration content to all participants from several departments and hierarchical levels. This style of information presentation might be appropriate in the pre-adoption stage because it allows civil servants to gain a broad overview about the reasons for change, the benefits, and the responsibilities of the different departments in the system. This global perspective helps civil servants to assess the technology with more objectivity and to evaluate the perceived externalities of the innovation. The information that participants receive during the demonstrations help them to form their evaluations about the usefulness and ease of use of the system. In the present study a positive association between the demonstrations and these perceptions was found. In addition to demonstrations, the comments of participants regarding the SAFWeb evaluations allowed satisfaction with the current system to be identified as another potential determinant of perceived usefulness and perceived ease of use about a new enterprise system (see Figure 2.4).



**Figure 2.4 Demonstrations and satisfaction with the current system as antecedents of perceived usefulness and perceived ease of use during the pre-implementation phase**

It is to be expected that satisfaction with the current system has a negative association with the beliefs of usefulness and ease of use, as employees who are unsatisfied with the current technology have an additional source of motivation to perceive the new enterprise system to be useful and easy to use, in comparison to those who are satisfied with the incumbent technology. Further research could test this relationship empirically by designing an additional survey in which employees express their satisfaction with the incumbent system in terms of performance, ease of use and accuracy, and compare

these results with the perceived usefulness and perceived ease of use of the new technology.

Practical experience was crucial in generating concrete positive beliefs about SAFWeb, by interacting with the system, employees were able to identify potential threats, as well as some minor errors that would affect their performance later on. This early feedback gives the Ministry of the Economy and Finance in the Republic of Panama the possibility to develop system improvements that can help prevent potential problems.

The time at which the demonstrations are implemented will have a decisive effect on the results. Following the suggestions of Herold et al. (1995), the demonstrations took place before any decision about the implementation of the system was made. When demonstrations take place far enough in advance, employees have at least the opportunity to feel that their suggestions have an impact on the implementation decision. In contrast, if demonstrations take place shortly before the implementation, employees have a low perception of choice and may feel that change is being imposed quickly and unexpectedly, which generates higher resistance. As a consequence, employees might lose their incentive to be honest in the evaluations because of the feeling of no matter what my opinion is, the new system will be implemented.

According to Zimbardo and Leippe (1991), there are six steps in the persuasion process: (i) exposure to message, (ii) attention to message, (iii) comprehension of message, (iv) acceptance of the message's conclusion, (v) retention of new attitude, and (vi) translation of attitude into behavior. The demonstrations in the present study seemed to generate the first four steps; however, a longitudinal study would be necessary to evaluate whether the new attitudes translate into behavior. The only attempt to generate any immediate behavior on the part of the civil servants was in asking them as institution to send a letter to the ministry if they were interested in implementing SAFWeb before other institutions. The result of this attempt was disappointing; by the end of 2013, only one institution had sent a letter of interest. One possible explanation for this is that civil servants may have misunderstood, and thought that they should send a letter only once their institution had fulfilled the minimum requirements for implementation. Further, since writing the letter depended on the director of the specific institution, and in many cases the director did not attend the demonstration, even if participants wanted to send the letter, the decision was beyond their control. It is also possible that not setting a deadline for sending the letter made it easier for participants to forget about this action. For the reasons discussed above, it is therefore recommended that those seeking to implement new technologies follow up constantly with employees. Examples of this follow-up include informing employees when the improvements to the system that they suggested have been implemented, allowing them to test how the new functionalities work, and establishing deadlines for the

completion of the implementation activities. This would support the translation of positive pre-implementation attitudes into behavior.

## **2.7 Conclusions**

This study offers insights into how demonstrations were designed to foster the pre-implementation acceptance of a new enterprise system. These demonstrations were used to persuade civil servants of the benefits of SAFWeb and to evaluate the acceptability of SAFWeb among potential adopters. The descriptive results support the hypothesis that early involvement through demonstrations is associated with the generation of well-established beliefs and attitudes towards this technology in civil servants with no previous experience with it. Moreover, the information obtained from the written comments in the surveys allowed to identify that satisfaction with the incumbent system might be negatively associated with the initial beliefs of usefulness and ease of use about the new enterprise system.

The design of this study had some limitations. First, there was no control group because all participants received the same demonstrations. The study also did not provide precise information about the effect size of the demonstrations on user acceptance. This limitation can be addressed in further research by measuring any beliefs and attitudes before and after the demonstration. The present study did not include any specific questions to measure the satisfaction of participants with the incumbent technology however this is an issue that should be addressed in further research and demonstrations. Longitudinal studies are the only way to show the whole picture of the implementation process to find out to what extent pre-implementation attitudes translate into behavior, and are thereby able to shape the way in which individuals learn and adapt to new information systems. However, despite these limitations, the data collected for this research offers important insights about the acceptance of enterprise systems during the pre-implementation phase.

The implementation of demonstrations during the pre-implementation phase in the specific context of SAFWeb in the Republic of Panama revealed a positive relationship between these demonstrations and the formation of positive beliefs and attitudes toward the enterprise system. The demonstrations conducted in the present study were designed applying the following seven strategies: (i) inducing a rational attitude, (ii) reducing status quo bias, (iii) providing first-hand experience, (iv) generating repeated exposure, (v) suggesting scarcity, (vi) increasing the perception of choice, and (vii) getting feedback. These strategies could be applied in the design of demonstrations for other contexts (e.g., private sector), to determine whether the same positive relationship during the pre-implementation phase holds.

The present study contributes to praxis by describing the way in which demonstrations were designed and implemented to promote the formation of positive beliefs and attitudes toward a new enterprise system, as well as by providing general strategies that could be applied to the design of demonstrations in other contexts. The study identified demonstrations and satisfaction with the current system as antecedents of perceived usefulness and perceived ease of use about new enterprise systems. These findings extend understanding about the determinants of the initial beliefs about new technologies, and indicate a new direction for further research in the user acceptance literature. Scholars in the user acceptance literature are encouraged to confirm empirically whether there is a negative association between satisfaction with the current technology and initial beliefs about the new enterprise system. Finally, it could be helpful to analyze whether these demonstrations can influence satisfaction with existing systems: since demonstrations could persuade employees of the existence of a better alternative to execute their daily tasks, attending such demonstrations might prompt employees to feel unsatisfied with the incumbent technology. If this influence of demonstrations on the satisfaction with the incumbent technology is confirmed, this would give technology promoters and senior management a new tool with which to enhance the pre-implementation acceptance of enterprise systems.

## CHAPTER 3

# MEASURING THE PRE-IMPLEMENTATION ACCEPTANCE OF ENTERPRISE SYSTEMS

### 3.1 Introduction

Several studies have suggested that employees' initial beliefs and attitudes toward a new technology can influence the success or failure of its implementation (Abdinnour-Helm et al., 2003; Herold et al., 1995). For this reason, measuring employees' readiness to adopt a new enterprise system during the pre-implementation stage is crucial. This early diagnosis allows the organization to identify potential threats and to develop interventions that prepare people for change and guarantee a smoother implementation process.

Two of the most influential models in the user acceptance literature are the technology acceptance model (TAM; Davis et al., 1989) and the unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003). Both models measure the intention to use a new technology with questions such as "When do you predict you will use the system?" and "If the system was available in your organization would you intend to use it?" These questions are suitable for situations in which individuals have the choice to adopt or reject the technology, which is not always the case in all organizations.

The adoption of a new enterprise system in an organization is disruptive in nature because it replaces incumbent systems and changes the way in which employees are used to working. Furthermore, in most of cases employees are forced to use the enterprise system regardless of their initial beliefs and attitudes toward it—non-use of the technology communicates a clear disregard for management policies and will likely result in negative consequences for the user (Klaus and Blanton, 2010). If employees are asked during the pre-implementation phase whether they intend to use the system, they will therefore likely answer in the affirmative, as the decision of whether or not to use this technology is beyond their control. For these reasons, neither the use nor the intention to use a new enterprise system are appropriate dependent variables to measure the pre-implementation acceptance of mandated information technologies. Thus, the question of interest is how the pre-implementation acceptance of new enterprise systems can be measured.

Since theories in the user acceptance literature are general in terms of the contexts and technologies to which they can be applied; there is a need to position theories such as the TAM and the UTAUT to the specific context of enterprise systems. To address this limitation, the present paper develops the Pre-implementation Acceptance Model (PAM) to explain employees' willingness to support the implementation of a new enterprise system in the organization. This model adapts the theory of reasoned action (TRA; Fishbein and Ajzen, 1975) to the context of pre-implementation acceptance of enterprise systems and includes the main constructs of the TAM and the UTAUT, together with the expected consequences of implementation. The PAM is then tested empirically using survey data from civil servants in the Republic of Panama, using Partial Least Squares – Structural Equation Modeling.

The present study advances scholars' understanding of the antecedents of pre-implementation acceptance in the user acceptance literature, offering new theoretical insights for practitioners. The chapter proceeds as follows: Section 3.2 presents the theoretical background, Section 3.3 proposes three versions of the pre-implementation acceptance model: a baseline model, an extended model that includes the expected consequences of implementation, and the final model, and Section 3.4 tests the three models empirically. Section 3.5 concludes and discusses the theoretical and practical implications of the study.

## **3.2 Theoretical foundations**

This paper builds upon four theoretical models: the theory of reasoned action (TRA), the theory of planned behavior (TPB), the technology acceptance model (TAM), and the unified theory of acceptance and use of technology (UTAUT). These four models were chosen for this study due to their relevance in the literature and their similarities. The theory of reasoned action and the theory of planned behavior are key theories in social psychology, and served as a theoretical framework for the development of the technology acceptance model and the unified theory of acceptance and use of technology. Figure 3.1 summarizes the four models.

### **3.2.1 The Theory of Reasoned Action (TRA)**

The theory of reasoned action (Fishbein and Ajzen, 1975) was developed to predict human behaviors over which people have complete volitional control. This theory assumes that human beings are rational and consider the implications of their actions before deciding to engage in a given behavior. Fishbein and Ajzen (1975) propose that a person's intention to perform a behavior is the immediate determinant of that action. According to these researchers, the best way to know if a person will behave in a certain manner is to ask this person whether he or she intends to perform the action or not.

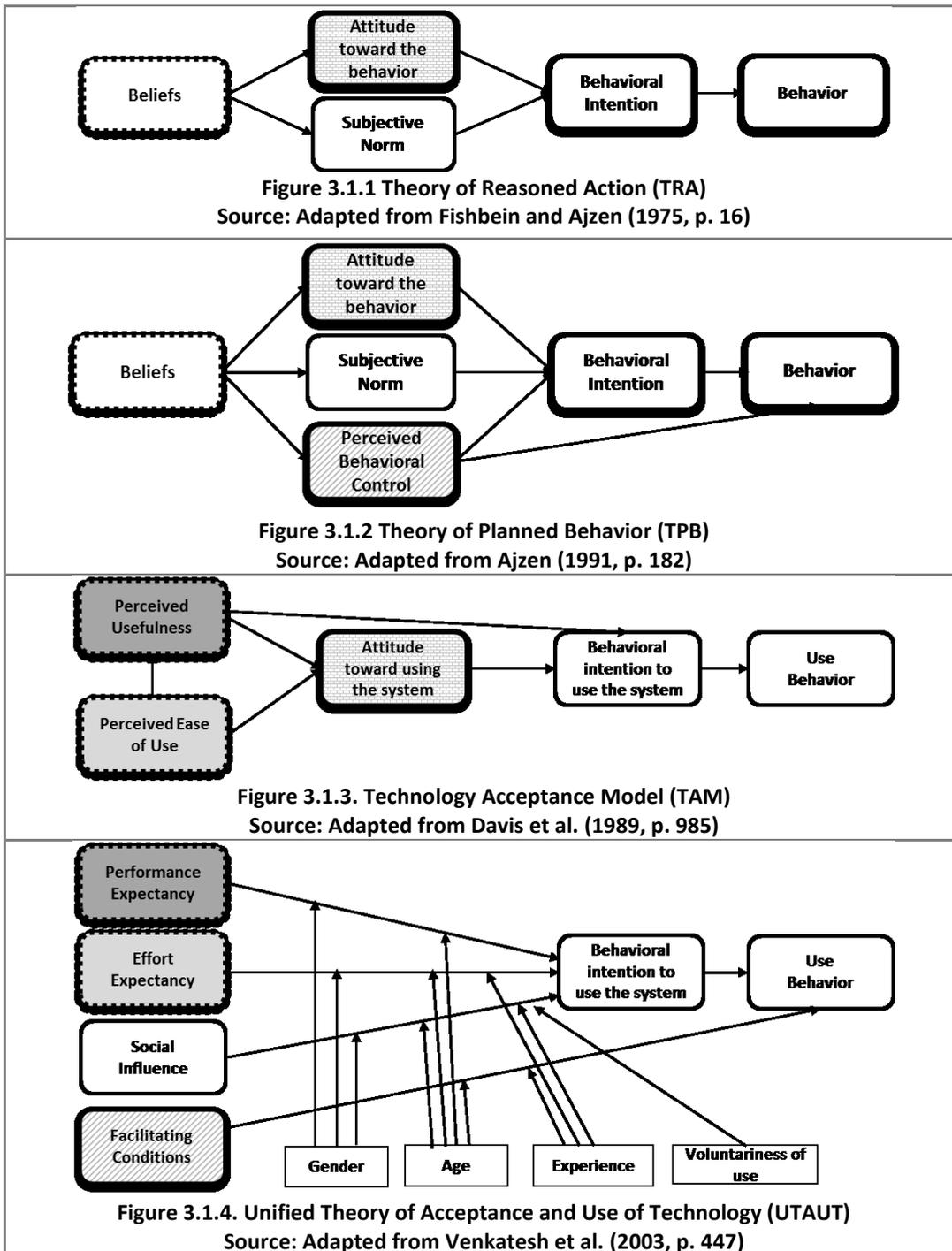
The theory of reasoned action postulates that a person's behavioral intention is a function of two determinants: the attitude toward the behavior and the subjective norm

(see Figure 3.1.1). The *attitude toward the behavior* is the individual's positive or negative evaluation of performing the behavior and the *subjective norm* is the extent to which that person thinks that important others would like him or her to perform the behavior in question. For example, an employee would like to work overtime to finish some reports that are crucial for the implementation of a new enterprise system in the organization (*attitude*) and she thinks that her supervisor, colleagues, and senior management would like for her to do so (*subjective norm*). In this case, the attitudes and subjective norm are consistent and support the performance of the behavior. However, inconsistencies between attitudes and subjective norms are very common (Ajzen, 2012). For instance, assume the same individual knows that her supervisor, colleagues, and senior management expect her to work overtime to finish the reports, but she does not want to do so. In such a situation, whether the individual intends to work overtime or not will depend on how the weight she gives to her own attitudes compares to the weight she gives to the opinions of important others.

Attitudes and subjective norms are a function of behavioral and normative beliefs, respectively (Fishbein and Ajzen, 1975). A *behavioral belief* is the association between the behavior of interest and the consequence or outcome of the behavior, while a *normative belief* is the perception of social pressures to perform or not perform the behavior in question. In other words, people will perform a behavior if they think that the performance will lead to favorable consequences, or if they believe that most of their important referents think that they should do so (Ajzen, 1985).

### **3.2.2 The Theory of Planned Behavior (TPB)**

Every intended behavior is a goal whose attainment is subject to some degree of uncertainty (Ajzen, 1988). Consider the following example: A group of employees would like to use a new enterprise system in their day-to-day work and they think that their supervisor, colleagues, and senior management will also support the use of the system. The theory of reasoned action would predict that, according to the attitudes and subjective norms, the employees intend to use and indeed will use the new enterprise system. However, in order to use the system, the technology must first be implemented in the organization. If the implementation does not take place, the employees' intention to use the technology will not have a chance to manifest in action. In such a case, the theory of reasoned action is not able to predict the behavior with accuracy because the individuals do not have total volitional control over the behavior. To overcome this limitation, the theory of planned behavior extends the theory of reasoned action with the construct *perceived behavioral control* (see Figure 3.1.2). This factor refers to the perceived ease or difficulty of performing the behavior and reflects the anticipated impediments and obstacles the individual might face (Ajzen, 1988). The more favorable the attitude and subjective norms with respect to a behavior, and the greater the perceived behavioral control, the stronger should be the individual's intention to perform the behavior under consideration (Ajzen, 1988).



**Figure 3.1 Comparison of theories.** The dotted rectangles represent beliefs and the different shadings highlight the similarities of constructs among the theories.

### 3.2.3 Technology Acceptance Model (TAM)

The technology acceptance model adapts the theory of reasoned action to explain the user acceptance of information systems. This model identifies two salient beliefs for the domain of information systems: perceived usefulness and perceived ease of use (see Figure 3.1.3). *Perceived usefulness* is the degree to which a person believes that using a particular system would enhance his or her job performance and *perceived ease of use* is the belief that using the system would be free of effort (Davis et al., 1989).

The TAM predicts and explains user behavior from measures taken after a brief period of interaction with a new system (Davis et al., 1989). Participants are surveyed about how useful and easy they think the system is, their attitudes towards its use, and their intention to use the system in the future. After some weeks or even months, participants report their real use of the system. The empirical results of the TAM show that perceived usefulness and perceived ease of use are the main determinants of attitudes towards the use of the system. Further, behavioral intention to use an information system is the main determinant of the use of the system. This finding is consistent with the theory of reasoned action and the theory of planned behavior.

### 3.2.4 The Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh et al. (2003) compare and integrate elements from eight prominent models in the user acceptance and social psychology literature. They propose in the unified theory of acceptance and use of technology (UTAUT) four constructs— performance expectancy, effort expectancy, social influence, and facilitating conditions—as direct determinants of usage behavior and behavioral intentions to use a system (see Figure 3.1.4). *Performance expectancy* is the degree to which an individual believes that using the system will help him or her to attain gains in job performance. *Effort expectancy* is the perception of ease associated with the use of the system. *Social influence* is the degree to which an individual perceives that important others believe he or she should use the new system. *Facilitating conditions* is the extent to which an individual believes that an organizational and technical infrastructure exists to support the use of the system.

The UTAUT also includes gender, age, experience, and voluntariness of use as moderators of the direct relationships between the exogenous and endogenous variables (see Figure 3.1.4). The empirical results of the UTAUT (Venkatesh et al., 2003) show that (i) performance expectancy is the strongest predictor of behavioral intention in both voluntary and mandatory settings; (ii) effort expectancy is significant in both voluntary and mandatory contexts, but only immediately after training, (iii) social influence is only significant in mandatory contexts and during the early stages of individual experience; and (iv) facilitating conditions are significant in both voluntary and

mandatory settings immediately following training; however, they are not significant in determining behavioral intentions when performance expectancy and effort expectancy are present.

### 3.2.5 Comparison of theories

The theory of reasoned action (TRA) and the theory of planned behavior (TPB) are theoretical frameworks that can predict and explain almost any human behavior. Conversely, the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT) focus on explaining the user acceptance of information systems.

There are several similarities among these four models. For instance, all four models propose behavioral intention and behavior as dependent variables, and all four include beliefs as explanatory variables (see Figure 3.1). These similarities are due to the strong influence of the TRA on the other three theories. To sum, the TPB is an extension of the TRA, the TAM adapts the TRA for the specific context of user acceptance of information systems, and the UTAUT integrates the main components of the other three theories into a unified theoretical model (see Figure 3.2).

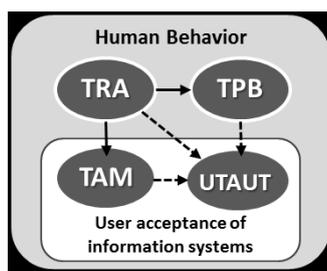


Figure 3.2. Relationships among the theories

The UTAUT indeed reflects the main constructs of the other three models: *performance expectancy* and *effort expectancy* in the UTAUT are the equivalents of *perceived usefulness* and *perceived ease of use* in the TAM (see Figures 3.1.4 and 3.1.3), *social influence* in the UTAUT corresponds to the *subjective norm* of the TRA and TPB, and *facilitating conditions* is the equivalent to *perceived behavioral control* of the TPB (see Figures 3.1.4 and 3.1.2).

Despite these similarities between the models, there are some notable differences. The difference between the TRA and TPB is the construct of *perceived behavioral control* (see Figures 3.1.1 and 3.1.2). However, Ajzen (1988) explains that when the individuals have total volitional control over their behavior, the TPB is identical to the TRA because perceived behavioral control is not expected to affect either the behavioral intentions or the actual behavior of individuals.

Unlike the TRA and TPB, the TAM omits the construct of *subjective norm* (see Figure 3.1.3). With regard to this, Fishbein and Ajzen (1975) suggest that the *attitude* construct alone might predict behavioral intention in situations in which the subjective norms have a low importance weight. It is possible that the voluntary decision to use a new information system represents a case in which the opinion of others (i.e., *subjective norm*) has low relevance. In such situations, the TAM might still give an accurate prediction of both the *intention to use* and the *actual use* of the system, despite excluding the construct of *subjective norm*. The UTAUT excludes the construct of *attitude* based on empirical evidence that suggests that one’s attitude toward using technology does not have a direct effect on *behavioral intention* (Venkatesh et al., 2003). This contradicts, however, the other three theories presented in Figure 3.1, for which the construct of *attitude* is one of the main determinants of behavioral intention.

While the TRA and TPB aggregate beliefs into a single variable, the TAM and UTAUT derive two specific beliefs related to the acceptance of information systems. Finally, the TRA and TPB propose that any effect of beliefs on *behavioral intention* is fully mediated by *attitudes*, *subjective norms*, and *perceived behavioral control*, while the TAM and UTAUT allow for direct effects of beliefs on *behavioral intention*. The TAM allows *perceived usefulness* to directly affect *behavioral intention* (Figure 3.1.3), and the UTAUT considers beliefs and *social influence* to be parallel direct determinants of *behavioral intention* (Figure 3.1.4), clearly contradicting the propositions of TRA and TPB.

Based on the theoretical foundations presented above, the present study proposes an adapted model to explain the pre-implementation acceptance of enterprise systems in organizations.

### 3.3 The Pre-implementation Acceptance Model

The Pre-implementation Acceptance Model (PAM) adapts and integrates the TRA, TPB, TAM, and UTAUT to explain the acceptance of enterprise systems in organizations during the pre-implementation phase. Figure 3.3 compares the PAM with the four theories reviewed in the previous section.

