Mississippi State University
Scholars Junction

Theses and Dissertations | Theses and Dissertations

1-1-2017

The Role of Cognitive and Affective Change Readiness in the Adoption of Information Systems: A Multilevel Perspective

Martin J. Ndicu

Follow this and additional works at: https://scholarsjunction.msstate.edu/td

Recommended Citation

Ndicu, Martin J., "The Role of Cognitive and Affective Change Readiness in the Adoption of Information Systems: A Multilevel Perspective" (2017). *Theses and Dissertations*. 4627.
https://scholarsjunction.msstate.edu/td/4627

This Dissertation - Open Access is brought to you for free and open access by the Theses and Dissertations at Scholars Junction. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of Scholars Junction. For more information, please contact scholcomm@msstate.libanswers.com.

The role of cognitive and affective change readiness in the adoption of information systems: A multilevel perspective

By

Martin J Ndicu

A Dissertation
Submitted to the Faculty
of Mississippi State University
in partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy
in Business Administration - Information Systems
in the Department of Management and Information Systems

Mississippi State, Mississippi

August 2017

Copyright by

Martin J Ndicu

©2017

The role of cognitive and affective change readiness in the adoption of information systems: A multilevel perspective

By

Martin J Ndicu

Approved:

_____
Robert F. Otondo
(Director of Dissertation)

_____
James Vardaman
(Committee Member)

_____
Kent Marett
(Committee Member)

_____
Brad S. Trinkle
(Committee Member)

_____
Nicole Ponder
(Committee Member/Graduate Coordinator)

_____
Sharon L. Oswald
Dean
College of Business

Name: Martin J Ndicu

Date of Degree: August 11, 2017

Institution: Mississippi State University

Major Field: Business Administration - Information Systems

Director of Dissertation: Dr. Robert F. Otondo

Title of Study: The role of cognitive and affective change readiness in the adoption of information systems: A multilevel perspective

Pages in Study: 126

Candidate for Degree of Doctor of Philosophy

Extant information systems literature has viewed systems acceptance and adoption from a technocentric viewpoint that emphasizes post-implementation intentions and attitudes - mainly usefulness and ease of use. Further, the effects of organizational hierarchy and work-environment factors have not been adequately factored largely because the single level user-level perspective has dominated. This dissertation addresses this gap by incorporating work environment factors while focusing on users' preliminary, pre-implementation attitudes, perceptions, and intentions. It thus employs a multilevel perspective that allows for deeper insights into the interplay between workgroup- and individual-level phenomena.

The objectives herein are, first, to illuminate change readiness as a plausible lens through which system acceptance and adoption can be viewed. Although change readiness is predominantly studied in organizational behavior, it has not yet been applied in information systems research. Consequently, it presents a promising approach to explore users' responses to new systems. Secondly, this dissertation aims to empirically

explore the multilevel nature of the change readiness constructs as envisaged in the framework of the antecedents and outcomes of change readiness.

The research model is adapted from the multilevel framework of the antecedents and outcomes of change readiness as propounded by Rafferty et al. (2013). Appropriate hypotheses are developed and a survey instrument established to test those hypotheses. To ensure validity, preliminary investigations are conducted after an expert panel review. Subsequently, data was collected and analyzed to assess the extent to which the proposed model and hypotheses are empirically supported.

Results and findings from this dissertation have theoretical and practical implications. Extant literature notes the dearth of research that theorizes outcomes of change readiness in the organizational behavior domain. This dissertation theorizes intention to adopt as an outcome of change readiness. Practice benefits from the context-based empirical results which (1) examine whether change readiness has any significant impact on system adoption and (2) the effect of workgroup change readiness on individual's intention to adopt the system.

Keywords: change readiness, intention to adopt, cognitive readiness to change, affective readiness to change, multilevel change readiness, system acceptance, and adoption.

DEDICATION

I dedicated this dissertation to my wife Lilian Njeri and to our wonderful children Ephraim, Makena and Naima. The special bond of family has meant a lot through this process and given me reasons to pursue greater things.

On behalf of all the great men and women who have worked hard over the years to make the college of business at MSU what it is today, this scholarly work is also dedicated to the memory of Dr. Charles Moore.

ACKNOWLEDGEMENTS

You can "*wrap this one in maroon and white!*" as our own Jack Cristil would proclaim. I want to thank all the people who helped me on my way here. First my relatives who stood with me all the way *asanteni sana*!