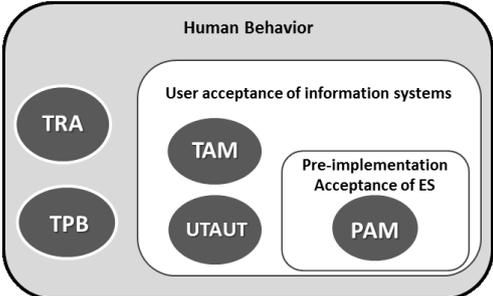


Figure 3.3. Position of the PAM in the literature

*Pre-implementation acceptance* should be understood as employees' willingness to use an information system that replaces incumbent technologies in an organization and that changes the way in which they are used to working. The use of a new enterprise system depends on implementation in the organization: If the implementation does not take place, employees will not be able to use the system. Therefore, employees who are interested in using a new technology are expected to intend to engage in behaviors that support its implementation.

*Intentions* are indications of how hard people are willing to try to perform the desired behavior (Ajzen, 1988) and *commitment* is the ability to achieve the desired outcome in the face of difficulties (Gollwitzer, 1993). Based on these two concepts, the PAM proposes *commitment intention* as the dependent variable. *Commitment intention* is the employees' willingness to exert efforts that support the implementation of a new enterprise system in spite of any difficulties that might arise. It is expected that, in the face of difficulties, committed employees would intensify their efforts to make implementation possible.

The construct *commitment intention* is measured with the following items: "If there was a referendum in my institution about the new technology, I would vote against its implementation," "If the success of the implementation was up to me, I would engage enough to make the project succeed," and "If necessary, I would be willing to work overtime to make the implementation possible in my institution." The items for the construct *commitment intention* represent if-then plans of willful behaviors related to the implementation of the new technology. Gollwitzer (1999) suggests creating if-then plans that link anticipated opportunities with goal-directed responses to enhance the rate of goal attainment. The commitment intention items are considered willful behaviors because although the organization can force an employee to do his tasks and to respect his schedule of work, the organization cannot force an employee to give that extra effort that might be necessary for the implementation to succeed. Although this is a new construct that merits further development and testing, these items are expected to reflect an approximation of employees' intention to support the implementation of a new system.

### **3.3.1 Baseline model – Model 1**

Consistent with the TRA, the pre-implementation acceptance model proposes two direct determinants of commitment intention: attitude toward using the system and institutional influence (See Figure 3.4). *Attitude toward using the system* is an employee's positive or negative evaluation of using the system (adapted from Fishbein and Ajzen's 1975 definition of *attitude toward behavior*). *Institutional influence* is the degree to which an employee perceives that important others in the organization will support the use of the system (adapted from Fishbein and Ajzen's 1975 definition of *subjective norm*).

For employees to be able to use the enterprise system, the technology must first be implemented in the organization. Therefore, if employees positively evaluate the use of a new enterprise system, one would expect that they would be willing to support the implementation of the technology in the organization. Further, if employees perceive that senior management, supervisors, and colleagues support the use of the technology, this would relate positively with their willingness to support the implementation, as individuals tend towards agreement with others (Moscovici and Doise, 1994). Conversely, if employees perceive that important referents in the organization are against the implementation of an enterprise system, this might dissuade them from engaging in behaviors that support implementation. Following this reasoning, as well as Fishbein and Ajzen (1975)'s proposal regarding the TRA, it is hypothesized that attitude toward using the system and institutional influence are positively correlated with commitment intention:

H1: *Attitude toward using the system* has a positive and significant relationship with *commitment intention*.

H2: *Institutional influence* has a positive and significant relationship with *commitment intention*.

The constructs attitudes toward using the system, institutional influence, and commitment intention together define the pre-implementation acceptance of new enterprise systems. However, it is also important to know the beliefs that determine such acceptance. The baseline model presented in Figure 3.4 postulates the main beliefs of the TAM—perceived usefulness and perceived ease of use—as direct determinants of attitudes toward using the system (Davis et al., 1989). One would expect that employees would evaluate an enterprise system positively, if they think thought that the new technology would improve their job performance, and if learning to operate the system was easy. In such a case, the benefits of the technology in terms of usefulness, paired with the costs in terms of the time needed to learn the system, are motivations to develop positive or negative attitudes toward the use of new enterprise systems. For these reasons the author of the present paper postulates the following hypotheses:

H3: Perceived usefulness has a positive and significant relationship with the attitude toward using the system.

H4: Perceived ease of use has a positive and significant relationship with the attitude toward using the system.

The arrows in Figure 3.4 show the hypothesized relationships between the constructs. Unlike the TAM, in which perceived usefulness is also postulated as direct determinant of behavioral intention, the baseline model does not include this relationship. This is in

line with Fishbein and Ajzen’s (1975) assertion, that any effect of beliefs on behavioral intention is fully mediated by attitudes and subjective norms.

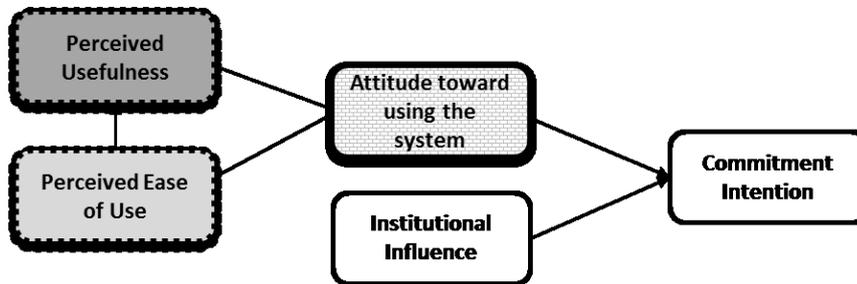


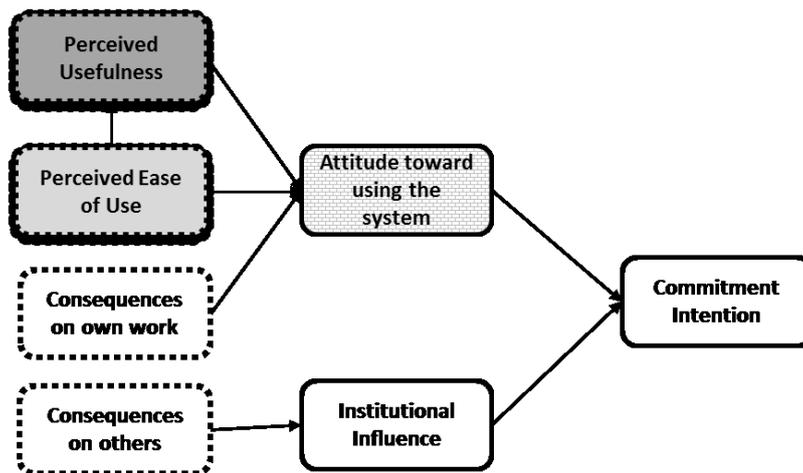
Figure 3.4. Baseline model (Model 1)

The dotted rectangles represent beliefs and the different shadings highlight the similarities of constructs with the theories presented in Figure 3.1

Note that the baseline model comprises all the constructs examined in Section 3.2 except for the constructs of *perceived behavioral control* and *facilitating conditions*. This construct was excluded from the analysis because the author of the present study assumes that employees have complete volitional control over their intention to intensify their efforts to support the implementation of the technology. In the case of such willful behaviors, Ajzen (1985) explains that the construct of *perceived behavioral control* does not have an influence on intention. Furthermore, the organization is supposed to provide all the necessary resources to implement and use the new technology (e.g., training, equipment). Thus, a lack of resources or facilitating conditions should not hamper the employee’s commitment intention.

### 3.3.2 The role of the expected consequences - Model 2

In developing a favorable or unfavorable attitude toward an innovation, an individual may mentally apply the new idea to his or her present situation before deciding whether or not to try it (Rogers, 2003). Fishbein and Ajzen (1975) also explained that behavioral beliefs are the relationship between the behavior and the expected consequences of that behavior. For this reason, the pre-implementation acceptance model includes the constructs of *consequences on own work* and *consequences on others* (see Figure 3.5). As in previous figures, the single-headed arrows in Figure 3.5 show the hypothesized relationships between the constructs.



**Figure 3.5. Expected consequences as antecedent of acceptance (Model 2)**

The dotted rectangles represent beliefs and the different shadings highlight the similarities of constructs with the theories presented in Figure 3.1

*Consequences on own work* is the expected outcome of implementation in terms of day-to-day work. It is expected that the construct consequences on own work would have a positive and significant relationship with attitudes toward using the system; that is, an employee who thinks that the implementation and the use of the enterprise system will benefit his own job should also develop positive evaluation about the use of the system:

H5: *Consequences on own work* has a positive and significant relationship with *attitudes toward using the system*.

*Consequences on others* are the perceived externalities of the implementation. An employee who thinks that the new enterprise system will be beneficial for others in the organization might infer that those individuals will support the implementation and the use of the system. In this respect, Fishbein and Ajzen (1975) theorized that subjective norms (*institutional influence*, in the present study) are determined by normative beliefs, which can be formed by receiving information that allows the individual to make inferences about a referent's expectations. It is hypothesized that the expected consequences on others would have a positive relationship with the construct of institutional influence:

H6: *Consequences on others* has a positive and significant relationship with *institutional influence*.

In the present study it is assumed that employees who receive information about a new enterprise system are able to infer the benefits that their colleagues and supervisors will

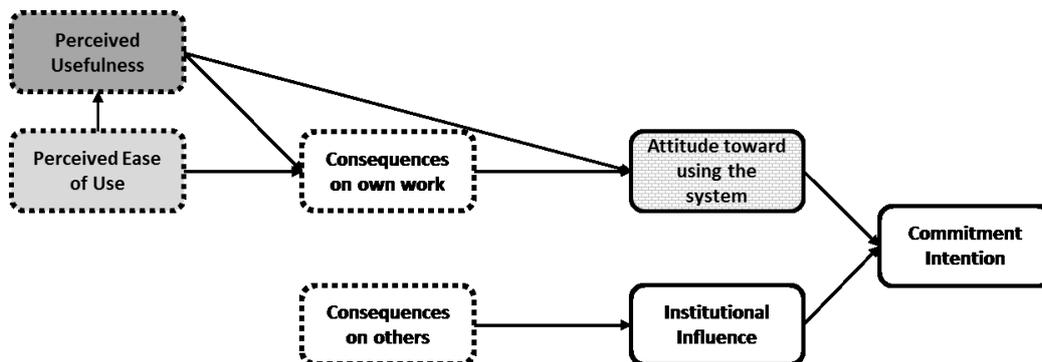
receive from it, because these are people with whom they have frequent interaction in the workplace.

### 3.3.3 Consequences on own work as mediator – Model 3

The final version of the PAM proposes that the construct *consequences on own work* mediates the relationship between perceived usefulness, perceived ease of use, and attitudes toward use. An employee who gains information about a new information system will initially form his beliefs about how useful or easy to use the system is. Those initial beliefs then help him to anticipate the consequences of using the system in his day-to-day work. For instance, an employee who thinks that the system is difficult to use might think that using the system would not have positive consequences for her job. Thus, it is hypothesized that perceived usefulness and perceived ease of use are direct determinants of the construct *consequences on own work* (see Figure 3.6):

H7: *Perceived usefulness* has a positive and significant relationship with *consequences on own work*.

H8: *Perceived ease of use* has a positive and significant relationship with *consequences on own work*.



**Figure 3.6. Pre-implementation acceptance model (Model 3)**

The dotted rectangles represent beliefs and the different shadings highlight the similarities of constructs with the theories presented in Figure 3.1

Considering that the PAM has just been developed, the role of the constructs that mediate between variables should be tested. Fishbein and Ajzen (1975) proposed that attitudes and subjective norms (*institutional influence*, in the present study) fully mediate all the effects of beliefs on behavioral intention. Accordingly, the following hypotheses are stated:

H9: *Institutional influence* fully mediates the relationship between *consequences on others* and *commitment intention*.

H10: *Attitudes toward using the system* fully mediates the relationship between *perceived usefulness* and *commitment intention*.

H11: *Attitudes toward using the system* fully mediates the relationship between *consequences on own work* and *commitment intention*.

Davis et al. (1989) propose in the TAM that perceived usefulness partially mediates the effect of perceived ease of use on the attitudes, because a system that is easy to use will be perceived as useful, but at the same time perceived ease of use will have a direct effect on the attitudes toward using the system, thus:

H12: *Perceived usefulness* partially mediates the relationship between *perceived ease of use* and the *attitudes toward using the system*.

The following section describes the dataset and the method used to test empirically the models and the hypotheses.

### **3.4 Data and method**

The sample was composed of 236 civil servants working for the Budget, Accounting, and Treasury departments of 24 public institutions in the Republic of Panama (see Appendix D for the summary statistics). The Ministry of the Economy and Finance of the Republic of Panama invited civil servants to participate in demonstrations of a new enterprise system for public institutions, SAFWeb. Participants had no previous experience with the system, so the demonstrations allowed them to gain their first impressions through both theoretical information and practical exercises. At the time of the demonstrations, institutions were not scheduled to implement SAFWeb, so the participants were uncertain about when the system might be implemented. However, it was clear to all participants that once the decision to implement the system was taken, they would be required to use the technology.

The demonstrations comprised approximately thirty minutes of theoretical information about the reasons for change and the benefits of the system, followed by one-and-a-half hours of interaction with the system. Immediately after the demonstrations,

participants were asked to fill out the SAFWeb evaluation questionnaire. The SAFWeb evaluation contained 31 items, representing seven constructs: perceived ease of use, perceived usefulness, expected self-efficacy, expected consequences of the innovation, institutional influence, commitment intention, and attitude toward using the system. Appendix B presents the whole questionnaire and Appendix C summarizes the definitions of the constructs and the sources of the items. Most of the items were adapted from previous instruments; only the constructs of *expected consequences of the innovation* and *commitment intention* were developed by the author.

Please note that the construct of *expected self-efficacy* was not included in the PAM (Figure 3.6). Expected self-efficacy was instead used as a marker variable to test the common method variance of the questionnaire. According to Lindell and Whitney (2001), the marker variable needs to be theoretically unrelated to at least one scale on the questionnaire. Expected self-efficacy is theoretically related to perceived ease of use (Venkatesh et al., 2003), and there is no theoretical support that relates this marker variable with the other constructs proposed in the PAM. Therefore, the smallest correlation between expected self-efficacy and the theoretically unrelated constructs is taken as the estimation of the common method variance (See Appendix G).

The construct of *expected consequences of the innovation* was split into two sub-scales: consequences on own work (items conseq\_19 and conseq\_20; See Appendix B) and the expected consequences on others (items from conseq\_15 to conseq\_18) . All items on the SAFWeb evaluation were answered on 7-point Likert-type scales from 1 to 7, where 1 is the negative end of the scale and 7 the positive end of the scale. The questionnaires were administered in Spanish, the official language in Panama, and a unique code was assigned to each participant protect his or her identity. Further, participants were informed that their institutions would not receive any feedback about their answers, not even aggregated information.

Before conducting data analysis, the validity and reliability of the questionnaire were tested. A confirmatory factor analysis was used to calculate the item outer loadings. These loadings need to be higher than 0.70 to demonstrate internal consistency, and items below 0.40 must be deleted (Hair et al., 2014). Accordingly, items eou\_2 and usefulness\_9 were excluded from the analysis (see Table 3.1). The items conseq\_19 and commint\_25 were kept in the analysis because they had scores above the threshold of 0.40. It was noted that the lower outer loadings corresponded to the negatively worded items on the SAFWeb evaluation.

Construct	Question number (Appendix B)	Model 1 outer loadings	Models 2 and 3 outer loadings
Perceived ease of use	eou_1	0.807	0.809
	eou_2	0.356	0.348
	eou_3	0.814	0.823
	eou_4	0.802	0.793
Perceived usefulness	usefulness_5	0.8516	0.850
	usefulness_6	0.9222	0.921
	usefulness_7	0.9256	0.924
	usefulness_8	0.9371	0.936
	usefulness_9	0.2852	0.299
	usefulness_10	0.8809	0.880
Consequences in own job	conseq_19		0.462
	conseq_20		0.919
Consequences on others	conseq_15		0.908
	conseq_16		0.908
	conseq_17		0.945
	conseq_18		0.835
Institutional Influence	instinf_21	0.879	0.878
	instinf_22	0.886	0.886
	instinf_23	0.890	0.890
	instinf_24	0.897	0.898
Commitment intention	commint_25	0.541	0.541
	commint_26	0.879	0.879
	commint_27	0.821	0.821
Attitude toward use	attitude_28	0.879	0.879
	attitude_29	0.859	0.859
	attitude_30	0.935	0.935
	attitude_31	0.927	0.927

**Table 3.1. Item outer loadings**

The low-scoring items are highlighted in gray.

After deleting the two items with item outer loadings below 0.40, the reliability and validity of the constructs was verified. The Average Variance Extracted (AVE) in all constructs was above 0.50, which indicates that the constructs explain more than half of the variance observed in their items (Fornell and Larcker, 1981). The factors thus demonstrate sufficient convergent validity. Reliability was estimated using the Composite Reliability. These values were all higher than the recommended cut-off value of 0.70, which indicates that these measures are reliable (see Table 3.2). The only exception was the construct of *consequences in own work* (Composite Reliability = 0.665); however, this lower reliability is not surprising given that this is a construct that was first developed in the present study, and has never before been tested.

Constructs	AVE	Composite Reliability
Perceived ease of use	0.669	0.858
Perceived usefulness	0.825	0.959
Consequences in own work	0.528	0.665
Consequences on others	0.810	0.944
Institutional Influence	0.789	0.937
Commitment intention	0.580	0.799
Attitude toward use	0.811	0.945

**Table 3.2. Validity and Reliability**

Fornell and Larcker (1981) suggested that the square root of the AVE of each construct can be used to establish discriminant validity. To test for discriminant validity the square root of the AVE (see the diagonal values in Table 3.3) was compared to all inter-factor correlations. Since the diagonal values are larger than other correlation values between the constructs, all factors demonstrate adequate discriminant validity.

	1	2	3	4	5	6	7
<b>Perceived ease of use (1)</b>	<b>0.818</b>						
<b>Perceived usefulness (2)</b>	0.729	<b>0.908</b>					
<b>Consequences in own work (3)</b>	0.561	0.626	<b>0.726</b>				
<b>Consequences on others (4)</b>	0.629	0.782	0.683	<b>0.900</b>			
<b>Institutional influence (5)</b>	0.564	0.678	0.621	0.753	<b>0.888</b>		
<b>Commitment intention (6)</b>	0.539	0.590	0.596	0.658	0.640	<b>0.761</b>	
<b>Attitude toward use (7)</b>	0.494	0.592	0.623	0.696	0.684	0.696	<b>0.901</b>

**Table 3.3. Fornell - Larcker Criterion Analysis for checking discriminant validity**

Before conducting structural equation modeling analysis, information that establishes the statistical quality of the questionnaire used should be reported (Gefen et al., 2011; Lowry and Gaskin, 2014; Hair et al., 2014). The tests reported in this section show that the constructs in the SAFWeb evaluation meet minimum reliability and validity criteria, verifying that it is appropriate to proceed with the data analysis and the interpretation of results. Further, additional tests (See Appendix G) confirm that the common method bias does not threaten the results.

### 3.5 Results

Data analysis was conducted using Partial Least Squares - Structural Equation Modeling (PLS-SEM), using the software SmartPLS version 2.0 (Ringle et al., 2005). Partial Least Squares was chosen for this study because it is a non-parametric method that is well

suited for exploratory research and theory development. For a more detailed discussion of this method, readers are referred to Hair et al. (2014) and Lowry and Gaskin (2014).

Table 3.4 shows the standardized path coefficients of the relationships between the constructs. The significance of the coefficients was estimated using the bootstrapping method with 5,000 subsamples. To interpret these results, it is helpful to note how Figures 3.4, 3.5, and 3.6 correspond to each of the models. Each path coefficient represents an arrow in the figures, and the dependent variables are listed in the results from right to left. For example, the first dependent variable (DV) in Table 3.4 is *commitment intention*, which is the final dependent variable of the structural models, followed by *attitude toward use* and *perceived usefulness*.

In Models 1, 2, and 3 the  $R^2$  indicates that *attitude toward use* and *institutional influence* together explain 53.5% of the dependent variable, *commitment intention*. Both determinants have positive and significant relationships with the dependent variable, with *attitude toward use* being stronger than *institutional influence*. This finding supports H1 and H2 and is congruent with the TRA and TPB.

*Perceived usefulness* has a positive and significant relationship with *attitude toward use* in all three models. This is consistent with the TAM and supports H3. Similarly, *perceived ease of use* has a positive and significant relationship with *attitude toward use* in Model 1. However, this relationship becomes insignificant with the inclusion of *consequences in own work* in Model 2. This empirical result does not support H4, and suggests that *consequences in own work* absorbs part of the effects of *perceived ease of use* on *attitudes toward use*.

*Expected consequences on own work* has a positive and significant relationship with *attitude toward use* in Models 2 and 3, which supports H5. Likewise, *consequences on others* shows a positive and significant relationship with *institutional influence* in Models 2 and 3, which supports H6.

The fourth column in Table 3.4 shows the path coefficients of the saturated model, which is the model that includes all the possible relationships. A saturated model means that all the constructs are related among them, although there is no theoretical support for such relationships. According to Gefen et al. (2011), a study that conducts a PLS-SEM analysis needs to compare the theoretical model with the saturated model because this comparison allows to check whether the significant paths in the theoretical model remain significant in the saturated model, and whether adding new relationships does not significantly increase the standard measure of effect size  $f^2$ .

Constructs	Model 1 $\beta$	Model 2 $\beta$	Model 3 $\beta$	Saturated model $\beta$	Effect size $f^2$
DV: Commitment Intention					
Attitude toward use	0.485*** (0.065)	0.485*** (0.064)	0.485*** (0.066)	0.372*** (0.070)	
Institutional Influence	0.308*** (0.067)	0.309*** (0.068)	0.308*** (0.067)	0.140* (0.077)	
Observations	235	235	235	235	
$R^2$	0.535	0.535	0.535	0.575	0.070
DV: Attitude toward use					
Perceived usefulness	0.494*** (0.070)	0.308*** (0.075)	0.333*** (0.070)	0.051 (0.075)	
Perceived ease of use	0.135* (0.074)	0.045 (0.067)			
Consequences in own work		0.408*** (0.070)	0.415*** (0.070)	0.261*** (0.072)	
Observations	235	235	235	235	
$R^2$	0.360	0.458	0.456	0.525	0.131
DV: Perceived usefulness					
Perceived ease of use	0.730*** (0.033)	0.730*** (0.032)	0.729*** (0.033)	0.728*** (0.033)	
Observations	235	235	235	235	
$R^2$	0.532	0.532	0.532	0.530	-0.004
DV: Institutional Influence					
Consequences on others		0.753*** (0.030)	0.753*** (0.030)	0.355*** (0.092)	
Observations		235	235	235	
$R^2$		0.567	0.567	0.635	0.107
DV: Consequences in own work					
Perceived usefulness			0.464*** (0.072)	0.468*** (0.070)	
Perceived ease of use			0.223*** (0.078)	0.221*** (0.077)	
Observations			235	235	
$R^2$			0.415	0.418	0.007

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

**Table 3.4. Standardized path coefficients**

Note: In all three models multicollinearity was controlled for by estimating the Variance Inflation Factor, which was always below the recommended value of three (Hair et al., 2014).

Except for the path coefficient between *perceived usefulness* and *attitudes toward use*, all the paths that were significant in Model 3 remain significant in the saturated model. It seems, however, that the simultaneous inclusion of *consequences on own work* and *consequences on others* as determinants of *attitude toward use* in the saturated model totally absorbs the relationship between *perceived usefulness* and *attitudes* (see Appendix H). This finding leads to the question of whether the expected consequences of the implementation on one's own work and on others are able to fully mediate the effect of the salient beliefs of *perceived usefulness* and *perceived ease of use* on *attitudes toward use*. It is reasonable to assume that, after their first experience with a new enterprise system, employees form their beliefs regarding usefulness and ease of use; these initial beliefs would then determine the consequences of the implementation that the employees expected in their own work and on others.

Furthermore, to the best of the author's knowledge, previous research has not yet clarified whether perceived usefulness and perceived ease of use can simultaneously determine attitudes toward use and institutional influence. The empirical results in the saturated model suggest that this is possible—for instance, the saturated model revealed that *perceived usefulness* has a positive and significant relationship with *consequences on others*, which is proposed as a direct determinant of institutional influence. These are questions that rise from the empirical results, and which require further analysis.

Finally, the effect size of the saturated model is presented in the fifth column of Table 4. It represents the change between the  $R^2$  in the saturated model and the  $R^2$  in the more complete version of the PAM (Model 3). The effect size  $f^2$  is calculated as follows:  $R^2_{\text{saturated model}} - R^2_{\text{theoretical model 3}}$  ( $1 - R^2_{\text{saturated model}}$ ) (Hair et al., 2014). The effect sizes are all below the threshold of 0.15, which indicates that the saturated model has a small effect size, and therefore does not threaten the validity of the relationships theorized in Model 3.

Given that the comparison with the saturated model did not reveal threats to the PAM, the mediating effects of the endogenous variables are also examined. A mediating effect is created when a third variable intervenes between two other related constructs (Hair et al., 2014). An example of this absorption is in Model 2: When the construct of *consequences on own work* was included the direct effect of *perceived ease of use* on *attitude toward use* became insignificant (see Table 3.4, Model 2). When included in the model, this third variable absorbs part of the effect between the two variables. To test whether mediating effects exist, the variance accounted for (VAF) needs to be estimated. The VAF determines the size of the indirect effect via the third mediator variable in relation to the total effect. Table 3.5 shows simple mediation analysis using bootstrapping with 5,000 subsamples (Preacher and Hayes, 2008).

Path	$\beta$	Direct effect (DE)	Indirect effect (IE) Path A * Path B	Total effect (DE + IE)	VAE IE/(DE + IE)
<b>Perceived usefulness -&gt; Consequences in own work -&gt; Attitude toward use</b>					
Perceived usefulness -> Attitude toward use (Direct effect)	0.334***				
Perceived usefulness -> Consequences in own work (Path A)	0.627***	0.334***	0.260***	0.594	0.437
Consequences in own work -> Attitudes toward use (Path B)	0.414***				
<b>Perceived ease of use -&gt; Consequences in own work -&gt; Attitude toward use</b>					
Perceived ease of use -> Attitudes toward use (Direct effect)	0.215***				
Perceived ease of use -> Consequences in own work (Path A)	0.560***	0.215***	0.281***	0.496	0.567
Consequences in own work -> Attitudes toward use (Path B)	0.502***				
<b>Consequences on others -&gt; Institutional Influence -&gt; Commitment intention</b>					
Consequences on others -> Commitment intention (Direct effect)	0.411***				
Consequences on others -> Institutional Influence (Path A)	0.753***	0.411***	0.251***	0.662	0.379
Institutional Influence -> Commitment intention (Path B)	0.333***				
<b>Perceived usefulness -&gt; Attitude toward use -&gt; Commitment intention</b>					
Perceived usefulness -> Commitment intention (Direct effect)	0.277***				
Perceived usefulness -> Attitude toward use (Path A)	0.595***	0.277***	0.317***	0.594	0.533
Attitude toward use -> Commitment intention (Path B)	0.532***				
<b>Consequences in own work -&gt; Attitude toward use-&gt; Commitment intention</b>					
Consequences in own work -> Commitment intention (Direct effect)	0.273***				
Consequences in own work -> Attitude toward use (Path A)	0.622***	0.273***	0.327***	0.600	0.545
Attitude toward use -> Commitment intention (Path B)	0.526***				
<b>Perceived ease of use -&gt; Perceived usefulness -&gt; Attitude toward use</b>					
Perceived ease of use -> Attitude toward use (Direct effect)	0.134*				
Perceived ease of use -> Perceived usefulness (Path A)	0.730***	0.134*	0.361***	0.495	0.729
Perceived usefulness -> Attitude toward use (Path B)	0.495***				

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 3.5. Mediator analysis

The VAF is interpreted as follows: When the VAF is below 20%, almost no mediation takes place, when the VAF is between 20% and 80% there is partial mediation, and when the VAF is above 80% full mediation is assumed (Hair et al., 2014). All the values of the VAF in Table 3.5 are between 20% and 80%, which indicates that the variables of *consequences on own work*, *institutional influence*, *attitude toward use*, and *perceived usefulness* partially mediate the effect of the independent variable on the dependent variable. Although this finding supports H7, H8, and H12, there is not enough evidence to support H9, H10, and H11 and their proposition that *attitude toward use* and *institutional influence* fully mediate the effects of *consequences on others*, *perceived usefulness* and *consequences in own work* on the dependent variable, *commitment intention*.

### 3.6 Conclusions and discussion

This study developed the pre-implementation acceptance model for the adoption of enterprise systems. This model was based on four prominent theories from social psychology and the user acceptance literature. The model proposes a new dependent variable that captures employees' intention to support the implementation of the new technology. It also examines the role of the expected consequences of implementation as an antecedent of the pre-implementation acceptance, in addition to beliefs about perceived usefulness and perceived ease of use. The empirical analysis supported the model and almost all the hypotheses, but it also revealed new and interesting relationships that have not yet been examined on the theoretical level.

The user acceptance literature has mainly identified the beliefs that affect *attitudes toward use*, leaving the construct of *institutional influence* without any information regarding possible antecedents. The present study proposed that the expected consequences of implementation on others was a direct determinant of institutional influence, and this relationship was confirmed empirically. However, there might be other beliefs that determine this construct. For instance, perceived usefulness or expected consequences on own work may affect not only attitudes, but institutional influence, as well. In the same vein, if employees receive training about a new technology, it is not clear to what extent this information may simultaneously affect both attitudes toward use and institutional influence. These are just two questions that interdisciplinary research may be able to answer in the future. Further, the findings in the saturated model suggest that the constructs of expected consequences of implementation on one's own work and on others might fully mediate the effect of the salient beliefs regarding perceived usefulness and perceived ease of use on attitudes toward use. If this finding is confirmed in further research, it would suggest that the expected consequences of implementation on one's own work and on others are more important beliefs in determining the attitudes toward using a new enterprise system than the perceptions of usefulness and ease of use.

From a practical perspective, the present study's findings suggest that the right interventions can help employees to anticipate the consequences of technology implementation in their own work and on others. Demonstrations of the system during the pre-implementation phase are crucial in preparing employees for change. Traditionally, such trainings have focused on the characteristics of the new technology, with the goal of influencing the perceived usefulness and perceived ease of use. However, the present study indicates that the expected consequences of the implementation also influence attitudes toward use and institutional influence. Therefore, demonstrations should clearly communicate the reasons for change, as well as the benefits that the new technology would bring to the organization and to the individual worker, such as giving more information about how the implementation of the system will change the current work situation, which incumbent technologies the new system will replace, and how workflows will be affected. It is also important to offer employees a global perspective about the benefits of the system; i.e., clarifying the impact of this new technology on other departments and on the institution as a whole. This presentation encourages individuals to consider the externalities when forming their intention to support or not support the implementation of the system.

Some limitations of this study include the novel nature of the items used to measure the constructs of commitment intention and the expected consequences of implementation. These constructs require further development and testing. Moreover, the PAM was tested with survey-data from civil servants of different public institutions in the Republic of Panama, which limits the generalizability of the findings to other countries and to the private sector until more evidence is collected in other contexts.

To conclude, the pre-implementation acceptance model applies theoretical frameworks from social psychology and from the user acceptance literature to the specific context of the adoption of enterprise systems. This study advances understanding about the antecedents of the pre-implementation acceptance of enterprise systems by revealing that the expected consequences of implementation on one's own work and on others are significant determinants of acceptance, and are potentially more important beliefs than the conventional explanations of perceived usefulness and perceived ease of use of systems. Further research in this unexplored area, such as longitudinal studies in both the private and public sector, would be helpful in confirming validity and clarifying the generalizability of the PAM.

## CHAPTER 4

# THE ROLE OF THE ORGANIZATIONAL CONTEXT IN SHAPING THE PRE-IMPLEMENTATION ACCEPTANCE OF ENTERPRISE SYSTEMS

### 4.1 Introduction

Enterprise systems are an organizational innovation implemented by management with the goal of increasing efficiency (Klaus et al., 2000; Klaus and Blanton, 2010). Such innovations alter work procedures, replace incumbent technologies, and integrate data from different departments into a unified system. Due to their disruptive nature, it is not surprising that employees are predisposed to resist the implementation of such technologies, and resistance has been identified as one of the main reasons for the failure of information systems (Kim and Kankanhalli, 2009). Regardless of how beneficial a technology might be, it will not have the desired result unless people use it and take maximum benefit of it (Abdinnour-Helm et al., 2003). As the old saying goes, it is “better the devil you know than the one you don’t,” user resistance reflects the human preference to stay with what is known and certain.

In an attempt to help practitioners reduce such resistance, much research in the user acceptance literature has focused on identifying the drivers of the acceptance of new technologies (e.g., Davis et al., 1989; Venkatesh et al., 2003). Theories such as the technology acceptance model (TAM; Davis et al., 1989) and the unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003) measure acceptance with the actual use or the intention to use a new technology, and they show that believing that a new technology is useful and easy to use are the main determinants of user acceptance.

However, the use of enterprise systems in organizations is mainly driven by compliance; that is, employees tend to use the new technology because they have to, and not because they are convinced of its value. In light of this understanding, the definition of user acceptance goes beyond the use or intention to use a new technology. *Acceptance* in this context should be understood as employees’ predisposition to adopt an enterprise system that replaces incumbent technologies in the organization and that changes the way in which employees are used to working.

Since situational factors may shape the attitudes and consequent behavior of individuals (Fishbein, 1966; Ajzen, 1988; Chih et al., 2012), there is a need to understand whether significant differences in employees' acceptance of enterprise systems may be based on job-related indicators that reflect the organizational context in which the implementation of the technology occurs. The theories in the user acceptance literature, despite their robustness and predictive power, neglect the role of situational factors as potential determinants of acceptance.

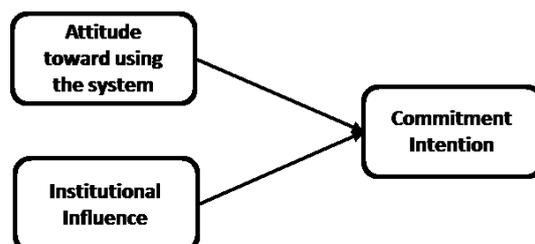
The main objective of the present study is to address this gap in the user acceptance literature by providing empirical evidence about the role of the organizational context in shaping the way in which employees react to new technologies during the pre-implementation phase. The data to study this phenomenon was obtained from civil servants in the Republic of Panama who participated in demonstrations of a new enterprise system that would be implemented in their institutions. The empirical analysis in this specific context would allow informing theory about organizational factors that shape the acceptance of enterprise systems and provide directions for further research in this unexplored area. Moreover, this study offers advice to practitioners on how to adjust the interventions to enhance acceptance according to the job-related indicators that might predispose employees to accept or resist the implementation of enterprise systems.

The chapter proceeds as follows: Section 4.2 presents the theoretical background and the hypotheses to be tested, Section 4.3 describes the setting of the analysis and the data collection, Section 4.4 presents the empirical results using Partial Least Squares – Structural Equation Modeling and one-way MANOVAS, and Section 4.5 discusses the implications for practice and research.

## **4.2 Theoretical background**

Given that the most prominent theories in the user acceptance literature, the TAM and UTAUT, originated from the theory of reasoned action (TRA; Fishbein and Ajzen, 1975), the TRA was used in the present study as the theoretical basis to measure the pre-implementation acceptance of enterprise systems. The acceptance of enterprise systems was measured using three constructs: (i) the attitude toward using the system, (ii) the institutional influence and, (iii) the commitment intention. The *attitude toward using the system* is the employee's positive or negative evaluation of using the enterprise system (adapted from Fishbein and Ajzen's 1975 definition of *attitude toward behavior*). *Institutional influence* is the degree to which an employee perceives that important others in the organization will support the use of the enterprise system (adapted from Fishbein and Ajzen's 1975 definition of *subjective norm*). *Commitment intention* is the strength of employees' willingness to exert efforts that support the implementation of the new enterprise system in spite of any difficulties that might arise

(adapted from Ajzen's 1988 definition of *intention* and Gollwitzer's 1993 definition of *commitment*). Consistent with the theory of reasoned action, the pre-implementation acceptance model in Figure 4.1 proposes that commitment intention is determined by attitude toward using the system and institutional influence. In other words, the author of the present study expects that employees will be willing to support the implementation of a new enterprise system if they have positive attitudes toward using it and if they think their supervisors, colleagues and the senior management would also support its use.



**Figure 4.1. Pre-implementation acceptance of enterprise systems (adapted from Fishbein and Ajzen's theory of reasoned action, 1975)**

The commitment intention of employees is crucial during the pre-implementation phase, because it communicates that employees are highly motivated to make the implementation possible.

Finally, job-related indicators were included in the present study to test to what extent these indicators relate to the pre-implementation acceptance of enterprise systems. The following subsection summarizes previous findings about the relationship between job-related indicators and the acceptance of organizational change, which served as a basis for the development of the hypotheses of the present study.

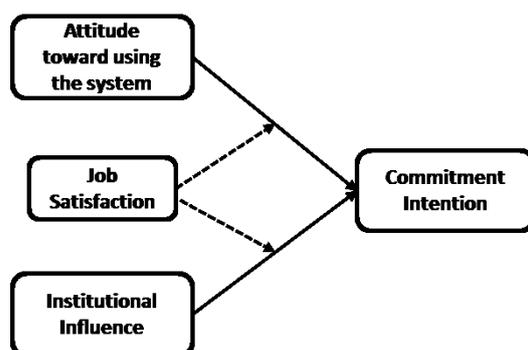
#### **4.2.1 Job satisfaction**

*Job satisfaction* is an employee's attitude toward his or her work, and it is often related to job performance and other organizational outcomes (Chih et al., 2012; Saari and Judge, 2004). For instance, Yousef (1999) found that employees who are satisfied with various facets of their jobs are likely to be more willing to accept changes than unsatisfied employees. Chih et al. (2012) also found evidence of a positive relationship between job satisfaction and attitude toward organizational change. According to Chih et al. (2012), job satisfaction has the highest total effect on attitude toward organizational change.

However, not all authors have observed a positive relationship between job satisfaction and attitude toward organizational change. On the contrary, Cordery et al. (1993) found

evidence of a negative relationship between job satisfaction and attitude toward organizational change. They argue that organizational change provides variety and opportunity for skill use; such opportunities might logically be attractive for employees whose jobs do not interest or challenge them, but less attractive for employees whose jobs already satisfy them. This argument is also consistent with the status quo bias theory, in which employees who are satisfied with their current job situation are more reluctant to change than those who are unhappy with the status quo (Kim and Kankanhalli, 2009).

Moreover, in the information systems literature, Morris and Venkatesh (2010) measured how the implementation of an enterprise system affects employee job satisfaction. They found that implementing new enterprise systems has the potential to drastically alter jobs, influencing employee's job satisfaction. However, during the pre-implementation phase, the opposite process can occur; i.e., job satisfaction can influence the way in which employees react to new technologies. The present study explores this issue and proposes that job satisfaction moderates the strength of the relationships between the three constructs that represent the acceptance of enterprise systems (See Figure 4.2).



**Figure 4.2. Job satisfaction moderates the acceptance of enterprise systems**

If job satisfaction moderates the relationships between the constructs, the path coefficients of highly satisfied employees should differ significantly from the path coefficients of unsatisfied employees. Accordingly, the following hypotheses are proposed:

- H1: The relationship between the *attitude toward using the system* and *commitment intention* will be significantly stronger for highly satisfied employees than for unsatisfied employees.
  
- H2: The relationship between *institutional influence* and *commitment intention* will be significantly stronger for highly satisfied employees than for unsatisfied employees.

Despite the fact that previous research has found both positive and negative relationships between job satisfaction and organizational change, the hypotheses of the present study assume a positive relationship of job satisfaction with the acceptance of enterprise systems.

#### **4.2.2 Salary**

Low levels of extrinsic job satisfaction are related to unfavorable attitudes toward organizational change (Cordery et al., 1993). Consistent with this finding, Yousef (1999) found that satisfaction with pay has a positive relationship with attitudes toward change. Further, Goldfinch et al. (2011) found that higher income may lead to a more positive feeling toward work in general and a reduction in stress from technology use. Although satisfaction with pay relates positively with acceptance of organizational change (Yousef, 1999; Cordery et al., 1993), the present study will explore whether salary itself is associated with significant differences in the pre-implementation acceptance of enterprise systems:

H3: The scores for attitudes toward using the system, institutional influence, and commitment intention will be significantly higher for employees with high salaries than for employees with low salaries.

#### **4.2.3 Job tenure**

Iverson (1996) found that acceptance of organizational change is higher in employees with shorter tenure. Kim and Kankanhalli (2009) support this finding, arguing that employees with longer job tenure might resist organizational change because it takes away the advantage of having more experience with the current way of working. In the information systems literature, Abdinnour-Helm et al. (2003) also found that newcomers were more optimistic about the potential capabilities of a new enterprise system than those employees who had been with the organization for longer periods of time. However, Agarwal and Prasad (1999) found no significant effect of job tenure on the acceptance of information systems. Based on all of the findings in this area, the present study proposes that job tenure negatively relates to the acceptance of enterprise systems:

H4: The scores for attitudes toward using the system, institutional influence, and commitment intention will be significantly lower for employees with long job tenure than for employees with short job tenure.

#### **4.2.4 Hierarchical position**

Abdinnour-Helm et al. (2003) found that an employee's hierarchical position has a great impact on his or her attitude toward the acceptance of enterprise systems. They argue that managers may have a broader knowledge base with which to evaluate the potential

value of technological innovations such as enterprise systems than rank-and-file employees. Similarly, Amoako-Gyampah (2004) found that rank-and-file employees felt less confident about their ability to use new technologies than managers did. According to Amoako-Gyampah, rank-and-file employees may miss the whole overview of the benefits of the technology by focusing on specific details, because they tend to be concerned about the system's ability to facilitate their daily jobs rather than its ability to provide integrated data. In light of these findings, the present study hypothesizes that higher hierarchical positions will positively relate to the employees' acceptance of enterprise systems.

H5: The scores for attitudes toward using the system, institutional influence, and commitment intention will be significantly higher for supervisors and heads of department than for rank-and-file employees.

#### **4.2.5 Department and type of institution**

In addition to the job-related indicators laid out in the preceding section, the present study proposes other two indicators that reflect the organizational context in which implementation takes place: the department and the type of the institution in which the employee works. The implementation of a new enterprise system can affect departments differently: while a new technology might create disruptive changes in some departments, other departments might be hardly affected by the new system, or might clearly benefit from more reliable data provision. For this reason, it is expected that employees coming from certain departments will show more acceptance than others:

H6: The scores for attitudes toward using the system, institutional influence, and commitment intention will be significantly different for employees from different departments.

Finally, the type of institution might also relate to the way in which employees react to new enterprise systems. It is difficult to develop one technology that perfectly fits the needs of any organization. For instance, if the same technology is proposed to a telecommunications and a manufacturing company, the employees working for the telecommunications company may have a higher acceptance of the new technology than those working for the manufacturing company, or vice versa. The reasons for this difference might be related to the organizational culture, management policies, routines, or how the technology fits with the needs of the organization.

H7: There will be significant differences in employee's scores for attitude toward the use of the system, institutional influence, and commitment intention based on the type of institution.

The following section describes the data and the methodology used to test empirically the hypotheses proposed above.

### 4.3 Data and methodology

The study sample was composed of 236 civil servants working for administrative departments of 24 public institutions in the Republic of Panama. The Ministry of the Economy and Finance of the Republic of Panama invited civil servants to participate in demonstrations of a new enterprise system for public institutions, SAFWeb. Appendix A presents a list of the number of participants per institution and type of institution. Most civil servants were female (72%) and the average worker was 44 years old. The demonstrations included approximately thirty minutes of theoretical information about the reasons for change and the benefits of the system, followed by one-and-a-half hours of interaction with the system. Data collection comprised self-reported data from three instruments: a registration form, the Job Satisfaction Survey (JSS), and the SAFWeb evaluation. The questionnaires were administered in Spanish, the official language in Panama, and each participant was assigned a unique code to ensure anonymity.

#### 4.3.1 Measurement of job-related indicators that reflect the organizational context

Study participants completed the registration form immediately before the demonstrations started, providing information about their salary, length of job tenure, hierarchical position, department, and type of institution. The salaries of civil servants were classified according to six categories (see Table 4.1) and the present study hypothesized that those employees with higher salaries would show significantly higher acceptance of the new enterprise system than those employees with lower salaries.

Monthly salary	<i>n</i>	%
Less than USD 500	23	10%
Between USD 501 and USD 750	45	20%
Between USD 751 and USD 1000	49	22%
Between USD 1001 and USD 1250	41	18%
Between USD 1251 and USD 1500	12	5%
More than USD 1500	57	25%
All salary levels	227	

**Table 4.1. Descriptive statistics of participant salaries**

Table 4.2 presents the summary statistics of job tenure. Job tenure was classified in four categories and the present study hypothesized that employees with longer tenures would report significantly lower acceptance of the enterprise system than employees with shorter tenures.