Dr. Pascal Bizarro assured me that my search for a PhD program would be incomplete if I had not considered Mississippi State University. I thank him for pointing me in the right direction. When I got here, I met faculty who have shaped my expectation of what research and scholarship at this level should be. In four years they have equipped me with research and teaching tools that I hope to use for the rest of my career.

I am grateful to the dissertation committee (Kent Marett, James Vardaman, Brad Trinkle and Nicole Ponder), under the directorship of Dr. Robert Otondo, who worked tirelessly to support and guide me through the dissertation process. I also acknowledge the role played by Dr. Parisi and the NSPARC Team (especially Stephen Grice, Jonathan Barlow, Martin Duclos, Shane Warren, Drew Boyles and Carol Ray). They provided valuable insights regarding WIOA, responded to questions and allowed me to use the data collection center.

Further, and on behalf of all the employees who participated in the project, I thank John Davis, the Executive Directors of Mississippi Department of Human Services and Mark Henry, the Executive Directors of Mississippi Department of Employment Security, for granting permission to collect data in the departments. Cathy Sykes of

MDHS and Robin Stewart at MDES were instrumental in understanding the sample pool and the data collection process.

I learned a lot from fellow PhD students in the College of Business. Kalana Malimage's dissertation defense was my first to attend, and then Jim Lee, Dustin Ormond, Phil Menard, Shwadhin Sharma, and Nirmalee Summers. You each contributed to my experience at MSU. Being in the same cohort as Greg Bott was also special. I also appreciate the hours spent with Ali Vedadi preparing for comprehensive exams, proof reading papers and co-authoring.

The College of Business has very personable staff who are always ready to help. I could always count on Nadine Rosinski and/or Angella Baker to guide me appropriately any time I was not sure of anything. Thank you!

Starkville will forever be etched in my family's hearts. We have experienced hospitality and the warm embrace of a very welcoming community. Since my parental responsibilities could not be suspended during this time, a groups of very special people shared it with me and did a wonderful job: the teachers and administrators of the Starkville Oktibbeha School District are outstanding. My children sing praises of their teachers and I am very grateful. On behalf of my entire family, I would like to note the special role played by Cross Point Church. The congregation reached out to us in practical ways and they have that look in their eyes that says "we are family". May God richly bless you!

Special thanks to Paul Asunda, Scott Cappleman, Hezron Chepkwony, Kevin Edulblute, Judy Kahrl, Margaret Khaitsa, Judy Middleton, Thomas Nyatta, Bernard Okeyo, Sospeter Otieno, Barclay and Eszti Palmer, Charles Sabatia, and their families.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AVE	Average Variance Extracted
BI	Behavioral Intention(s)
CFA	Confirmatory Factor Analysis
CMV	Common Method Variance
CGM	Centering on the Grand Mean
CWC	Centering Within Context (Centering on the Group mean)
DV	Dependent Variable
EFA	Exploratory Factor Analysis
FEDI	Financial Electronic Data Interchange
GLM	General Linear Modeling
GST	General System Theory
HLM	Hierarchical Linear Modeling
ICC	Intraclass Correlation Coefficient
ICMS	Integrated Case Management System
IS	Information Systems
IV	Independent Variable
MDS	Mobile Data Services
MSB	Mean Squares Between
MSW	Mean Squares Within

NSPARC	National Strategic Planning and Research Center
OB	Organizational Behavior
OLS	Ordinary Least Squares
PRM	Passive Resistance Misuse
SMC	Squared Multiple Correlation
TAM	Technology Acceptance Model
UTAUT	Unified Theory of Acceptance and Use of Technology
WIOA	Workforce Innovation and Opportunity Act

CHAPTER I

INTRODUCTION

The purpose of this dissertation is to investigate the relationships among change readiness and users' intentions to adopt a new system. This chapter makes the case for presenting change readiness as an alternate lens for viewing system adoption. In particular, this research examines phenomena that precede those embodied within the Technology Acceptance Model (TAM; Davis 1989; Davis et al. 1989; Davis 1986), perhaps the most influential theory in IS (Information Systems) research (Malhotra and Galletta 1999).