<b>Job tenure</b>	<b><i>n</i></b>	<b>%</b>
Less than one year	27	12%
Between 1 and 5 years	91	40%
Between 6 and 10 years	34	15%
More than 10 years	78	34%
All job tenure levels	230	

**Table 4.2. Descriptive statistics of participant job tenure**

Table 4.3 shows the hierarchical position of the participants. Most of the civil servants who participated in this study were either rank-and-file employees or heads of departments. The six categories of hierarchical position displayed in Table 4.3 were merged into three categories: (i) Rank-and-file employee, (ii) Head of department or Supervisor, and (iii) Director, Sub-director, or Auditor. The present study hypothesized that rank-and-file employees would show lower acceptance of the new enterprise system than heads of department or supervisors.

<b>Hierarchical position</b>	<b><i>n</i></b>	<b>%</b>
Rank-and-file employee	109	47%
Supervisor	4	2%
Head of department	98	42%
Auditor	2	1%
Sub-director	4	2%
Director	13	6%
All hierarchical positions	230	

**Table 4.3. Descriptive statistics of participant hierarchical position**

Table 4.4 shows the list of departments that participated in the demonstrations. These departments were merged into five categories: (i) Accounting, (ii) Budget, (iii) Treasury, (iv) Administration, Finances, and Auditing, and (v) Others. It was assumed that the SAFWeb software would affect each department differently. For instance, SAFWeb assigns new tasks and more responsibility to the Accounting department. In contrast, the Budget department has only a few tasks in the system, and becomes dependent on

the Accounting department, because SAFWeb automates budget execution based on accounting records. The Treasury department also becomes dependent on the Accounting department, because, in order to issue a payment through the system, the Accounting department first must register the transaction. Finally, SAFWeb gives more control to the administrative departments, which are able to monitor and generate financial reports at any time. Other departments are not affected directly by the software, but could be affected indirectly by changes in administrative procedures stemming from the implementation of SAFWeb. Given the different impact that SAFWeb will have on each department, the present study hypothesized that there will be significant differences in its acceptance based on employees' departments.

<b>Department</b>	<b><i>n</i></b>	<b>%</b>
Accounting	99	43%
Budget	24	10%
Treasury	36	16%
Administration and Finances	25	11%
Auditing	7	3%
Heritage assets and inventories	10	4%
Human Resources	5	2%
Information Technology	7	3%
Procurement	7	3%
Others	10	4%
All departments	230	

**Table 4.4. Descriptive statistics of participant departments**

Finally, Table 4.5 presents the descriptive statistics of the types of institutions. In the Republic of Panama, public institutions are classified into six categories (Contraloría General de la República, 2005). Most of the civil servants who participated in the demonstrations for the present study were either part of a central government institution or a decentralized institution. Central government institutions are the ministries and its subsidiaries. While decentralized institutions receive payments from citizens in exchange for services, central government institutions receive transfers from the National Treasury and other public institutions. Decentralized institutions therefore need an additional option in the enterprise system to register payments from citizens, an option that central government institutions do not need. This is just one example of the differences in the accounting needs of several types of institutions that might relate to the acceptance of a new enterprise system. For this reason, in the present study it is hypothesized that there will be significant differences in the acceptance of the enterprise system based on the type of institution.

Type of institution	<i>n</i>	%
Central government	71	31%
Decentralized	125	54%
Financial intermediary	7	3%
Municipality	8	3%
Public company	19	8%
All type of institutions	230	

**Table 4.5. Descriptive statistics of types of institution**

In addition to the job-related indicators presented above, which were measured through the registration form, participants' job satisfaction was measured with the Job Satisfaction Survey (JSS; Spector, 1985). The Job Satisfaction Survey (JSS) is a widely used scale that assesses nine facets of job satisfaction, as well as overall satisfaction. The nine facets it measures are pay, promotion, supervision, fringe benefits, contingent or performance-based rewards, operating conditions, coworkers, nature of work, and communication. The scale is comprised of 36 6-point Likert-type items with possible scores ranging from 1 to 6, with 1 = "strongly disagree" and 6 = "strongly agree." A total satisfaction score is also computed by summing all of the item scores (Spector, 1997). Table 4.6 presents a summary of the constructs of the Job Satisfaction Survey.

Facets	Number of items	Sample question
Pay	4	I feel I am being paid a fair amount for the work I do.
Promotion	4	There is really too little chance for promotion at my job.
Supervision	4	My supervisor is quite competent in doing his/her job.
Fringe Benefits	4	I am not satisfied with the benefits I receive.
Contingent rewards	4	I do not feel that the work I do is appreciated.
Operating conditions	4	Many of our rules and procedures make doing a good job difficult.
Coworkers	4	I like the people I work with.
Nature of work	4	I feel a sense of pride in doing my job.
Communication	4	Communications seem good within this organization.

**Table 4.6. Job Satisfaction Survey - Summary of constructs**

The JSS was chosen for the present study because it was designed for use in human service, public, and nonprofit organizations (Spector, 1985). It is also free to use for research purposes and is shorter than comparable scales such as the Job Descriptive Index (JDI; Kihm et al., 1997) and the Minnesota Satisfaction Questionnaire (Weiss et al., 1967). The original JSS scale is in English. The translated version to Spanish provided by Marion-Landais, C.A. (1993) was edited by the author of the present thesis, who is

Spanish native speaker from the Republic of Panama. The edited version of the scale was then proofread by one bilingual, and two monolingual Panamanian civil servants working for the Ministry of the Economy and Finances in the Republic of Panama.

Table 4.7 presents the descriptive statistics and the alpha coefficients of the Job Satisfaction Survey findings for the present study. In this table almost all the subscales' reliability coefficients are below 0.70. However, Spector (2015) has argued that low reliability for a previously validated scale may be due to national cultural differences, or due to the fact that the translated measure does not adequately capture the nuance of the intended construct.

Subscale	Number of items	N	Mean Score	SD	Mean inter-item correlation	Alpha coefficient
Pay	4	226	12.830	4.122	0.281	0.605
Promotion	4	228	13.370	3.575	0.177	0.467
Supervision	4	223	16.840	4.185	0.376	0.704
Benefits	4	226	12.250	3.295	0.128	0.366
Contingent Rewards	4	228	12.800	3.643	0.197	0.495
Operating conditions	4	225	12.070	2.775	0.043	0.158
Coworkers	4	228	16.870	3.284	0.238	0.536
Nature of work	4	228	20.780	2.818	0.348	0.622
Communication	4	226	14.510	3.586	0.231	0.546
Total Satisfaction	36	221	132.720	18.037	0.107	0.816

**Table 4.7. Job Satisfaction Survey - Descriptive statistics and alpha coefficients**

For the present study, however, only the total job satisfaction score—which had a high reliability coefficient (0.816)—was used in data analysis.

### 4.3.2 Measurement of the acceptance of enterprise systems

The acceptance of enterprise systems was measured through the SAFWeb evaluation questionnaire. The SAFWeb evaluation comprises 31 items representing seven constructs: Perceived ease of use, perceived usefulness, self-efficacy, expected consequences of the implementation, institutional influence, commitment intention, and attitude toward using the system. Since the focus of this study is the pre-implementation acceptance of enterprise systems, only the three constructs of *attitude toward use*, *institutional influence*, and *commitment intention* were considered. The other four constructs represent the antecedents or determinants of acceptance (beliefs about the use of the system and the expected consequences of the implementation), and are therefore outside the scope of this study. Table 4.8 summarizes the constructs and the sources of the items.

The items assessing *attitude toward using the system* and *institutional influence* were adapted from previous research (Venkatesh et al., 2003; Taylor and Todd, 1995), and the answers to all items were given on a 7-point Likert-type scale from 1 to 7, where 1 is the negative end of the scale and 7 the positive end of the scale (See Appendix B for the item wording). Commitment intention is a self-developed construct that was included to confirm acceptance of the technology. If individuals have positive attitudes towards the technology, it is hypothesized in the present study that they will be willing to exert an effort to make implementation possible.

Construct	Number of items	Sample question	Sources
Attitude toward using the system	4	Using SAFWeb would be ...	Davis et al. (1989), Taylor and Todd (1995), Venkatesh et al. (2003)
Institutional Influence	4	I think the senior management of my organization will support the use of the system	Thompson et al. (1991), Venkatesh et al. (2003)
Commitment intention	3	If there was a referendum in my institution on SAFWeb, I would vote against its implementation.	Self-developed construct

**Table 4.8. SAFWeb Evaluation – summary of constructs**

Table 4.9 presents the descriptive statistics and the alpha coefficients of the SAFWeb Evaluation. While the alpha coefficients of institutional influence and attitudes toward use were quite high (0.918 and 0.929, respectively), the reliability of commitment intention was somewhat low (0.588). This low alpha coefficient for commitment intention is, however, not surprising, given that it was assessed using only three items and it is a self-developed construct.

Subscale	Number of items	N	Mean score	SD	Mean inter-item correlation	Alpha coefficients
Attitudes toward use	4	223	23.720	3.340	0.768	0.929
Institutional influence	4	225	22.820	4.093	0.737	0.918
Commitment intention	3	226	17.110	2.918	0.373	0.588

**Table 4.9. SAFWeb Evaluation - descriptive statistics and alpha coefficients**

In the next section, further reliability and validity testing of the SAFWeb evaluation will be performed.

### **4.3.3 Reliability and validity tests of the acceptance constructs**

Before describing the reliability and validity testing of the acceptance constructs, the nature of the analysis will be explained in greater detail. Since the job-related indicators of salary, job tenure, hierarchical position, department, and type of institution are categorical, one-way MANOVAs were conducted, with the dependent variables being total scores of the constructs *attitudes toward use*, *institutional influence*, and *commitment intention*. One-way MANOVA testing will reveal any significant differences in the acceptance scores based on the categorical job-related indicators.

A Partial Least Squares – Structural Equation Modeling (PLS-SEM) analysis was conducted to determine whether job satisfaction moderates the relationship between the three acceptance constructs. This method was chosen because it is non-parametric, and is therefore appropriate for exploratory research and theory development. For a more detailed discussion on this method, please see Hair et al. (2014) and Lowry and Gaskin (2014).

Before conducting the PLS-SEM analysis, the statistical quality of the questionnaire used was confirmed (Gefen et al., 2011; Lowry and Gaskin, 2014 and Hair et al. (2014), using the software SmartPLS version 2.0 (Ringle et al., 2005) for instrument validation. To test the internal consistency of the items, a confirmatory factor analysis was used to compute item outer loadings. These loadings need to be higher than 0.70 to demonstrate internal consistency, and items below 0.40 must be deleted (Hair et al., 2014). All of the items except *commint\_25* demonstrated high internal consistency with outer loadings above 0.70 (see Table I1 in Appendix I). While the item *commint\_25* had the lowest item outer loading, it was above 0.40, so it was not excluded from the analysis.

Once the internal consistency of the items was confirmed, the reliability, convergent, and discriminant validity were tested (see Table I2 in Appendix I). The Average Variance Extracted (AVE) in all constructs was above 0.50, which indicates that the constructs explain more than one-half of the variance observed in their items (Fornell and Larcker, 1981). The factors thus demonstrate sufficient convergent validity.

Reliability was estimated using composite reliability and alpha coefficients. The alpha coefficients were all above 0.80, except for the self-developed construct of commitment intention. However, all the composite reliabilities were higher than the recommended threshold of 0.70, which indicates that the study measures are reliable. To test for discriminant validity, the square root of the AVE (on the diagonal of Table I3 in Appendix I) was compared to all inter-factor correlations. Since the diagonal values were larger

than the other correlation values between the constructs, all factors demonstrated adequate discriminant validity (Fornell and Larcker, 1981).

In addition to the reliability and validity tests described above, Appendix G presents the common method variance test of the SAFWeb Evaluation, which indicated that common method bias does not threaten the results of the analysis.

## **4.4 Results**

The tests described in the previous section show that the constructs in the SAFWeb evaluation meet the minimum reliability and validity criteria to proceed with data analysis and the interpretation of results. The results are presented in two stages. The first part presents the standardized path coefficients of the PLS-SEM analysis to test the role of job satisfaction in moderating the strength of the relationships between the acceptance constructs (see Figure 4.1).

The second part of the analysis uses one-way MANOVAS and the software SPSS version 21.0 (IBM Corp, 2012) to test the differences in the scores of attitude toward use, institutional influence, and commitment intention, based on participants' salary, job tenure, hierarchical position, department, and type of institution. Unlike the PLS-SEM analysis, in which each construct's item was included in the model, the sums of the scores in each construct were set as dependent variables in the one-way MANOVAS.

### **4.4.1 The role of job satisfaction on the acceptance of enterprise systems**

As job satisfaction is a continuous variable, it was dichotomized into highly satisfied and unsatisfied civil servants based on median scores (Hair et al., 2014). The median total job satisfaction score was 129 in the present study; participants with scores below this value were labeled unsatisfied and those with total job satisfaction scores above the median were considered highly satisfied. The data for the four participants who had exactly the median score of 129 were dropped from the analysis. To test whether the heterogeneity captured by the job satisfaction moderated the strength of the relationships in Figure 4.1, the model was run separately for each group. Table 4.10 presents the standardized path coefficients obtained from the PLS-SEM analysis using the software SmartPLS version 2.0. Model 1 presents the standardized path coefficients obtained for the whole sample, Model 2 shows the path coefficients for the low satisfied group and Model 3 for the highly satisfied group. Note that the significance of the standardized path coefficients were estimated with bootstrapping method with 5000 subsamples.

Constructs	Model 1 (Whole sample) $\beta$	Model 2 Low satisfaction $\beta$	Model 3 High Satisfaction $\beta$	Low-High job satisfaction Difference
DV: Commitment Intention				
Attitude toward use	0.476*** (0.068)	0.342*** (0.097)	0.688*** (0.103)	-0.346**
Institutional Influence	0.320*** (0.070)	0.465*** (0.089)	0.070 (0.119)	0.395***
Observations	228	104	112	
R-squared	0.541	0.548	0.546	

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$

**Table 4.10. Standardized path coefficients of the acceptance of enterprise systems by level of job satisfaction**

Note: In all three models multicollinearity was controlled for by estimating the Variance Inflation Factor, which was always below the recommended value of three (Hair et al., 2014).

In Model 1, both attitude toward use and institutional influence were found to have a significant relationship with commitment intention, with attitude having the highest path coefficient. For the low satisfaction group (Model 2), although both variables were significant determinants of commitment intention, institutional influence has the highest path coefficient. For the high satisfaction group (Model 3), the opposite was true: attitude toward use was the main determinant of commitment intention, and the relationship between institutional influence and commitment intention was very small and insignificant. To confirm whether the differences between the two groups were significant, *t*-testing was conducted to determine the difference between the path coefficients; these *t*-values were then converted into two-tailed *p*-values (Lowry and Gaskin, 2014), and both differences were found to be significant at the 0.05 level.

Highly satisfied employees had a significantly stronger relationship between attitude toward use and commitment intention than did unsatisfied employees, which supports H1. However, the opposite was true for the relationship between institutional influence and commitment intention, with a significantly stronger relationship for unsatisfied employees than for highly satisfied ones, which does not support H2.

To confirm the findings further, the two-stage product indicator approach is used (Hair et al., 2014). In this method, the total scores of the job satisfaction are included in the model as a direct determinant of commitment intention. In the first stage, the model was run without the interaction terms to obtain the scores of the latent variables. In the second stage, the latent variable scores of attitude toward use, institutional influence,

commitment intention, and job satisfaction from the first-stage were used as inputs. Then the interaction terms for each explanatory variable are calculated.

As can be observed in Table 4.11, the interaction term Attitude toward use \* Job Satisfaction has a positive and significant effect on Commitment intention (0.170). For a mean-centered level of job satisfaction, the relationship between attitude toward use and commitment intention has a value of 0.533. If job satisfaction becomes higher, this would imply that the relationship between attitude toward use and commitment intention would increase by the size of the interaction term (0.170). If the job satisfaction becomes smaller, the relationship between attitude toward use and commitment intention would decrease by 0.170.

Conversely, the interaction term Institutional Influence \* Job Satisfaction has a negative and significant effect on Commitment intention (-0.211). For a mean-centered level of job satisfaction, the relationship between institutional influence and commitment intention has a value of 0.260. If job satisfaction becomes higher, the relationship between institutional influence and commitment intention would therefore be expected to decrease by the size of the interaction term (-0.211). Hence, when job satisfaction becomes higher, the institutional influence becomes less important for the explanation of commitment intention. If the job satisfaction becomes smaller, the relationship between institutional influence and commitment intention would increase by 0.211.

<b>Model 4 (Whole sample)</b>	
<b>Constructs</b>	<b>β</b>
DV: Commitment Intention	
Attitude toward use	0.533*** (0.068)
Institutional Influence	0.260*** (0.070)
Job Satisfaction	0.064 (0.065)
Attitude toward use * Job Satisfaction	0.170** (0.073)
Institutional Influence * Job Satisfaction	-0.211*** (0.073)
Observations	228
R-squared	0.543

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 4.11. Standardized path coefficients using the two stage product indicator approach**

This result confirms that job satisfaction indeed moderates the strength of the relationship between the explanatory variables of attitude toward using the system and institutional influence, as well as the outcome variable of commitment intention.

Based on these findings, it can be inferred that, compliance and consensus with others in the organization are important reasons for unsatisfied civil servants to commit to making implementation possible. For instance, a very unsatisfied civil servant might be unwilling to work overtime to finish implementation activities unless the organization asks him to do so, or unless he observes that his supervisors and colleagues are working hard on the implementation activities as well. In this example, the civil servant's motivation is driven mainly by institutional influence, which is the perception that important others in the organization support the use of the system.

For highly satisfied civil servants, institutional influence did not relate to their commitment intention. It seems that having positive attitudes towards the use of the enterprise system is reason enough for highly satisfied employees to commit to implementation activities.

#### **4.4.2 The role of salary on the acceptance of enterprise systems**

A one-way MANOVA was conducted to determine the effect of the six levels of salary on the three variables of attitudes toward using the system, institutional influence, and commitment intention. No significant differences were found for the six levels of salary on the dependent measures ( $Wilk's \lambda = 0.903, F_{15, 586} = 1.467, p = 0.112, d = 0.038$ ). These findings suggest that the level of salary does not relate to the acceptance scores; thus, there is no support for H3. Table J1 in Appendix J contains the descriptive statistics relating to salary.

#### **4.4.3 The role of job tenure on the acceptance of enterprise systems**

A one-way MANOVA revealed no significant differences on the acceptance of enterprise systems based on the four levels of job tenure ( $Wilk's' \lambda = 0.942, F_{9, 528} = 1.448, p = 0.164, d = 0.025$ ). Table J2 in Appendix J contains the descriptive statistics relating to job tenure.

Contrary to the findings of Iverson (1996), Kim and Kankanhalli (2009), and Abdinnour-Helm et al. (2003), the results of the present study suggest that job tenure is not associated with differences in civil servant's acceptance of enterprise systems. Thus, there is no support for H4. This finding is similar to that of Agarwal and Prasad (1999), who did not find any significant relationship between job tenure and the acceptance of information systems.

#### 4.4.4 The role of hierarchical position on the acceptance of enterprise systems

A one-way MANOVA was conducted to test the association between participants' hierarchical position and the acceptance of enterprise systems. In this case, significant differences were found in the dependent measures based on the three levels of hierarchical position (Wilk's  $\lambda = 0.943$ ,  $F(6, 436) = 2.149$ ,  $p = .047$ ,  $d = 0.030$ ). Table 4.12 presents the descriptive statistics by hierarchical position. As can be observed, supervisors have higher scores in all three dependent variables.

Hierarchical position	n	Attitudes toward using the system		Institutional Influence		Commitment Intention	
		Mean	SD	Mean	SD	Mean	SD
Rank-and-file employee	103	23.14	3.399	22.50	4.163	16.54	2.750
Supervisors	101	24.41	3.131	23.28	3.963	17.77	2.936
Senior management	19	23.21	3.584	22.37	4.193	17.26	2.903
All hierarchical positions	223	23.72	3.340	22.84	4.077	17.16	2.896

**Table 4.12. Descriptive statistics by hierarchical position**

In order to confirm these findings, a one-way ANOVA and its non-parametric counterpart, the Kruskal-Wallis test, were conducted as follow-up tests (see Table 4.13). To control for Type I errors across the multiple ANOVAs, the Bonferroni correction was used. In this correction, the significance level of 0.05 was divided by the number of analyses conducted (Field, 2009; Mayers, 2013), meaning that each analysis was significant at the 0.017 level. Accordingly, the results in Table 4.13 suggest that participants' scores on commitment intention differed significantly based on their hierarchical positions, as  $p$ -values from both the one-way ANOVA and the Kruskal-Wallis test were below 0.017.

Hierarchical Position	One-way ANOVA			Kruskal-Wallis test	
	F (2, 220)	p	$\eta^2$	H(2)	p
Attitudes toward using the system	4.032	0.019	0.035	6.986	0.029
Institutional Influence	1.077	0.342	0.010	1.823	0.399
Commitment intention	4.757	0.009	0.041	8.023	0.016

**Table 4.13. One-way ANOVA and Kruskal-Wallis test results**

Before conducting the post-hoc test to discover the source of differences, the assumptions of normal distribution and homogeneity of variance were tested. The Levene's test shows that the assumption of homogeneity of variances holds for the three dependent variables; Bonferroni post-hoc test was therefore used for all dependent variables.

Since the Shapiro-Wilk test of normality indicated that the data were not normally distributed, the non-parametric Mann-Whitney test was conducted to give more assurance to our results (Field, 2009; Mayers, 2013). The results of the Bonferroni post-hoc test in Table 4.14 indicate that rank-and-file participants reported lower commitment intention scores than did supervisors ( $p = 0.007$ ).

Hierarchical Position	Bonferroni		Bonferroni		Bonferroni	
	Attitudes toward use		Institutional Influence		Commitment Intention	
	Difference	<i>p</i>	Difference	<i>p</i>	Difference	<i>p</i>
Rank-and-file vs. supervisor	-1.27	0.019	-0.78	0.516	-1.23	0.007
Rank-and-file vs. senior management	-0.07	1.000	0.13	1.000	-0.72	0.583
Supervisor vs. senior management	1.20	0.445	0.91	1.000	0.51	1.000

**Table 4.14. Parametric Bonferroni post-hoc tests to detect differences based on hierarchical position**

The non-parametric Mann-Whitney (See Table 4.15) confirms this finding ( $p = 0.004$ ), and indicates that rank-and-file participants reported also lower attitude scores than supervisors ( $p = 0.011$ ).

Hierarchical Position	Attitudes toward use			Institutional Influence			Commitment Intention		
	U	<i>p</i>	<i>r</i>	U	<i>p</i>	<i>r</i>	U	<i>p</i>	<i>r</i>
	Rank-and-file vs. supervisor	4138	0.011	-0.179	4681	0.207	-0.088	4026	0.004
Rank-and-file vs. senior management	944	0.804	-0.023	959	0.887	-0.013	852	0.379	-0.082
Supervisor vs. senior management	772	0.175	-0.125	844	0.400	-0.077	864	0.480	-0.064

**Table 4.15. Non-parametric Mann Whitney post-hoc tests to detect differences based on hierarchical position**

These findings suggest that there are indeed significant differences in the acceptance of enterprise systems based on the hierarchical position of employees. More specifically, supervisors and heads of departments show higher attitude toward use and commitment intention scores than rank-and-file employees. These results are consistent with previous research and support H5.

One interpretation for these differences in attitudes toward use and commitment intention is that supervisors gain more control with the new technology, as SAFWeb provides a platform through which supervisors can revise and authorize each entry completed by the civil servants under their supervision. However, rank-and-file employees might naturally see it as negative that the new technology allows supervisors to monitor everything what they do. Further, rank-and-file employees are the main affected due to the increased workload caused by the new technology. This might be some reasons why supervisors were found to have higher attitude scores than rank-and-file employees.

Supervisors and heads of department are responsible for getting things done and for solving potential problems in their departments, and might recognize the importance of engaging in activities to make the implementation of the enterprise system possible. This responsibility awareness might explain the higher commitment intention of supervisors as compared to rank-and-file employees.

#### **4.4.5 The role of department on the acceptance of enterprise systems**

The one-way MANOVA did not reveal significant differences in the acceptance of enterprise systems based on department (Wilk's  $\lambda = 0.927$ ,  $F_{12, 572} = 1.393$ ,  $p = 0.164$ ,  $d = 0.029$ ). Table J3 in Appendix J contains the descriptive statistics by department. Therefore, although civil servants might be expected to have different reactions to a new technology based on their departments, there was no support for H6 in the present study's data.

#### **4.4.6 The role of the type of institution on the acceptance of enterprise systems**

Finally, the effect of the type of institution on the three dependent variables of institutional influence, attitudes toward using the system, and commitment intention were tested. The one-way MANOVA confirmed significant differences among the five types of institutions on the dependent measures (Wilk's  $\lambda = 0.852$ ,  $F_{12, 572} = 2.970$ ,  $p < 0.001$ ,  $d = 0.062$ ). Table 4.16 contains the descriptive statistics by the type of institution. As can be observed, participants working for central government institutions had the lowest acceptance scores and participants working for municipalities had the highest acceptance scores.

Type of institution	n	Attitudes toward using the system		Institutional Influence		Commitment Intention	
		Mean	SD	Mean	SD	Mean	SD
Central government	69	22.62	3.536	21.10	3.715	16.22	2.667
Decentralized	121	24.24	3.228	23.79	4.017	17.45	2.966
Financial intermediary	7	24.29	2.928	23.57	2.936	19.14	2.854
Municipality	8	26.13	1.727	26.00	2.878	19.63	2.066
Public company	18	23.11	2.805	21.44	3.989	16.94	2.363
All type of institutions	223	23.72	3.340	22.84	4.077	17.16	2.896

**Table 4.16. Descriptive statistics by the type of institution**

As follow-up tests, a one-way ANOVA and its non-parametric counterpart, the Kruskal-Wallis test, were conducted. The results in Table 4.17 confirm the finding that participants' acceptance scores differed significantly based on the type of institution, with  $p$ -values for both parametric and non-parametric tests all below 0.017.

Type	One-way ANOVA			Kruskal-Wallis test	
	F (4, 218)	p	$\eta^2$	H(4)	p
Attitudes toward using the system	4,038	0.004	0.069	14,713	0.003
Institutional Influence	7,289	0.000	0.118	24,707	0.000
Commitment intention	4,732	0.001	0.080	16,949	0.002

**Table 4.17. One-way ANOVA and Kruskal-Wallis test**

Before conducting the post-hoc test to discover the source of differences, the assumptions of normal distribution and homogeneity of variance were tested. The Shapiro-Wilk test indicated that the assumption of normality does not hold, and the Levene's Test showed that the assumption of homogeneity of variances is only tenable for institutional influence ( $F(4,218) = 1.727$ ,  $p = 0.145$ ). For this reason, Bonferroni's post-hoc test was used only for the construct of *institutional influence*, as this was the only construct that met the assumption of homogeneity of variance. The Games-Howell post-hoc test was used for the other two constructs, as this test is indicated when the assumption of homogeneity of variance is violated.

The post-hoc tests were found to be significant at the 0.013 level according to the Bonferroni correction (Field, 2009; Mayers, 2013).

In Table 4.18, the Games-Howell post-hoc test results show that the attitude scores of civil servants working for central government institutions were lower than those of civil servants working for municipalities ( $p = 0.002$ ). The Bonferroni post-hoc test scores indicate that the institutional influence scores of civil servants working in central government institutions were lower than those of civil servants working for decentralized institutions ( $p < 0.001$ ) or municipalities ( $p = 0.008$ ). Finally the Games-Howell post-hoc test results indicate that the commitment intention scores of civil servants working for central government were lower than those working for municipalities ( $p = 0.011$ ).

Type	Games-Howell		Bonferroni		Games-Howell	
	Attitude toward use		Institutional Influence		Commitment Intention	
	Difference	$p$	Difference	$p$	Difference	$p$
Central government vs. decentralized	-1.62	0.018	-2.68	0.000	-1.24	0.030
Central government vs. financial intermediary	-1.66	0.643	-2.47	1.000	-2.93	0.170
Central government vs. municipality	-3.50	0.002	-4.90	0.008	-3.41	0.011
Central government vs. public company	-0.49	0.971	-0.34	1.000	-0.73	0.789

**Table 4.18. Parametric Bonferroni and Games-Howell post-hoc tests to detect differences based on the type of institution**

The non-parametric Mann–Whitney test results in Table 4.19 confirm the results of the parametric post-hoc test; these test results also show that employees who worked in central government institutions had lower attitude scores than those who worked in decentralized institutions ( $p = 0.002$ ).

Type	Attitude toward use			Institutional Influence			Commitment Intention		
	$U$	$p$	$r$	$U$	$p$	$r$	$U$	$p$	$r$
Central government vs. decentralized	3074	0.002	-0.222	2788	0.000	-0.296	3327	0.005	-0.91
Central government vs. financial intermediary	171	0.203	-0.149	148	0.086	-0.197	109	0.013	-0.278
Central government vs. municipality	122	0.006	-0.298	85	0.001	-0.366	95	0.001	-0.350
Central government vs. public company	546	0.420	-0.086	609	0.824	-0.024	510	0.216	-0.134

**Table 4.19. Non-parametric Mann Whitney post-hoc tests to detect differences based on the type of institution**

The findings of the present study suggest that there are significant differences in participants' acceptance scores based on the type of institution they work for, supporting H7. Participants working in central government institutions reported lower scores for attitudes, institutional influence, and commitment intention than those who worked for decentralized institutions or municipalities. Based on these findings, it seems that the type of institution captures part of the organizational context in which implementation takes place, thereby shaping the way in which participants react to the implementation of the new enterprise system.

Central government institutions in the Republic of Panama have accounting needs and procedures that are different from those of decentralized institutions and municipalities. A lack of technology fit, as well as differences in managerial policies and routines could be some reasons for the lower acceptance scores of civil servants working for central government institutions, as compared to those working for decentralized institutions or municipalities.

#### **4.5 Discussion and Conclusion**

The present study empirically tested the role of the organizational context in shaping the acceptance of enterprise systems during the pre-implementation phase. These findings enrich the knowledge base of the user acceptance literature by demonstrating that job satisfaction, hierarchical position, and the type of institution are associated to the predisposition of civil servants in the Republic of Panama to accept a new enterprise system for public institutions.

These results suggest that, for highly satisfied employees, attitudes toward using the system were the only determinant of their willingness to support the implementation of the technology. For unsatisfied employees, the perception that important others in the organization support the use of the technology was even more important than their own attitude toward using the system. Since attitudes toward using the system were key determinants of acceptance for both highly satisfied and unsatisfied employees, it is crucial that practitioners design communication strategies that allow employees to form positive evaluations about new technologies and their future implementation. This could be done through workshops that emphasize the benefits of the technology, and that offer practical experience during early stages of the implementation process—ideally, before senior management has even decided to adopt the new technology. For unsatisfied employees, for whom compliance is the main reason to commit to implementation activities, formal communications from senior management and periodic reports about the progress of implementation activities might help them to realize the support that important others in the organization give to the adoption of the new enterprise system.

The findings in this study suggest that supervisors had more positive attitudes toward use and higher commitment intentions than rank-and-file employees. Practitioners

should therefore try to convince supervisors about the benefits of new technologies first, because they are key actors during the implementation process. If a supervisor opposes the adoption of an enterprise system, then the employees under his or her supervision will likely also oppose the change to avoid conflict with the supervisor. Conversely, if the supervisor supports change, he or she will find the way to involve subordinates in getting the job done and supporting implementation.

Central government institutions reported lower acceptance than decentralized institutions or municipalities. This knowledge can inform better strategies to promote new technologies. For instance, the Ministry of the Economy and Finance, the supplier of SAFWeb, should exert more effort to convince employees in central government institutions about the benefits of the new technology than to convince employees in decentralized institutions or municipalities. Another possibility is that the lower acceptance in central government institutions was due to the lack of fit of the enterprise system to the needs of that specific type of institution. By applying the findings of the present study, suppliers of new technologies could be made aware of potential problems associated with specific types of contexts, and would have the opportunity to address these problems prior to implementation.

Although the present study demonstrated that job-related indicators relate to the acceptance of a new enterprise system for public institutions in the Republic of Panama, further research is needed to confirm these findings in other contexts (e.g. enterprise systems in the private sector). Another point to be explored further is the reasons for the non-significant results relating to employees' salaries, job tenure, and departments, does it occur only in the public sector in Panama or is it different in other contexts? Longitudinal studies could also be helpful in identifying whether job-related indicators also affect acceptance during later stages of the implementation process. Finally, given that the construct of *commitment intention* was developed by the author for use in the present study, more research is needed to improve its validity and generalizability to other contexts.

In conclusion, scholars and practitioners should consider the role of job-related indicators in the design of interventions to enhance user acceptance of enterprise systems. Identifying how job-related indicators relate to the acceptance of enterprise system during the pre-implementation phase allows practitioners to anticipate the risk factors correlated with lower acceptance in employees—just as physicians consider risk factors when examining patients. For instance, knowing that most employees are unsatisfied, would warn the promoter of the technology about the need to emphasize the support that senior management and other important referents give to the implementation. Finally, although practitioners can do very little to directly influence job-related indicators such as job satisfaction or hierarchical position, they can at least design more effective strategies according to the job-related risk factors of the employees.

## CHAPTER 5

### CONCLUSIONS

The present thesis contributes to the user acceptance literature by improving understanding about the role of pre-implementation acceptance in the adoption of enterprise systems. This phenomenon was addressed from three different perspectives in the three core papers: Chapter 2 focused on strategies to foster acceptance of enterprise systems, while informing theory about the antecedents of perceived usefulness and perceived ease of use; Chapter 3 developed the pre-implementation acceptance model to measure and explain the relationships between the factors that determine acceptance of enterprise systems; and Chapter 4 empirically tested the relationship between job-related indicators that represent the organizational context in which the enterprise will be implemented and the acceptance of the technology.

The general objectives of the study were successfully achieved, and all of the chapters provided relevant implications for both theory and practice. Although the empirical analysis was based on survey data of potential adopters of a specific enterprise system for public institutions in the Republic of Panama, the findings in all of the papers permitted a theoretical basis to be developed, which can be applied to the adoption of enterprise systems in general. This theoretical basis comprises four assertions: (i) the strategies used to design the demonstrations of SAFWeb can be applied to the design of demonstrations of other enterprise systems; (ii) the role of demonstrations and satisfaction with incumbent systems as antecedents of perceived usefulness and perceived ease of use can be tested in other contexts of the adoption of enterprise systems; (iii) the pre-implementation acceptance model (PAM) can also be applied to the adoption of any enterprise system; and (iv) the methodology used to test the relationships of job-related indicators in the acceptance of enterprise systems can also be used as a basis for further research. To sum, the present thesis provides a knowledge basis to explain the pre-implementation acceptance of enterprise systems in different contexts, and could be used in further research to confirm the generalizability of these findings.

The main limitations of the present thesis are the self-reported and cross-sectional nature of the data. Further, as the constructs of *commitment intention*, *the expected consequences of implementation on own work*, and *consequences of the implementation on others* were first developed by the author for use in the present study, more research is needed to improve the validity and generalizability of these constructs to other contexts. In spite of these limitations, the dataset revealed new insights about the pre-

implementation acceptance of enterprise systems. The following subsections summarize the contributions in each of the core papers and provide directions for further research.

## **5.1 Chapter 2**

The qualitative study presented in the second chapter of this thesis addresses Benbasat and Barki's (2007) observation that repeatedly demonstrating that perceived usefulness and perceived ease of use are salient beliefs influencing acceptance is of limited value if one does not understand how to influence such beliefs. In an attempt to fill this gap, the second chapter explained how demonstrations were designed to help individuals form sound beliefs about the technology. It was found that, immediately after attending the demonstrations, participants who had no previous knowledge or experience with the new enterprise system expressed positive beliefs and attitudes toward the technology.

The relationship between demonstrations and positive beliefs and attitudes provides guidance on how to influence perceived usefulness and perceived ease of use, the main beliefs identified in the TAM. The present study shows that, during the pre-implementation stage, the promoter of the enterprise system can influence the initial beliefs of individuals by providing concrete information about reasons for change and the benefits that the new technology will bring. Furthermore, it is crucial that demonstrations offer participants first-hand experience with the technology. This first-hand experience helped individuals to make more accurate assessments about the enterprise system, and helped them to articulate concerns about specific aspects of the enterprise system that did not fit the departments' need. Since the adoption of enterprise systems is a top-down decision that aims mainly to satisfy senior management's needs, it is necessary to obtain bottom-up feedback from the final users, who can confirm whether or not the system also satisfies the needs of their specific department. This bottom-up feedback allows employees to provide an assessment of the technology from their own perspective, and to evaluate whether the enterprise system satisfies their day-to-day work needs. Senior management can then consider improvements to the technology, and whether or not they still think the enterprise system should be implemented in the organization. To maximize the benefit of this feedback, communication interventions such as demonstrations should be conducted well in advance, before the senior management has decided to implement the technology.

The design of the demonstrations in chapter 2 applied the following seven strategies from the literature: (i) inducing a rational attitude, (ii) reducing status quo bias, (iii) providing first-hand experience, (iv) generating repeated exposure, (v) suggesting scarcity, (vi) increasing the perception of choice and (vii) getting feedback. This strategies can be applied in the design of demonstrations in other contexts (e.g. adoption of enterprise systems in the private sector), to find out whether the same positive relationship between demonstrations and pre-implementation acceptance hold.

The main theoretical contribution of chapter 2 is the identification of demonstrations and the satisfaction with the incumbent system as antecedents of the perceived usefulness and perceived ease of use about new enterprise systems during the pre-implementation phase. This extends understanding about the determinants of the initial beliefs about new technologies and proposes a new direction for further research in the user acceptance literature. Scholars in the user acceptance literature are encouraged to confirm empirically whether there is a negative association of the satisfaction with the incumbent technology and the initial beliefs about the new enterprise system. Finally, it would be worth to analyze whether the demonstrations are able to influence the satisfaction with the current system. Demonstrations could persuade employees about the existence of a better alternative to execute their daily tasks, and therefore, after the demonstrations employees could feel unsatisfied with the incumbent technology. If this influence of demonstrations on the satisfaction with the incumbent technology is confirmed, this would give a new tool for the promoter of the technology and the senior management to enhance the pre-implementation acceptance of enterprise systems and to ensure a smoother implementation process.

## 5.2 Chapter 3

The technology acceptance model (TAM; Davis et al., 1989) and the unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003) are the most influential theories in the user acceptance literature. These theories explain individual-level acceptance in terms of the actual use or the intention to use a new technology. In the social psychology literature, the theory of reasoned action (TRA; Fishbein and Ajzen, 1975) had a strong influence on the development of the TAM and UTAUT. The TRA was designed to explain only willful behaviors. One may therefore argue that, although the TAM and UTAUT can explain and predict the individual-level acceptance of new technologies in both voluntary and mandatory usage contexts, these models are better suited to situations in which individuals can choose whether to adopt or reject the technology. Therefore, theories such as the TAM and UTAUT might not be appropriate to explain the adoption of enterprise systems in organizations, as it is a typical example of top-down innovation in which employees are mandated to use the new technology.

The third chapter in the present thesis addressed this limitation and developed the pre-implementation acceptance model (PAM), which adapted the TRA, TPB, TAM, and UTAUT to the specific context of enterprise systems. *Acceptance* in this context was defined as employees' willingness to adopt a new enterprise system that changes the way in which they are used to working. Rather than assessing the use of or intention to use the system, the PAM proposed *commitment intention* as the new dependent variable: employees' willingness to engage in behaviors that support the

implementation of the system. This was considered to be a more appropriate dependent variable for the adoption of enterprise systems. Employees who have positive attitudes toward the use of the new technology are expected to be willing to give their best efforts to make the implementation happen, as, if implementation does not take place, they would not be able to use the technology.

The TAM has focused on attitudes toward using the technology as the main determinant of the intention to use the system. In situations in which individuals decide whether to use or not to use a new technology for their personal use, the construct of *attitudes* alone may be able to accurately predict the individuals' intention to use the technology. However, in the context of adoption of a new enterprise system, the individual is not isolated, because he or she depends on others in the organization. For this reason, the PAM extends the TAM with the construct of *institutional influence*, which represents the subjective norm in TRA, and which is a direct determinant of commitment intention. In addition to the beliefs of perceived usefulness and perceived ease of use, the PAM includes two newly developed constructs, the expected consequences of the implementation on one's own work, and the consequences of the implementation on others; these constructs are antecedents of the attitudes toward using the system and institutional influence, respectively. To date, there has been little research on identifying the antecedents of institutional influence or subjective norms for the context of enterprise systems. The study presented in this chapter proposed the expected consequences of the implementation on others as a direct determinant of institutional influence.

The empirical analysis supported the PAM. The new construct *consequences of the implementation on own work* was found to have a significant and direct effect on attitudes toward use. Moreover, the construct *consequences of the implementation on others* was found to have a significant and direct effect on institutional influence. The findings of data analysis indicate that the expected consequences of the implementation on own work partially mediate the influence of the established beliefs of perceived usefulness and perceived ease of use on the attitudes toward use. For practitioners, this would mean that communication strategies should not only focus on influencing the perception of the usefulness and ease of use of the technology, but should also help employees imagine what the consequences of the technology would be in their day-to-day work, as well as for others. Similarly, giving a global overview of the benefits of the implementation on other departments would allow employees to develop a better idea of the consequences of implementation for others. This better and more comprehensive understanding would then help employees to infer whether important others (i.e. senior management, colleagues, heads of department) in the organization would support the implementation of the enterprise systems.

To conclude, this study contributes to the user acceptance literature by providing a new model specifically designed to explain the pre-implementation acceptance of enterprise systems. The empirical analysis revealed that the expected consequences of the implementation on own work and on others are significant determinants of acceptance and are potentially more important beliefs than the perceived usefulness and perceived ease of use of systems. Further research in this unexplored area, can use the PAM as theoretical model and apply it into different contexts of adoption of enterprise systems to confirm validity and clarifying generalizability of the findings.

### **5.3 Chapter 4**

Finally, the fourth chapter focused on organizational factors that may affect acceptance, but over which the promoter of the technology has little or no influence. While the change management literature has studied the role of job-related indicators in shaping the way in which people react to organizational change, the user acceptance literature has given little attention to this topic. This is not surprising, given that TAM and UTAUT can be applied to any context, and including specific contextual factors would only restrict the generalizability of these theories.

The findings presented in this chapter show that there were significant differences in the pre-implementation acceptance scores of employees based on their hierarchical position and the type of institution they work for. More specifically, supervisors and heads of departments reported higher attitude toward use and higher commitment intention than rank-and-file employees. Similarly, participants working for central government institutions reported lower attitude toward use, institutional influence, and commitment intention than those participants working for decentralized institutions and municipalities. The promoter of the technology can do very little to change the job-related indicators of job satisfaction, salary, job tenure, hierarchical position, department, and type of institution. However, recognizing whether those indicators predispose employees to be more or less resistant toward the new technology could be useful in the design of interventions. The promoter of the enterprise system would know in advance that rank-and-file employees tend to have lower acceptance than supervisors and heads of departments. Communication strategies should therefore be aimed at convincing rank-and file employees of the benefits of the enterprise system. Further, the supplier of the technology—for instance, the Ministry of the Economy and Finance—would know in advance that major efforts are needed to persuade civil servants working for the central government about the benefits of the technology. Another way of interpreting this result is that if civil servants working in a certain type of institution report lower acceptance than employees in other types of institutions, it may be as well that the technology in question does not fit very well with that specific type of institution, and that resistance might be grounded in legitimate concerns about compatibility. In any case, this kind of diagnosis information should be available during

the pre-implementation phase, to allow the implementation process to be planned well in advance, and to guide the design of interventions.

The empirical analysis also revealed that, while for participants who were unsatisfied with their jobs, both attitudes toward use and institutional influence were significant determinants of commitment intention, for highly satisfied participants, only attitudes toward use was a significant determinant of commitment intention. While highly satisfied participants had a stronger relationship between attitudes toward use and commitment intention than unsatisfied participants, unsatisfied participants had a stronger relationship between institutional influence and commitment intention than highly satisfied participants. These findings suggest that there are indeed significant differences in the relationship between the acceptance variables based on the level of job satisfaction. One interpretation of these results is that, for highly satisfied participants, their own evaluation of the implementation is reason enough to commit to implementation. However, for unsatisfied employees, their own evaluation, and their perception of whether important others will support the implementation of the system are both important factors in determining commitment intention. In other words, while highly satisfied employees tend to support implementation based on intrinsic motivation, unsatisfied employees are more motivated by compliance and consensus with important others in the organization.

For the promoter of the innovation and senior management these findings would mean that, when dealing with unsatisfied employees, communication strategies should emphasize the support that important others in the organization will give to the implementation. For instance, demonstrations might provide information about the benefits that the senior management and other departments would obtain from the implementation of the system, or members of senior management might give speeches about the support that the organization will give to the new technology. Conversely, for highly satisfied employees, communication strategies should emphasize how the new technology would help employees improve their work duties.

In conclusion, chapter 4 contributes to the literature by providing empirical evidence about the role of the organizational context in shaping the acceptance of enterprise system. Although in the specific case of SAFWeb in the Republic of Panama only job satisfaction, hierarchical position and type of institution had significant associations with acceptance; it cannot be inferred that these same job-related indicators play roles in the adoption of enterprise systems in the private sector or in other countries. Finally, organizations should consider the role of job-related indicators in the design of interventions to enhance user acceptance of enterprise systems.

#### 5.4 Directions for further research

Based on the experience and knowledge obtained in the course of the present thesis, the following directions for further research are suggested:

**Satisfaction with the incumbent system as an antecedent of acceptance.** Participants attending demonstrations expressed their opinions about the new enterprise system in comparison with the incumbent technology. It would therefore be needed to analyze whether satisfaction with the incumbent system that the new enterprise system would replace has a negative relation to the initial beliefs and attitudes toward the technology. One would expect that those employees who are unsatisfied with the current way of working would be more inclined to evaluate the new technology positively, while those employees who are satisfied with the status quo would be more reluctant to perceive the benefits of the new enterprise system. This could be analyzed empirically by adding a new construct of *satisfaction with the current system*, which could be operationalized with questions assessing overall satisfaction with the incumbent technology, as well as questions comparing the new enterprise system and the incumbent technology.

**The role of demonstrations to enhance pre-implementation acceptance of enterprise systems.** More studies measuring the effect of demonstrations on pre-implementation acceptance of a new enterprise system are needed. Such studies could, for example, assess participants' beliefs about the system before the demonstrations, and then measure acceptance immediately after the demonstrations. Field experiments could also be conducted, in which the control group receives either no demonstration or a different type of demonstration.

**The antecedents of institutional influence.** Interdisciplinary research is needed to discover the antecedents of institutional influence. The present study proposed the expected consequences of the implementation on others as a direct determinant of institutional influence. Demonstrations that are able to influence the perceived usefulness and perceived ease of use might therefore affect the perceived consequences of implementation on others. It is also unknown whether perceived usefulness and perceived ease of use affect the construct of institutional influence directly, or only indirectly through the expected consequences of the implementation on others.

**The facets of job satisfaction and its relationship with pre-implementation acceptance of enterprise systems.** The present thesis found overall job satisfaction to moderate the strength of the relationships among attitudes toward use, institutional influence, and commitment intention. It would therefore be interesting to analyze in more detail which aspects of job satisfaction are the most influential. For example, while satisfaction with pay or promotion might be related to the attitudes toward the use of the system, satisfaction with supervision and coworkers might be related to institutional influence.

**The effect of pre-implementation acceptance on implementation success and organizational learning.** Finally, longitudinal studies are necessary to obtain a more complete picture of the implementation process, to evaluate to what extent high pre-implementation acceptance is related to implementation success, and to the time that it takes employees to learn and adapt to the new technology.

To conclude, the present thesis contributes to the user acceptance literature by providing a theoretical basis to foster, understand and to measure the acceptance of enterprise systems during the pre-implementation phase. This study highlighted the importance of the pre-implementation phase for the success or failure of enterprise systems. Senior management that plan to adopt a new enterprise system should know in advance the employees' technology acceptance in order to design and implement early interventions to mitigate potential problems and guarantee a smoother implementation process.

## DEUTSCHSPRACHIGE ZUSAMMENFASSUNG

Die vorliegende Arbeit thematisiert die Akzeptanz von Unternehmenssoftware während der Vorumsetzungsphase von Anwendern. Die Einführung von Unternehmenssoftware ist eine organisatorische Innovation, die wichtige Änderung am Arbeitsplatz verursacht. Die Einführung neuer Unternehmenssoftware kann positive Effekte wie Produktivitätssteigerungen, Kostensenkungen oder Verbesserungen der Informationsbereitstellung und Kontrolle erzeugen. Sie ersetzt die vorherrschenden Technologien und verändert damit Arbeitsabläufe. Ihre Nutzung ist meistens verpflichtend. Aus diesen Gründen ist es wahrscheinlich, dass die Mitarbeiter der neuen Technologie ablehnend gegenüber stehen. Der Widerstand der Anwender stellt ein Risiko für die Einführung der Unternehmenssoftware dar, da die Einführung verschoben oder unterbrochen werden könnte. Andererseits kann Widerstand auf eventuelle Probleme hinweisen, die ansonsten nicht erkannt werden. Um diesen Umständen Rechnung zu tragen, sollte der Hersteller der Software und die einsetzenden Unternehmen während der Vorumsetzungsphase die Akzeptanz oder den Widerstand der Mitarbeiter messen. Dadurch können Technologieumsetzungsprobleme vermieden werden. Aus den genannten Gründen ergibt sich für das vorliegende Dissertationsvorhaben folgende Forschungsfrage: Wie kann die Akzeptanz von Unternehmenssoftware während der Vorumsetzungsphase gemessen und gefördert werden.

Dieses Dissertationsvorhaben stellt eine passgenaue theoretische Grundlage, die auf der Technologieakzeptanz und der sozialpsychologischen Literatur aufbaut, um die Akzeptanz von Unternehmenssoftware während der Vorumsetzungsphase zu messen, bereit. Einerseits gibt es Akzeptanzfaktoren auf welche der Hersteller der Software oder die einsetzenden Unternehmen großen Einfluss haben. Zum Beispiel können sie, durch Kommunikationsmaßnahmen in der Vorumsetzungsphase, die ersten Vorstellungen eines Anwenders gegenüber der Nutzung einer Software beeinflussen. Andererseits kann der Hersteller kontextuelle organisatorische Faktoren kaum beeinflussen. Diese spezifischen Faktoren können die Art und Weise der Akzeptanz fördern oder behindern, deswegen ist ihre Identifizierung während der Vorumsetzungsphase wichtig.

Als Datengrundlage dieser Dissertation dient ein Befragungsdatensatz, der in der Republik Panama mit der Unterstützung des panamaischen Finanzministeriums gesammelt wurde. Die Beamten der (potenziell) adoptierenden Organisationen hatten wenig oder keine Vorkenntnisse über die neue Unternehmenssoftware. Daher hat das panamaische Finanzministerium Beamte zur Teilnahme an Softwarevorführungen eingeladen, an welchen insgesamt 236 Beamte aus 24 öffentlichen Institutionen teilgenommen haben. Während der Vorführungen haben die Teilnehmer drei Fragebögen beantwortet. Diese Daten werden in den drei Hauptteilen der vorliegenden Arbeit analysiert.

Die vorliegende Dissertation gliedert sich in fünf Kapitel. Das erste Kapitel erklärt die Motivation und Relevanz des Themas für Theorie und Praxis. Es zeigt das Bedürfnis in der Technologieakzeptanzliteratur für Forschung auf, die die Akzeptanz von Unternehmenssoftware während der Vorumsetzungsphase behandelt. Außerdem beschreibt das erste Kapitel die Forschungsziele, beschreibt die Datenerhebung in der Republik Panama und präsentiert schließlich eine Zusammenfassung der folgenden Kapitel.

Das zweite Kapitel ist qualitativer Natur und beschränkt sich auf die Frage, wie die Bildung einer positiven Erwartung eines Anwenders gegenüber der Nutzung einer neuen Software gefördert werden kann. Hier wird die Technologieakzeptanzliteratur kritisiert, weil sie kaum Hinweise darauf gibt, wie die Erwartungen der Anwender in Bezug auf die neue Software positiv beeinflusst werden können. Aus diesem Grund beschäftigt sich das zweite Kapitel mit der Planung und Implementierung von Vorführungen, um die Erwartungen, die wahrgenommene Nützlichkeit und Einfachheit der Bedienung der Software, zu beeinflussen. Das Ziel der Vorführungen war, die Teilnehmer über die Gründe für die Ablösung des bestehenden Systems und die Vorteile der neuen Unternehmenssoftware zu informieren. Zusätzlich zur theoretischen Präsentation haben die Teilnehmer die Software direkt durch geleitete Übungen getestet. Am Ende der Vorführung haben die Teilnehmer die Software mit Hilfe von Fragebögen bewertet.

Die Untersuchung zeigt, dass diejenigen Teilnehmer, die geringe oder kein Vorkenntnisse der neuen Software hatten, nach den Vorführungen positive Erwartungen und Haltungen gegenüber der neuen Technologie äußerten. Diese Ergebnisse unterstützen die Hypothese, dass frühzeitige Einbindung der zukünftigen Anwender durch Vorführung zur Bildung von positiven Erwartungen und Haltungen gegenüber der Implementierung der Software korreliert.

Darüber hinaus boten die Fragebögen die Möglichkeit zum Einfügen freier Kommentare. Aus den schriftlichen Kommentaren kann man ableiten, dass die Zufriedenheit mit dem bestehenden System die Akzeptanz einer neuen Software beeinflussen könnte, weil einige Teilnehmer ihre Meinungen im Vergleich zum bestehenden System berichtet haben. Schließlich sollte nicht unerwähnt bleiben, dass die Vorführungen das Sammeln wichtiger Rückmeldungen für den Hersteller erlaubte. Die Rückmeldungen bezogen sich auf spezifische Funktionen der Software, die verbessert werden müssten, um den Bedürfnissen des Unternehmens besser zu entsprechen.

Zusammenfassend, zeigt dieses Kapitel zwei neue Bestimmungsgrößen für die Technologieakzeptanzliteratur auf. Einerseits bieten die Softwarevorführungen Informationen und praktische Erfahrungen bezüglich der wahrgenommenen Nützlichkeit und Einfachheit der Software. Andererseits ist die Zufriedenheit mit dem bestehenden

System eine weitere Bestimmungsgröße, welche die ersten Erwartungen an die neue Software beeinflussen kann.

Das dritte Kapitel beschäftigt sich mit der Frage, wie die Akzeptanz von Unternehmenssoftware während der Vorumsetzungsphase gemessen werden kann. Dafür entwickelt und beschreibt dieses Kapitel das „Pre-implementation Acceptance Model (PAM)“, welches zur Messung der Akzeptanz der Unternehmenssoftware verwendet wird. Das PAM beinhaltet die vier prominentesten Modelle der Akzeptanz- und der Sozialpsychologieliteratur: Das Technology Acceptance Model (TAM), die Unified Theory of Acceptance and Use of Technologies (UTAUT), die Theory of Reasoned Action (TRA) und die Theory of Planned Behavior (TPB). Diese vier Modelle wurden als theoretische Grundlage für das PAM wegen ihrer Relevanz in der Literatur und ihrer Ähnlichkeiten ausgewählt. Der TRA und TPB sind grundlegende Theorien in der Sozialpsychologie, welche als Rahmen für die Entwicklung der wichtigsten Theorien in der Akzeptanzliteratur (TAM und UTAUT) benutzt wurden. Während TRA und TPB auf fast alle Bereiche des menschlichen Verhaltens angewandt werden können, konzentrieren sich die TAM und UTAUT auf die Erklärung der Anwenderakzeptanz bei Informationssystemen.

Die bestehenden Akzeptanzmodelle TAM und UTAUT sind wegen ihrer Generalisierbarkeit und ihres Ursprungs aus der Sozialpsychologie Theorien, die am besten auf freiwillige Technologieadaption anwendbar sind. Beide Theorien messen die Akzeptanz der Software über die tatsächliche Nutzung oder die Nutzungsabsicht der Anwender. Jedoch ist im Fall von Unternehmenssoftware zu erwarten, dass die Mitarbeiter keine Wahl bezüglich der Verwendung von Software haben. Deswegen ist es zweifelhaft, ob die Nutzung oder Nutzungsabsicht der Software hier passende Indikatoren sind. Aus diesem Grund postuliert das PAM für Unternehmenssoftware einen neuen Zielgröße, die *Unterstützungsabsicht*. Die *Unterstützungsabsicht* wurde in diesem Untersuchungsrahmen festgelegt als die Bereitschaft der Mitarbeiter, die Umsetzung der Software in der Organisation zu unterstützen. Drei Versionen des PAM werden präsentiert. Das Basismodell adaptiert die wichtigsten Konstrukte des TRA als direkte Bestimmungsgröße der Unterstützungsabsicht: (i) *die Einstellung über die Nutzung des Systems*: die Bewertung der Mitarbeiter bezüglich der Verwendung des Systems, und (ii) der *institutionelle Einfluss*: die Wahrnehmung der Mitarbeiter, ob Andere in der Organisation die Verwendung des Systems unterstützen werden. Zusätzlich zu diesen zwei Konstrukten und die Unterstützungsabsicht der Anwender, die die Akzeptanz der Unternehmenssoftware während der Vorumsetzungsphase verkörpern, enthält das Basismodell die Hauptwahrnehmungen des TAM und UTAUT als direkte Bestimmungsgrößen der Einstellung zur Nutzung der Software. Diese Bestimmungsgrößen sind einerseits die *wahrgenommene Nützlichkeit*, also der Glaube, dass die Software die Arbeitsleistung des Anwenders verbessern könnte. Andererseits die

*wahrgenommene Einfachheit*, d.h. der Glaube, dass die Software einfach zu bedienen ist.

Das zweite Modell erweitert das Basismodell mit zwei neuen Konstrukten: Erstens die *Folgen der Umsetzung für die eigene Arbeit*, d.h. die erwarteten Konsequenzen der Nutzung der Software für den eigenen Arbeitsbereich. Zweitens *die Folgen der Umsetzung für Andere*, was die externen Effekte der Umsetzung einzufangen versucht. Es ist zu vermuten, dass ein Mitarbeiter, der glaubt, dass die Nutzung der Software positive Auswirkungen auf seine eigene Arbeit hat, auch eine positive Einstellung über Nutzung der Software entwickeln sollte. Daher kann das Konstrukt *Folgen der Umsetzung für die eigene Arbeit* als direkte Bestimmungsgröße der *Einstellung über Nutzung des Systems* verwendet werden. Analog dazu wird ein Mitarbeiter, der denkt, dass die Anderen in der Organisation von der Software profitieren würden, auch eine höhere Wahrnehmung haben, dass Andere in der Organisation die Verwendung des Systems unterstützen werden. Deshalb wird das Konstrukt *Folgen der Umsetzung für die Anderen* als direkte Bestimmungsgröße des *Institutionellen Einflusses* verwendet.

Das dritte Modell des PAM postuliert, dass das Konstrukt *Folgen der Umsetzung für die eigene Arbeit* ein Mediator zwischen der *Wahrgenommenen Nützlichkeit*, der *wahrgenommenen Einfachheit* und der *Einstellung zur Nutzung der Software* ist. Dies ergibt sich schon allein dadurch, dass ein Mitarbeiter, der erste Informationen über eine neue Software bekommt, zuerst die Nützlichkeit und Einfachheit wahrnimmt und zunächst die Folgen der Umsetzung in seinem eigenen Arbeitsbereich voraussehen kann.

Die empirische Analyse mit dem Partial Least Squares – Strukturgleichungsmodell – Verfahren bestätigt die drei Modelle. Die Ergebnisse zeigen, dass die *Einstellung zur Nutzung der Software* und der *Institutionelle Einfluss* mehr als 53% der *Unterstützungsabsicht* erklären. Es wird außerdem gezeigt, dass das neue Konstrukt *Folgen der Umsetzung für die eigene Arbeit* einen signifikanten und direkten Zusammenhang mit der *Einstellung zur Nutzung der Software* hat. Das Konstrukt *Folgen der Umsetzung auf Andere* weist einen signifikanten und direkten Zusammenhang mit dem *Institutionellen Einfluss* auf. Praktisch bedeutet dies, dass die Kommunikationsstrategien sich nicht nur auf die Beeinflussung der Wahrnehmung bezüglich der berühmten Konstrukte Nützlichkeit und Einfachheit konzentrieren sollten, sondern auch auf die Antizipation der Folgen der Technologieeinführung durch die Mitarbeiter auf deren eigene Arbeit und die Arbeit der Anderen.

Das vierte Kapitel untersucht, ob es signifikante Unterschiede in der Akzeptanz der Unternehmenssoftware aufgrund bestimmter berufsspezifischer Indikatoren gibt. Die untersuchten berufsspezifischen Indikatoren sind: Die Arbeitszufriedenheit, das Gehalt, die Dauer der Betriebszugehörigkeit, die hierarchische Position, die Abteilung und die Art der Organisation. Diese Indikatoren wurden aus den folgenden Gründen gewählt:

Erstens: die Veränderungsmanagementliteratur hat relevante Ergebnisse über den Einfluss der Arbeitszufriedenheit, der Gehaltzufriedenheit, der Dauer der Betriebszugehörigkeit und der hierarchischen Position bezüglich der Akzeptanz des organisatorischen Wandels gefunden. Allerdings gibt es kaum Forschungsergebnisse über diesen Einfluss im Fall von Unternehmenssoftware. Weiterhin sind außer der Arbeitszufriedenheit alle Indikatoren objektive Werte, die einfach in der Organisation verfügbar sind (z.B. in der Personalabteilung). Zuletzt lohnt es sich, aufgrund des störenden Charakters der Einführung neuer Unternehmenssoftware, zu analysieren, ob die Abteilung und Art der Organisation, in welcher Mitarbeiter das System verwenden werden, die Art und Weise in der Mitarbeiter auf die neue Technologie während der Vorumsetzungsphase reagieren, prägt.

Die Akzeptanz wurde in diesem Kapitel mit den drei Hauptkonstrukten des Pre-implementation Acceptance Models (PAM) gemessen: Einstellung über Nutzung der Software, der Institutionelle Einfluss und die Unterstützungsabsicht. Das Partial Least Squares – Strukturgleichungsmodell – Verfahren wurde verwendet, um festzustellen, ob der Zusammenhang zwischen der Einstellung über die Nutzung der Software und der Unterstützungsabsicht, und der Zusammenhang zwischen dem Institutionellen Einfluss und der Unterstützungsabsicht, bei zufriedenen Mitarbeitern deutlich stärker ist als bei nicht zufriedenen Mitarbeitern.

Weil die Gesamtarbeitszufriedenheit eine diskrete Variable ist, wurden die Daten in zufriedengestellt und nicht zufriedengestellt anhand des Median unterteilt. Das PLS-SEM Verfahren wurde drei Mal ausgeführt: Mit dem gesamten Datensatz, mit den zufriedengestellten Mitarbeitern (n=112), und mit den nicht zufriedengestellten Mitarbeitern (n=104). In den drei Analysen hat die Einstellung über Nutzung der Software einen positiven und signifikanten Zusammenhang mit der Unterstützungsabsicht. Allerdings war der Zusammenhang zwischen dem Institutionellen Einfluss und der Unterstützungsabsicht nur für den gesamten Datensatz und bei den nicht zufriedengestellten Mitarbeitern signifikant. Für die zufriedengestellten Mitarbeiter traf dies nicht zu.

Die Unterschiede zwischen den Zusammenhangskoeffizienten bei zufriedengestellten und den nicht zufriedengestellten sind signifikant. Diese Ergebnisse deuten darauf hin, dass tatsächlich der Zusammenhang zwischen der Einstellung über die Nutzung der Software und der Unterstützungsabsicht bedeutend stärker für die zufriedengestellten Mitarbeiter im Vergleich zu den nicht zufriedengestellten Mitarbeitern ist. Allerdings ist überraschenderweise der Zusammenhang zwischen dem Institutionellen Einfluss und der Unterstützungsabsicht bedeutend schwächer für die zufriedengestellten Mitarbeiter im Vergleich zu den nicht zufriedengestellten Mitarbeitern. Hier können besonders soziale Faktoren wie Konformität und Konfliktvermeidung am Arbeitsplatz eine Rolle spielen.

Basierend auf diesen Ergebnissen kann man schlussfolgern, dass Einstimmigkeit ein wichtiger Grund für nicht zufriedengestellte Mitarbeiter ist, sich zu engagieren um die Umsetzung zu ermöglichen. Für die zufriedengestellten Mitarbeiter spielt der Institutionelle Einfluss keinerlei Rolle für die Unterstützungsabsicht. Es ist zu vermuten, dass eine positive Einstellung zur Nutzung der Software Grund genug für zufriedengestellte Mitarbeiter ist, um die Umsetzung zu unterstützen.

Der zweite Teil der Analyse untersucht die Unterschiede in den Ausprägungen der Einstellung über Nutzung der Software, dem Institutionellen Einfluss und der Unterstützungsabsicht, basierend auf dem Gehalt, der Dauer der Betriebszugehörigkeit, der hierarchischen Position, der Abteilung und der Art der Organisation der Teilnehmer. Hier wird das MANOVA Verfahren durchgeführt. Obwohl keine signifikanten Unterschiede basierend auf dem Gehalt, der Dauer der Betriebszugehörigkeit und der Abteilung der Teilnehmer gefunden wurden, hat die Analyse signifikante Unterschiede basierend auf der hierarchischen Position und der Art der Organisation aufgezeigt. Follow-up Tests mit dem ANOVA Verfahren und dem nicht-parametrischen Kruskal-Wallis Test haben diese Ergebnisse bestätigt. Schließlich haben Post-hoc Tests ergeben, dass Mitarbeiter auf Führungsebenen eine höhere *Einstellung über die Nutzung der Software* und *Unterstützungsabsicht* als Mitarbeiter ohne Führungsaufgaben aufweisen. Die Post-hoc Tests haben ebenfalls aufgezeigt, dass Teilnehmer aus den zentralen Regierungsorganisationen eine niedrigere *Einstellung über die Nutzung der Software*, den *Institutionellen Einfluss* und die *Unterstützungsabsicht* aufweisen als Teilnehmer aus dezentralisierten Regierungsorganisationen und Stadtverwaltungen. Diese Ergebnisse erweitern die Wissensbasis der Technologieakzeptanzliteratur, da sie den Einfluss der Arbeitszufriedenheit, der hierarchischen Position und der Art der Organisation auf die Wahrscheinlichkeit, dass die Anwender neue Unternehmenssoftware unterstützen oder die Einführung behindern, erklären.

Das fünfte Kapitel fasst die Hauptbeiträge der vorliegenden Arbeit zusammen und präsentiert Fragen die durch diese Arbeit nicht geklärt werden konnten. Zum Beispiel, welchen genauen Einfluss die Zufriedenheit mit dem bestehenden System auf die Akzeptanz einer neuen Software hat, den Kausaleffekt den Softwarevorführungen auf die Erhöhung der Akzeptanz haben. Diese sind lohnenswerte Ansatzpunkte für zukünftige Untersuchungen im Bereich der Technologieakzeptanzliteratur.

Zusammenfassend lässt sich sagen, dass die vorliegende Dissertation die Technologieakzeptanzliteratur mit einer theoretischen Grundlage für die Akzeptanz von Unternehmenssoftware während der Vorumsetzungsphase erweitert und diese messbar macht. Außerdem bietet diese Arbeit einen allgemeinen Überblick über die Einflussfaktoren der Akzeptanz, insbesondere diejenigen, die vom Hersteller der Software und der einsetzenden Unternehmen beeinflussbar sind, und solche, die nur bedingt beeinflussbar sind. Zusätzlich wird das Verständnis über die verschiedenen

Zusammenhänge zwischen den Einflussfaktoren der Akzeptanz erweitert. Zudem unterstreicht die Arbeit die Wichtigkeit der Vorumsetzungsphase für den Erfolg oder Misserfolg der Umsetzung und bietet Hinweise für Praxis Anwendungen, wie die Akzeptanz erhöht werden könnte. Für die umsetzenden Unternehmen ist es wichtig, während der Vorumsetzungsphase die Bereitschaft der Mitarbeiter die neue Software zu verwenden zu kennen. Mit diesem Wissen können frühzeitig Maßnahmen ergriffen werden, um den Widerstand der Mitarbeiter gegen die Einführung neuer Software zu verringern und eine reibungslose Umsetzungsphase zu ermöglichen.

## BIBLIOGRAPHY

- Amoako-Gyampah, K. (2004). "ERP implementation factors: A comparison of managerial and end-user perspectives." *Business Process Management*, 10(2), 171-183.
- Amoako-Gyampah, K., and Salam, A. F. (2004). "An extension of the technology acceptance model in an ERP implementation environment." *Information & Management*, 41(6), 731-745.
- Abdinnour-Helm, S., Lengnick-Hall, M. and Lengnick-Hall, C. (2003). "Pre-implementation attitudes and organizational readiness for implementing an Enterprise Resource Planning system." *European Journal of Operational Research*, 146(1), 258-273.
- Aiken, L. (2002). "Attitudes and related psychosocial constructs: Theories, assessment, and research." *Sage Publications*, USA, pp. 317.
- Ajzen, I. and Fishbein, M. (1980). "Understanding attitudes and predicting social behavior." Englewood Cliffs, NJ: *Prentice-Hall*. USA. pp. 278.
- Ajzen, I. (1985). "From intentions to actions: A theory of planned behavior." In J. Kuhl & Beckman (Eds.), *Action-control: From cognition to behavior*. Springer, Germany, 11-39.
- Ajzen, I. (1988). "Attitudes, personality and behavior." *The Dorsey Press*, Great Britain, pp. 175.
- Ajzen, I. (1991). "The theory of planned behavior." *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. (2012). "The theory of planned behavior." In P. A. M. Lange, A. W. Kruglanski & E. T. Higgins (Eds.), *Handbook of theories of social psychology*. London, UK: Sage, 438-459.
- Agarwal, R., and Prasad, J. (1999). "Are individual differences germane to the acceptance of new information technologies?" *Decision sciences*, 30(2), 361-391.
- Baskerville, R. (1999). "Investigating information systems with action research." *Communications of the Association for Information Systems*, 2(19), 1-32.
- Benbasat, I. and Barki, H. (2007). "Quo vadis, TAM?" *Journal of the Association for Information Systems*, 8(4), 211-218.

- Bjøørnenak, T., & Olson, O. (1999). "Unbundling management accounting innovations." *Management Accounting Research*, 10(4), 325-338.
- Brehm, J. (1980). "A dissonance analysis of attitude-discrepant behavior" in Rosenberg, M., Hovland, C., McGuire, W., Abelson, R. and Brehm, J. (1980). "Attitude, Organization and Change: An Analysis of Consistency Among Attitude Components". *Greenwood Press*, USA, pp. 239.
- Chêne, M. (2009). "The implementation of integrated financial information management systems (IFMS)." *U4 Expert Answer*.
- Chih, W., Yang, F. and Chang, C. (2012). "The study of the antecedents and outcomes of attitude toward organizational change." *Public Personnel Management*, 41(4), 597-617.
- Cialdini, R. (2001). "Harnessing the science of persuasion." *Harvard Business Review*, (Reprint R0109D), 72-79
- Cohen, A. (1960). "Attitudinal consequences of induced discrepancies between cognitions and behavior". In Fishbein, M. (1967). "Readings in Attitude Theory and Measurement". *John Wiley & Sons, Inc.* USA, 1-13.
- Cooper, R. & Zmud, R. (1990). "Information technology implementation research: A technology diffusion approach." *Management Science*, 36(8), 123-138.
- Contraloría General de la República (2005). "Manual de contabilidad gubernamental." Decreto 420-2005 del 26 de septiembre de 2005. *Gaceta Oficial* 25,424.
- Cordery, J., Sevastos, P., Mueller, W. and Parker, S. (1993). "Correlates of employee attitudes toward functional flexibility." *Human Relations*. 46(6), 705-723.
- Cox, D. and Cox, A. (2002). "Beyond first impressions: The effects of repeated exposure on consumer liking of visually complex and simple product designs." *Journal of the Academy of Marketing Science*, 30(2), 119-130.
- Davis, F. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." *MIS Quarterly*, 13(3), 319-40.
- Davis, F., Bagozzi, R. and Warshaw, P. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." *Management Science*, 35(8), 982-1001.

- Deléchat C. and S. Vtyurina. (2013). "Panama: Growth to remain buoyant." *IMF Survey Magazine: Countries & Regions*. March 28, 2013.
- Field, A. (2009). "Discovering statistics using SPSS." *Sage Publications*, Third Edition, UK.
- Fishbein, M. (1966). "Attitude and the prediction of behavior." in M. Fishbein (Ed). "Readings in attitude theory and measurement". *John Wiley & Sons, Inc.* USA. pp. 499
- Fishbein, M. and Ajzen, I. (1975). "Belief, attitude, intention, and behavior: An introduction to theory and research." Reading, MA: Addison-Wesley.
- Forero, H. (2013). "Panama - enhanced public sector efficiency technical assistance loan: P121492." *Implementation status results report: Sequence 04*. Washington, DC: World Bank.
- Fornell, C. and Larcker, D.F. (1981). "Evaluating structural equation models with unobservable variables and measurement error." *Journal of Marketing Research*, 18(1), 39-50.
- Gallivan, M.J. (2001). "Organizational adoption and assimilation of complex technological innovations: Development and application of a new framework". *ACM Sigmis Database*, 32(3), 51-85.
- Gallouj, F. and Zanfei, A. (2013). "Innovation in public services: Filling a gap in the literature." *Structural Change and Economic Dynamics*, 27(1), 89-97.
- Gefen, D., Rigdon, E. and Straub, D. (2011). "An update and extension to SEM guidelines for administrative and social science research." *MIS Quarterly*, 35(2), iii-xiv.
- Goldfinch, S., Gauld, R. and Baldwin, N. (2011). "Information and communications technology use, e-government, pain and stress among public servants." *New Technology, Work and Employment*, 26(1), 40-53.
- Gollwitzer, P. (1993). "Goal achievement: The role of intentions." *European Review of Social Psychology*, 4(1), 142-185.
- Gollwitzer, P. (1999). "Implementation intentions: Strong effects of simple plans." *American Psychologist*, 54(7), 493-503

- Hair, J., Hult, T., Ringle, C. and Sarstedt, M. (2014). "A primer on partial least squares structural equation modeling (PLS-SEM)." *Sage Publications*, USA, pp. 307.
- Harmon-Jones, E. and Allen, J. (2001). "The role of affect in the mere exposure effect: Evidence from psychophysiological and individual differences approaches." *The Society for Personality and Social Psychology, Inc.*, 27(7), 889-898
- Herold, D., Farmer, S. and Mobley, M. (1995). "Pre-implementation attitudes toward the introduction of robots in a unionized environment." *Journal of Engineering and Technology Management*, 12(1), 155-173.
- Hirschheim, R. and Newman, M. (1988). "Information systems and user resistance: Theory and practice." *The Computer Journal*, 31(5), 398-408.
- Holbeche, L. (2006). "Understanding change: Theory, implementation and success." *Elsevier*. Great Britain. 455 pp
- IBM Corp. Released (2012). IBM SPSS Statistics for Macintosh Version 21.0. Armonk, NY: IBM Corp.
- Iverson, R. (1996). "Employee acceptance of organizational change: The role of organizational commitment." *The International Journal of Human Resource Management*, 7(1), 122-149
- Jun, K. & Weare, C. (2010). "Institutional motivations in the adoption of innovations: The case of e-Government." *Journal of Public Administration Research and Theory*, 495-519.
- Kardes, F. (1988). "Spontaneous inference processes in advertising: The effects of conclusion omission and involvement on persuasion." *Journal of Consumer Research*, 15(2), 225-233.
- Klaus, H., Rosemann, M. And Gable G. (2000). "What is ERP?" *Information System Frontier*, 2(2), 141-162
- Klaus, T. and Blanton, J. (2010). "User resistance determinants and the psychological contract in enterprise system implementations." *European Journal of Information Systems*, 19(1), 625-636.

- Kihm, J. A., Smith, P. C., & Irwin, J. L. (1997). "Update for users of the JDI: New national norms for the Job Descriptive Index." *The Industrial-Organizational Psychologist*, 35(1), 26-30.
- Kim, H. and Kankanhalli, A. (2009). "Investigating user resistance to information systems implementation: A status quo bias perspective," *MIS Quarterly*, 33(3), 567-582.
- Lindell, M and Whitney, J. (2001). "Accounting for common method variance in cross-sectional research designs." *Journal of Applied Psychology*, 86(1), 114-121.
- Lowry, P. B., and Gaskin, J. (2014). "Partial least squares (PLS) structural equation modeling (SEM) for building and testing behavioral causal theory: When to choose it and how to use it." *Professional Communication, IEEE Transactions on*, 57(2), 123-146.
- Lynn, M. (2010). "The psychology of unavailability: Explaining scarcity and cost effects on value." *Basic and Applied Social Psychology*, 13(1), 3-7.
- Malhotra, N., Kim, S. and Patil, A. (2006). "Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research", *Management Science*, 52(12), 1865-1883.
- Marion-Landais, C. A. (1993). "A cross-cultural study of leader-member exchange quality and job satisfaction as correlates of intra-dyadic work-value congruence." *Unpublished master's thesis, University of South Florida, Tampa*.
- Mayers, A. (2013). "Introduction to statistics and SPSS in psychology" *Pearson Education*. Harlow
- Michel Madera, M., Torres Nabel, L. C., and Quevedo Huerta, L. N. (2013). "Estudio de traducción y confiabilidad del instrumento de la Teoría Unificada de la Aceptación y Uso de la Tecnología (UTAUT)." *Revista Apertura*, 4(2).
- Morris, M. and Venkatesh, V. (2010). "Job characteristics and job satisfaction: Understanding the role of enterprise resource planning system implementation". *MIS Quarterly*. 34(1), 143-161.
- Moore, G. and Benbasat, I. (1991). "Development of an instrument to measure the perceptions of adopting an information technology information". *Information Systems Research*, 2(3), 192-222.

- Moscovici, S., & Doise, W. (1994). "Conflict and consensus: A general theory of collective decisions." *Sage*.
- Petty, R., Cacioppo, J. and Schumann, D. (1983). "Central and peripheral routes to advertising effectiveness: The moderating role of involvement." *Journal of Consumer Research*, 10(2), 135-146.
- Petty, R. and Cacioppo, J. (1990). "Involvement and persuasion: Tradition versus integration", *Psychological Bulletin*, 107(3), 367-374.
- Podsakoff, P., MacKenzie, S., Lee, J. and Podsakoff, N. (2003). "Common method biases in behavioral research: A critical review of the literature and recommended remedies.", *Journal of Applied Psychology*, 88(5), 879-903
- Polites, G. and Karahana, E. (2012). "Schackled to the status quo: The inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance", *MIS Quarterly*, 36(1), 21-42.
- Preacher, K. and Hayes, A. (2008). "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models", *Behavior Research Methods*, 3(1), 879-891
- Rogers, E. (2003). "Diffusion of innovations". *Free Press*. 5th Edition. USA. pp.576.
- Ringle, C., Wende, S. and Will, A. (2005). "SmartPLS: release 2.0 (beta)". *SmartPLS*. Germany.
- Saari, L. M., and Judge, T. A. (2004). "Employee attitudes and job satisfaction." *Human resource management*, 43(4), 395-407.
- Spector, P. (1985). "Measurement of human service staff satisfaction: Development of the Job Satisfaction Survey." *American Journal of Community Psychology*, 13(6), 693-713.
- Spector, P. (1992). "Summated rating scale construction: An introduction." *Sage University Papers Series: Quantitative Applications in the Social Sciences*, 07-082, pp. 73.
- Spector, P. 1997. "Job satisfaction: application, assessment, causes, and consequences.", *SAGE Publications*. USA. pp. 96.

- Spector, P., Liu, C., Sanchez, J. (2015). "Methodological and substantive issues in conducting multinational and cross-cultural research". *The Annual Review of Organizational Psychology and Organizational Behavior*, 2(1), 9.1-9.31.
- StataCorp. 2009. "Stata statistical software: Release 11". College Station, TX: StataCorp LP.
- Taylor, S. and Todd, P. (1995). "Understanding information technology usage: A test of competing models". *Information Systems Research*, 6(2), 144-176
- Thompson, R., Higgins, C. and Howell, J. (1991). "Personal computing: Toward a conceptual model of utilization". *MIS Quarterly*, 15(1), pp. 125-143
- Venkatesh, V., & Bala, H. (2008). "Technology acceptance model 3 and a research agenda on interventions." *Decision sciences*, 39(2), 273-315.
- Venkatesh, V., Morris, M., Davis, G. and Davis, F. (2003). "User acceptance of information technology: Toward a unified view." *MIS Quarterly*, 27(3), 425-478.
- Venkatesh, V. (1999). "Creation of favorable user perceptions: Exploring the role of intrinsic motivation." *MIS Quarterly* 23(2), 239-260.
- Verhallen, T. and Robben, H. (1994). "Scarcity and preference: An experiment on unavailability and product evaluation." *Journal of Economic Psychology*, 15(1), 315-331.
- Weiss, D. J., Dawis, R. V., & England, G. W. (1967). "Manual for the Minnesota Satisfaction Questionnaire." *Minnesota studies in vocational rehabilitation*.
- Yousef, D. (1999). "Organizational commitment and job satisfaction as predictors of attitudes toward organizational change in a non-western setting." *Personnel Review*, 29(5), 567-592.
- Zajonc, R. (1968). "Attitudinal effects of mere exposure." *Journal of Personality and Social Psychology*, 9(2), 1-27.
- Zimbardo, P. and Leippe, M. (1991). "The psychology of attitude change and social influence". *McGraw Hill*. USA. pp. 370.

## APPENDIX A

Table A1 presents a list of the number of participants per institutions and type of institution.

ID Institution	Institution type	Participants	High hierarchy participants
1	Decentralized	4	***
2	Decentralized	6	***
3	Financial intermediary	3	Administrative director
4	Financial intermediary	4	***
5	Central government agency	28	Administrative sub-director
6	Central government agency	8	Administrative director
7	Decentralized	12	Finance director
8	Decentralized	6	Administrative director
9	Public company	11	Finance sub-director
10	Decentralized	4	***
11	Central government agency	10	Administrative sub-director
12	Decentralized - University	71	Accounting Records director
13	Decentralized - University	8	Administrative director
14	Public company	8	Executive secretary of finances
15	Central government agency	4	***
16	Central government agency	6	***
17	Central government agency	11	Administrative director
18	Decentralized	4	Administrative director
19	Municipality	6	Sub-director of planning
20	Decentralized	6	Administrative director and sub-director
21	Central government agency	3	***
22	Central government agency	3	***
23	Decentralized	8	***
24	Municipality	2	***
<b>Total of participants</b>		<b>236</b>	

**Table A1. Participants per institution**

\*\*\*There were no high hierarchy participants

## APPENDIX B – SAFWEB EVALUATION

This questionnaire aims to know your first impression and expectations about SAFWeb. For a more objective evaluation we ask you to answer the questionnaire right after your first interaction with the system. The lecturer will indicate you the moment in which you can answer the questionnaire. To answer the questions, please circle the number that comes closest to reflecting your opinion about it.

<b>Perceived ease of use</b> ( <i>eou_</i> )		Totally false	Quite false	False	Undecided	True	Quite true	Totally true
1	It would be easy for me to remember how to perform tasks using SAFWeb.	1	2	3	4	5	6	7
2	Learning to operate the system would be difficult for me.	1	2	3	4	5	6	7
3	I would find it easy to get the system to do what I want it to do	1	2	3	4	5	6	7
4	Overall, I would find the system easy to use	1	2	3	4	5	6	7

<b>Perceived usefulness</b> ( <i>usefulness_</i> )		Totally false	Quite false	False	Undecided	True	Quite true	Totally true
5	SAFWeb would give me greater control over my work.	1	2	3	4	5	6	7
6	SAFWeb would enable me to accomplish tasks more quickly.	1	2	3	4	5	6	7
7	SAFWeb would improve the quality of work I do.	1	2	3	4	5	6	7
8	SAFWeb would make it easier to do my job.	1	2	3	4	5	6	7
9	SAFWeb would worsen my job performance.	1	2	3	4	5	6	7
10	Overall, I find using SAFWeb would be advantageous in my job.	1	2	3	4	5	6	7

<b>Expected Self-efficacy</b> ( <i>selfeff_</i> )		Totally false	Quite false	False	Undecided	True	Quite true	Totally true
<i>Considering what you have seen about the system so far, do you think you could complete a task using the system...</i>								
11	If there was no one around to tell me what to do as I go.	1	2	3	4	5	6	7
12	If I could call someone for help if I got stuck.	1	2	3	4	5	6	7
13	If I had a lot of time to complete the task.	1	2	3	4	5	6	7
14	If I had just the built-in help facility for assistance.	1	2	3	4	5	6	7

<b>Expected consequences of the implementation</b> ( <i>conseq_</i> )		Totally false	Quite false	False	Undecided	True	Quite true	Totally true
15	The adoption of the system would be beneficial for my institution.	1	2	3	4	5	6	7
16	The adoption of the system would help the Ministry of Economy and Finances to have a better control of the national public expenditure and the government accounting.	1	2	3	4	5	6	7
17	The institutions that adopt the system will enhance the accuracy of their accounting records.	1	2	3	4	5	6	7
18	I think my colleagues would expend less time on routine job tasks by using the system.	1	2	3	4	5	6	7
19	Using the system would increase my workload.	1	2	3	4	5	6	7
20	SAFWeb would make me change for the better the way I'm used to work.	1	2	3	4	5	6	7

<b>Institutional influence</b> ( <i>instinf_</i> )		Totally false	Quite false	False	Undecided	True	Quite true	Totally true
21	I think my boss will be in favor of the implementation.	1	2	3	4	5	6	7
22	I think my colleagues will like the idea of implementing the system in the organization.	1	2	3	4	5	6	7
23	I think the senior management of my organization will support the use of the system.	1	2	3	4	5	6	7
24	In general, I think that the organization will support the use of the system.	1	2	3	4	5	6	7

<b>Commitment Intention</b> ( <i>commint_</i> )		Totally false	Quite false	False	Undecided	True	Quite true	Totally true
25	If there was a referendum in my institution on SAFWeb, I would vote against its implementation.	1	2	3	4	5	6	7
26	If the success of the implementation were up to me, I would engage enough to make the project succeed.	1	2	3	4	5	6	7
27	If necessary, I would be willing to work overtime to achieve the implementation in my institution.	1	2	3	4	5	6	7

To complete the following sentences put a mark on the adjective that reflects your opinion.

<b>Attitude towards using the system</b> ( <i>attitude_</i> )								
28	Using SAFWeb would be ...	awful idea	very bad idea	bad idea	neither	good idea	very good idea	excellent idea
29	The system would make work...	extremely boring	very boring	boring	neither	interesting	very interesting	extremely interesting
30	I would .... the idea of using the system	extremely dislike	quite dislike	dislike	neither	like	quite like	extremely like
31	Working with the system would be...	extremely frustrating	quite frustrating	frustrating	neither	satisfying	quite satisfying	extremely satisfying

Comments:

k

## APPENDIX C

### SAFWEB EVALUATION – SUMMARY OF CONSTRUCTS

Construct	Number of items	Sample question	Source
Perceived ease of use	4	It would be easy for me to remember how to perform tasks using SAFWeb.	Davis (1989), Venkatesh et al. (2003), Moore & Benbasat (2001)
Perceived usefulness	6	SAFWeb would enable me to accomplish tasks more quickly.	Moore & Benbasat (2001)
Expected self-efficacy	4	Considering what you have seen about the system so far, do you think you could complete a task using the system if there was no one around to tell you what to do as you go.	Venkatesh et al. (2003)
Expected consequences of the implementation	6	The adoption of the system would be beneficial for my institution.	Own construct
Institutional Influence	4	I think the senior management of my organization will support the use of the system	Thompson et al. (1991)/Venkatesh et al. (2003)
Commitment intention	3	If there was a referendum in my institution on SAFWeb, I would vote against its implementation.	Own construct
Attitude towards using the system	4	Using SAFWeb would be ...	Davis et al. (1989), Taylor and Todd (1995), Venkatesh et al. (2003)

**Table C1. SAFWeb Evaluation – Summary of constructs**

## APPENDIX D

### SUMMARY STATISTICS

<b>Variable</b>	<b><i>n</i></b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Gender (1=Female)	230	0.717		0	1
Age	230	44	11	19	70
Job Tenure (years)	230	13	11	0	41
Job Satisfaction	228	132	18	83	192
Salary (USD month)	227	1180	600	375	3500
Pay	233	13	4	4	24
Promotion	235	13	4	5	24
Supervision	230	17	4	4	24
Fringe benefits	233	12	3	4	24
Contingent rewards	235	13	4	4	23
Operating conditions	232	12	3	4	23
Coworkers	235	17	3	6	24
Nature of work	235	21	3	13	24
Communication	233	14	4	4	24
Total Job Satisfaction	228	6	1	4	7
Perceived Ease of Use	234	6	1	4	7
Perceived Usefulness	234	6	1	3	7
Expected Self efficacy	228	5	1	1	7
Expected consequences	232	6	1	4	7
Institutional Influence	233	6	1	4	7
Commitment intention	233	6	1	4	7
Attitude towards	230	6	1	4	7

**Table D1 Summary statistics**

<b>Type of institution</b>	<b>Frequency</b>	<b>%</b>
Central government	71	31%
Decentralized	125	54%
Financial intermediary	7	3%
Municipality	8	3%
Public company	19	8%

**Table D2 Type of institution**

<b>Department</b>	<b>Frequency</b>	<b>%</b>
Accounting	99	43%
Budget	24	10%
Treasury	36	16%
Administration and Finances	25	11%
Audit	7	3%
Heritage assets and inventories	10	4%
Human Resources	5	2%
Information Technology	7	3%
Procurement	7	3%
Others	10	4%

<b>Hierarchical position</b>	<b>Frequency</b>	<b>%</b>
Street-level employee	109	47%
Supervisor	4	2%
Head of department	98	42%
Auditor	2	1%
Sub-director	4	2%
Director	13	6%

<b>Education (Last academic degree)</b>	<b>Frequency</b>	<b>%</b>
High School Diploma	63	27%
Bachelor's Degree	138	60%
Master's Degree	29	13%
PhD	0	0

<b>Specialization of studies</b>	<b>Frequency</b>	<b>%</b>
Business administration	43	19%
Accounting	112	49%
Economics, Finance, Marketing	27	12%
Others (Engineering, Law, etc)	21	9%
N/A	27	12%

**Table D3 Department, position and education**

<b>Previous working experience</b>	<b>Frequency</b>	<b>%</b>
Private sector	83	36%
Public sector	80	35%
Self-employed	21	9%
Student	46	20%
<b>Direct experience with SAFWeb or other IFMS</b>	<b>Frequency</b>	<b>%</b>
No direct experience with SAFWeb	230	100%
No direct experience with IFMS	192	83%
Experience with SIAFPA	32	14%
Experience with other softwares	6	3%
<b>Indirect experience with SAFWeb or other IFMS</b>	<b>Frequency</b>	<b>%</b>
Indirect experience with SIAFPA	74	32%
Indirect experience with SAFWeb	3	1%
Indirect experience with SAFWeb and SIAFPA	2	1%
No indirect experience	151	66%

**Table D4 Previous experience**

## APPENDIX E

### COMMENTS

#### Positive comments

1. "I'm very impressed and excited about the use of the system. Really, it is fabulous, I congratulate you and I will become a multiplying voice of this new tool."
2. "I would like the system to be implemented in our region because it would help us very much, from what I have seen until now it is very good to speed our daily work."
3. "It is an excellent software that allows working faster with all the records of the institution that adopts the system".
4. "It is extremely interesting in order to achieve reliable records."
5. "Excellent."
6. "Very good training, clear, concise and short. Thanks, I wish it could be implemented."
7. "I hope it will be implemented soon. I think it is crucial for my institution. "
8. "In general, I think the system is very good, but it currently does not include the process of budget commitment. For me this is very important because I work for the budget department as budget analyst. "
9. "I like the idea of using SAFWeb. I hope it will be very soon."
10. "I think this is a very friendly system and easy to use."
11. "I really feel this is a valuable tool for my institution because nowadays we do not have an integrated system to register the information."
12. "For the Directorate of Internal Audit it would be a very useful tool because we would have direct access to the system, without having to raise requests to others, that in many cases delay in providing an answer. Simplification of our labor."
13. "For me it would be excellent to implement this system, because it would help a lot in time, costs and there would be common organization. It would be fair."
14. "Congratulations, I hope it is implemented soon in our institution, I think it is a very good tool but it needs to fit our needs."
15. "I consider it is excellent, the accounting records would help us a lot in the budget control."
16. "I think that with some inclusions of budget, the system is interesting applied."
17. "With the current technological improvements, don't to profit them is to stay in the past and to say no to progress. The technology is to lighten load, one should not oppose changes, provided that it is for the good of the institution or the country."
18. "According to the presentation it would be easy and it would provide immediate answers to the system users and to the authorities for decision making. Congratulations. Thanks!"
19. "We should take advantage of this time offered by the civil servants of the Ministry of Economy and Finances and we should become multiplying agents to explain the benefits of the system and that our institution adopts it."
20. "As with any new implementation, it scares me at the beginning, it is only about looking for a beneficial change that facilitates our work and at the same time change the obsolete system that we currently use it is only a matter of organization and try to benefit of this system".

21. "Definitely this tool would help us don't stay till late preparing the financial statements, because nowadays we use the Raman software and for the volume of information that we manage in our institution, it has become very slow and there are no operators who give maintenance to the system".
22. "I know SIAFPA-SRPG because of my experience in the Court of Auditors and I like it, what we should check is whether the colleagues that are dinosaurs or have being much time using the legacy system agree or oppose. Thanks. "
23. "My institution should use this system."
24. "It is a very good software, it is acceptable."
25. "We hope its implementation is in the short term."
26. "It is fair and necessary."
27. "Excellent tool"
28. "For me it is a very interesting system, I feel it accelerates the work and less mistakes on it."
29. "I love the option of SAFWeb to work in an integrated way with real time information."
30. "The demonstration seemed fruitful, it would allow the information to be precise and faster for the user and for the benefit of the supplier."
31. "This system is and will be excellent if it is implemented in my institution because it is precise and the records would be done faster and with more reliability. I was fascinated with SAFWeb, excellent."
32. "I consider the system is excellent but including some modifications according to the needs of our institution that is very complex."
33. "I believe its implementation in my work would be an excellent idea."
34. "Interesting system"
35. "For the particularities of our institution, maybe there are some items that you could create tables for the migration of data and work on it to be able to use the parameterization of registers. Its implementation would be excellent."
36. "I am from the accounting department and it takes me time entering the data and then doing my accounting records. I think it would be better to use this tool in comparison to the one we have nowadays, that even creates duplicates sometimes. I prefer a thousand times SAFWeb than Raman."
37. "It would be very important if it is implemented in our institution."
38. "It is very excellent."
39. "The program SAFWeb is complete."
40. "It is an excellent program for accountants."
41. "It seems a very interesting and organized project, it would save time."
42. "Please now!"
43. "Any change is for the better and especially in our institution it would be a significant progress."
44. "I think to implement the system is an excellent idea, however much training is needed for the civil servants involved."
45. "This is something new for me and in my job I would like to learn the system and implement it in my day-to-day work."
46. "This system is very interesting because it allows to keep the records with transparency and reliability."
47. "Any system that organizes and standardizes the plan of work is always positive."

48. "If the system is beneficial for my type of financial accounts, of course it would be fantastic."
49. "I liked it a lot but we had little time because the presenter was explaining too fast".
50. "The system is good for the institutions, but the bases of institutions like mine, that do not have a budgetary fund should be taken into account. But very good the system. I liked the presentation, congratulations."
51. "I liked how you gave the presentation."
52. "Congratulations, good tool."
53. "I would not use SAFWeb directly because it is not in my functions, however my institution and the office in which I work can implement it."
54. "The SAFWeb would help a lot with respect to the data entry, for instance the purchase order. I only think it would be a bit more workload for the accounting department but it really helps a lot."
55. "Thanks for considering this bridge SAFWeb to move on in an organized way to better systems that allow decision making with the certainty of having reliable information."
56. "If it is implemented with an efficient technical support and with the opportune communication it would be of great benefit for the institution."

### **Skeptical comments**

1. "Until we do not implement the system SAFWEB, we won't know the total benefit. The system is very friendly."
2. "Any new implementation in an institution most of the time is difficult in the beginning, but if it is beneficial, it should be implemented in our institution."
3. "Since this is the first time that I attend to a training about this new software, for us and especially for me, it is not very clear, with further trainings we will be able to give a better opinion about this program."
4. "What worries me of this system is that it does not offer the possibility to use a sub-account that are included in the contingency funds and it would be sad if we could not use all the advantages that this accounting system offer us, because it would be necessary to include this particularity that currently exists with the centralized funds that do not have any bank account and are canalized through deposits to the Cash desk in our institution. For instance, the contingency fund."
5. "Any system should be implemented according to the operating needs of the institution, taking as reference the General Accepted Accounting Standard Norms."
6. "The department of patrimonial assets has not been taken into account because the equipment is delivered to the general store where an inventory tag is given and then the equipment is delivered to the units."
7. "I like the system a bit, and why a bit because I don't think people should work as a robot, because the capacity to analyze should not be removed from people who like to think, analyze. This is my humble opinion."
8. "Well, if it is to safe time it would be very good because we would complete our daily activities faster. Hopefully it works."
9. "The process of budget commitment is missing, without this we are forced to use a parallel system and budget reconciliations, this means more work for the budget analysts and more

delays to approve and record the expenditures. The assignation of the budget items in the documents is missing; the system gives the responsibility to the accounting department."

10. "(a)It has an accounting orientation, not administrative, the modules of procurement, storage and budget are also required" (b) it is an initiative that requires effort that the possible implementation of the modules need to be done at the same time not afterwards."
11. "If this system is implemented in our institution, we hope it is effective for the good of the children that receive care in this institution."
12. "In the institution the staff do not think in improve work, but in who will substitute them, hence they do not allow the technology."

## **Suggestions**

1. "If it is implemented, there should be collaboration between the Ministry of Economy and Finances and the Court of Auditors."
2. "It think it must be programmed with enough time to be able to coordinate harmoniously before the implementation."
3. "You should give enough time for the implementation of the system. Do not start until the institution is ready".
4. "You should stay a couple of days in my institution to help us to assimilate it better, you know that there are some difficult civil servants that are reluctant to change their routines."
5. "As it was mentioned at the beginning of the presentation, the administrative procedures should be revised by the institutions."
6. "Nowadays we use several systems for instance, procurement, cash incomes, inventories and others, which is very time consuming, so it would be advisable to standardize the systems to improve the work situation."
7. "More interaction with the system would be needed."
8. "I think you should dedicate more time to the explanation of the tool."
9. "I consider the seminar was very good but I think you should take the measures to make it real and do not let it depend on the institution."
10. "The presentation was excellent, I congratulate you. We should have more time for practice."
11. "You should give a user manual to the institutions. In this way, people can guide themselves with the use in their work."
12. "The seminar was satisfactory, but it need to include a bit more of information"
13. "There should be something to remember the steps".

## APPENDIX F

### RELIABILITY AND VALIDITY TESTS OF SAFWEB EVALUATION

A confirmatory factor analysis revealed the item outer loadings. These loadings need to be higher than 0.70 to demonstrate internal consistency and items below 0.40 must be deleted (Hair et al, 2014). Accordingly, items eou\_2, usefulness\_9 and conseq\_19 are excluded from the analysis.

Construct	Item ID	Outer loading
<b>Perceived ease of use</b>	eou_1	0.819
	eou_2	0.369
	eou_3	0.788
	eou_4	0.808
<b>Perceived usefulness</b>	usefulness_5	0.845
	usefulness_6	0.919
	usefulness_7	0.922
	usefulness_8	0.935
	usefulness_9	0.308
	usefulness_10	0.885
<b>Self-efficacy</b>	selfeff_11	0.751
	selfeff_12	0.681
	selfeff_13	0.743
	selfeff_14	0.803
<b>Expected consequences</b>	conseq_15	0.888
	conseq_16	0.890
	conseq_17	0.928
	conseq_18	0.832
	conseq_19	0.280
	conseq_20	0.775
<b>Institutional Influence</b>	instinf_21	0.879
	instinf_22	0.886
	instinf_23	0.890
	instinf_24	0.897
<b>Commitment intention</b>	commint_25	0.541
	commint_26	0.879
	commint_27	0.821
<b>Attitude toward use</b>	attitude_28	0.878
	attitude_29	0.860
	attitude_30	0.935
	attitude_31	0.927

**Table F1. Item outer loadings**

The Average Variance Extracted (AVE) in all constructs is above 0.50, which indicates that the constructs explain more than one-half of the variance observed in their items (Fornell and Larcker, 1981). The factors thus demonstrate sufficient convergent validity. Reliability was estimated using the Composite Reliability. These values were higher than the recommended 0.70, which indicates that our measures are reliable (See Table F2).

Constructs	AVE	Composite Reliability
Perceived ease of use	0.667	0.858
Perceived usefulness	0.825	0.959
Self-efficacy	0.556	0.833
Expected consequences	0.755	0.939
Institutional Influence	0.788	0.937
Commitment intention	0.580	0.799
Attitude toward use	0.811	0.945

**Table F2. Validity and Reliability**

Fornell and Larcker (1981) suggest that the square root of AVE in each construct can be used to establish discriminant validity. To test for discriminant validity we compared the square root of the AVE (See Table F3) to all inter-factor correlations. Since the diagonal values are larger than other correlation values between the constructs, all factors demonstrate adequate discriminant validity (See Table F3).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Perceived ease of use (1)</b>	<b>0.817</b>						
<b>Perceived usefulness (2)</b>	0.726	<b>0.908</b>					
<b>Self-efficacy (3)</b>	0.241	0.267	<b>0.746</b>				
<b>Expected consequences (4)</b>	0.651	0.793	0.298	<b>0.869</b>			
<b>Institutional Influence (5)</b>	0.569	0.679	0.238	0.765	<b>0.888</b>		
<b>Commitment intention (6)</b>	0.548	0.592	0.213	0.670	0.641	<b>0.761</b>	
<b>Attitude towards (7)</b>	0.499	0.595	0.151	0.708	0.684	0.696	<b>0.901</b>

**Table F3. Fornell - Larcker Criterion Analysis for checking discriminant validity**

## APPENDIX G

### COMMON METHOD VARIANCE TESTS

In this study, the independent and dependent variables were collected using the same questionnaire at one point of time, this increases the risk of having too high common method variance. Common method variance might threaten the validity of the results because the correlation between the constructs can be inflated (Lindell and Whitney, 2001; Podsakof et al, 2003). Malhotra et al (2006) found that common method variance in the information system domain is not as serious as those found in other disciplines. They explain that the scales used in information system research tend to be concrete about an object and respondents are expected to feel less need to guess. However, it is still important to identify whether common method variance is too high and can threaten the validity of the results.

The Harman's one-factor test was performed to measure the common method variance at the item level. The software SPSS version 21.0 (IBM Corp, 2012) was used to conduct an exploratory factor analysis with the 31 items of the SAFWeb evaluation. As result, 5 factors emerged and the largest factor accounted for the 44 percent of the variance. In order to perform a more conservative Harman's one-factor test we replicate the test excluding the four negative worded items that lacked of internal consistency. As result four factors emerged, the largest factor accounting for 49.6% of the variance. Common method bias would be a problem if only one factor emerged, or only one factor accounted for more than 50 percent of the variance. Our results in both cases indicate that common method bias should not threaten the validity of the results. Finally we tested this bias at the construct level using the software SmartPLS and the marker-variable expected self-efficacy. This variable is theoretically related to perceived ease of use but the literature does not relate it to the other constructs in the PAM. Lindell and Whitney (2001) suggest that a proxy for common method variance is the lowest correlation between the marker variable and the other variables. Table G1 presents the constructs correlations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Perceived ease of use (1)</b>	<b>1</b>							
<b>Perceived usefulness (2)</b>	0.729	<b>1</b>						
<b>Consequences own (3)</b>	0.561	0.626	<b>1</b>					
<b>Consequences others (4)</b>	0.630	0.782	0.683	<b>1</b>				
<b>Institutional Influence (5)</b>	0.564	0.678	0.621	0.753	<b>1</b>			
<b>Commitment intention (6)</b>	0.539	0.590	0.596	0.658	0.640	<b>1</b>		
<b>Attitude toward use (7)</b>	0.494	0.592	0.623	0.696	0.684	0.696	<b>1</b>	
<b>Expected Self-efficacy (8)</b>	0.237	0.267	0.272	0.281	0.238	0.213	0.151	<b>1</b>

**Table G1 Constructs correlation including the marker variable expected self-efficacy**

The lowest correlation between the marker variable and the other constructs is 0.151 and the highest correlation is 0.28. Both correlations are below the threshold of 0.30 that indicates low correlation, which indicates that common method bias should not affect drastically the interpretation of our results.

## APPENDIX H

### STANDARDIZED PATH COEFFICIENTS OF THE SATURATED MODEL OF THE PAM

Constructs	$\beta$	SE	R2	n
DV: Commitment Intention			0.575	235
Attitude toward use	0.372***	(0.070)		
Institutional Influence	0.140*	(0.077)		
Expected consequences on others	0.128	(0.100)		
Expected consequences in own work	0.106	(0.065)		
Perceived usefulness	0.014	(0.081)		
Perceived ease of use	0.131**	(0.061)		
DV: Attitude toward use			0.525	235
Perceived usefulness	0.051	(0.075)		
Perceived ease of use	0.019	(0.063)		
Expected consequences in own work	0.261***	(0.072)		
Expected consequences on others	0.464***	(0.081)		
DV: Perceived usefulness			0.53	235
Perceived ease of use	0.728***	(0.033)		
DV: Institutional Influence			0.635	235
Expected consequences on others	0.355***	(0.092)		
Attitude toward use	0.268***	(0.062)		
Expected consequences in own work	0.093	(0.070)		
Perceived usefulness	0.147*	(0.085)		
Perceived ease of use	0.050	(0.064)		
DV: Expected consequences in own work			0.418	235
Perceived usefulness	0.468***	(0.070)		
Perceived ease of use	0.221***	(0.077)		
DV: Expected consequences on others			0.678	235
Expected consequences in own work	0.309***	(0.061)		
Perceived usefulness	0.538***	(0.066)		
Perceived ease of use	0.069	(0.055)		

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table H1. Standardized path coefficients of the saturated model of the PAM**

## APPENDIX I

### RELIABILITY AND VALIDITY TESTS OF THE MAIN CONSTRUCTS OF THE PAM ACCORDING TO THE JOB SATISFACTION LEVEL

A confirmatory factor analysis reveals the item outer loadings. These loadings need to be higher than 0.70 to demonstrate internal consistency and items below 0.40 must be deleted (Hair et al, 2014).

Construct	Question number (Appendix B)	Whole sample (n=228)	Low satisfaction (n=104)	High satisfaction (n=112)
<b>Attitude toward use</b>	attitude_28	0.888	0.900	0.862
	attitude_29	0.866	0.907	0.804
	attitude_30	0.938	0.951	0.915
	attitude_31	0.942	0.944	0.929
<b>Institutional Influence</b>	instinf_21	0.885	0.882	0.882
	instinf_22	0.897	0.882	0.901
	instinf_23	0.899	0.884	0.900
	instinf_24	0.901	0.862	0.926
<b>Commitment intention</b>	adopint_25	0.562	0.614	0.524
	adopint_26	0.882	0.851	0.895
	adopint_27	0.824	0.820	0.798

**Table I1. SAFWeb Evaluation – Item outer loadings**

Once the internal consistency of the items is confirmed, the reliability, convergent and discriminant validity are tested (see Tables I2 and I3).

The Average Variance Extracted (AVE) in all constructs is above 0.50, which indicates that the constructs explain more than one-half of the variance observed in their items (Fornell and Larcker, 1981). The factors thus demonstrate sufficient convergent validity.

Reliability was estimated using the alpha coefficient and the composite reliability. Hair et al (2014) explain that whereas the coefficient alpha tends to underestimate the internal consistency reliability because it assumes that all indicators are equally reliable, the composite reliability prioritizes the indicators according to their individual reliability. Therefore, it is more appropriate to use the composite reliability rather than the coefficient alpha. In Table I2 the alpha coefficients are all above 0.80 except the self-developed construct commitment intention. However, all the composite reliabilities were higher than the recommended threshold 0.70, which indicates that our measures are reliable.

Constructs	Whole sample (n=228)			Low satisfaction (n=104)			High satisfaction (n=112)		
	AVE	Coefficient Alpha	Composite Reliability	AVE	Coefficient Alpha	Composite Reliability	AVE	Coefficient Alpha	Composite Reliability
Attitude toward use	0.827	0.929	0.950	0.857	0.944	0.960	0.772	0.901	0.931
Institutional Influence	0.802	0.918	0.942	0.770	0.902	0.810	0.814	0.924	0.946
Commitment intention	0.591	0.641	0.807	0.591	0.647	0.931	0.570	0.598	0.792

**Table I2. Validity and reliability of the acceptance constructs**

Fornell and Larcker (1981) suggest using the square root of AVE in each construct to establish discriminant validity. To test for discriminant validity we compared the square root of the AVE (the diagonal values in Table I3) to all inter-factor correlations. Since the diagonal values are larger than other correlation values between the constructs, all factors demonstrate adequate discriminant validity.

Constructs	Whole sample (n=228)			Low satisfaction (n=104)			High satisfaction (n=112)		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Attitude toward use (1)	<b>0.909</b>			<b>0.926</b>			<b>0.879</b>		
Institutional Influence (2)	0.698	<b>0.895</b>		0.676	<b>0.877</b>		0.710	<b>0.902</b>	
Commitment intention (3)	0.699	0.652	<b>0.769</b>	0.656	0.696	<b>0.769</b>	0.738	0.558	<b>0.755</b>

**Table I3. Fornell - Larcker Criterion Analysis for checking discriminant validity of the acceptance constructs**

## APPENDIX J

### DESCRIPTIVE STATISTICS BY SALARY, JOB TENURE, AND DEPARTMENT

Salary	N	Attitudes toward using the system		Institutional Influence		Commitment Intention	
		Mean	SD	Mean	SD	Mean	SD
Less than USD 500	23	23.30	3.052	21.52	3.907	16.65	2.933
Between USD 501 and USD 750	44	23.18	3.294	22.61	4.368	16.82	2.814
Between USD 751 and USD 1000	47	23.45	3.393	22.21	3.928	17.19	2.849
Between USD 1001 and USD 1250	38	24.74	3.430	23.97	3.915	17.26	2.947
Between USD 1251 and USD 1500	11	24.82	2.401	23.82	3.656	16.73	3.228
More than USD 1500	57	23.75	3.491	23.12	4.128	17.79	2.883
All salary levels	220	23.75	3.344	22.84	4.080	17.20	2.891

**Table J1. Descriptive statistics by salary**

Job tenure	N	Attitudes toward using the system		Institutional Influence		Commitment Intention	
		Mean	SD	Mean	SD	Mean	SD
Less than one year	27	23.59	3.178	22.44	3.166	17.19	2.746
Between 1 and 5 years	90	23.77	3.585	23.10	4.144	17.66	3.017
Between 6 and 10 years	31	24.42	3.128	22.87	4.500	17.35	2.847
More than 10 years	75	23.41	3.192	22.65	4.161	16.48	2.738
All job tenure levels	223	23.72	3.340	22.84	4.077	17.16	2.896

**Table J2. Descriptive statistics by job tenure**

Departments	N	Attitudes toward using the system		Institutional Influence		Commitment Intention	
		Mean	SD	Mean	SD	Mean	SD
Accounting	94	23.66	3.375	22.85	4.163	17.11	3.053
Budget	24	23.33	3.841	21.79	4.354	17.13	2.740
Treasury	35	24.06	2.786	24.20	3.445	17.37	2.808
Administration, Finances and Audit	32	23.75	3.690	23.41	4.087	17.63	2.744
Others	38	23.76	3.225	21.74	3.937	16.74	2.873
All departments	223	23.72	3.340	22.84	4.077	17.16	2.896

**Table J3. Descriptive statistics by department**

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Jena, den 1.06.2015

Kamira Muriel Sánchez Nicosia