For the last few decades, TAM has dominated studies related to technology use and systems adoption (Chen and Weber 2006). While TAM's contribution is appreciated on the one hand, it has been criticized, on the other hand for a number of reasons such as the methodology used for testing the model, the variables and relationships that exist within the model, the core theoretical foundation underlying the model (Chuttur 2009), and the absence of usefulness theory (Benbasat and Barki 2007). Calls have been made to reorient researchers' attention toward alternate lenses (Benbasat and Barki 2007) through which technology adoption can be viewed.

Other existing lenses in the IS domain include the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al. 2003), Delone and McLean's IS Success Model (DeLone and McLean 1992, 2003), and Task-Technology Fit (TTF;

Goodhue and Thompson 1995). These models have chiefly addressed users' tendencies to accept or reject, and use or not use an implemented technology. However, at the core of adoption is the evaluative determination of readiness to give up the status quo and embrace an alternate technology or information system, through which users decide to accept and use or reject the system *before* that system is implemented. While the extant theories have provided insight into system use and adoption, the role of that evaluative determination of readiness to give up old information systems and embrace the new is inadequately researched.

Change and Change Readiness

Lewin's seminal work in group dynamics (Lewin 1947a) describes the change process as involving three consecutive stages: unfreezing, change, and refreezing. In the unfreezing stage, the need for change is expressed and evidence disconfirming the success of the current way of doing things is presented and reinforced (Woodall 1996). The desired outcomes of this stage are to instill the need to deal with inadequacies and discrepancies of the status quo and ensure the requisite course of action becomes apparent to all. To build buy-in, the new way of doing things is touted as the solution to current problems.

The change stage involves deliberate effort to transition from the current state to the new. Other terms that describe this phase include transition (Bridges 1991; Henderson 2002) and moving (Zand and Sorensen 1975). The idea of moving is founded on the notion that an equilibrium existed before unfreezing, and this stage involves moving to a new equilibrium (Lewin 1947a, 1947b). Regarding this phase, Bridges (1991) distinguished between external and internal aspects of change:

> "It isn't the changes that do you in; it's the transitions. Change is not the same as transition. Change is situational: the new site, the new boss, the new team roles, and the new policy. Transition is the psychological process people go through to come to terms with the new situation. Change is external; transition is internal." (p. 3)

Bridges describes three phases of change: endings, transitions, and new beginning. The distinction made between external change and internal transition is important. External change is manifested through physical installation of the new system while the internal process of change is akin to the influence of change readiness on an individual's intention to adopt a new system. When the physical/external change is implemented, users who make the psychological transition will embrace the change and make new beginnings with the new system.

Similar to the three-stage models presented by Lewin (1947a) and Bridges (1991), Armenakis et al. (2000) have more recently described the three steps of change as "readiness, adoption and institutionalization," and justify these labels as being "consistent with recent change literature" (p. 103). They argue that the change message is critical in helping organizational members to be ready for the change and embrace it when it is introduced so that over time they are committed to the new way.

These three models of change appear simple but their relevance and applicability in system adoption research is yet to be adequately explored. Accordingly, this dissertation lays a theoretical foundation though the isomorphism between these change models and system adoption to make the argument that system adoption is inherently a change process, and that employees' attitudes toward change – change readiness in

particular – are therefore important factors that influence adoption of technology and information systems at both individual- and workgroup-levels.

System Adoption as a Change Process

Numerous process models have been advanced in IS adoption literature (Cooper and Zmud 1990; Kwon and Zmud 1987; Rogers 1962, 2003) with an objective of explicating the steps organizations follow in the acquisition, adoption and assimilation of a new system. Cooper and Zmud (1990) systematically capture the steps, and describe the processes involved and the outcome of each step (Table 1.1). Since other models have similar phases/steps, we shall use the Cooper and Zmud (1990) model to generalize the IS adoption models.

Table 1.1 Six Phases of IS Implementation Process by Cooper and Zmud (1990)

Phase	Definition	
Initiation	Process	Scanning of organizational problems/opportunities and IT solutions
	Outcome	A match found between an IT solution and its application in the organization
Adoption	Process	Getting organizational backing for the implementation of the IT application
	Outcome	A decision is reached to invest resources necessary to accommodate the implementation effort
Adaptation	Process	The IT application is developed, installed and maintained
	Outcome	The IT application is available for use in the organization
Acceptance	Process	Inducing the organizational members to commit to IT application usage
	Outcome	The IT application is employed in organizational work
Routinization	Process	Usage of the IT application is encouraged as a normal activity
	Outcome	Adjusting the organization's governance system to account for the IT application
Infusion	Process	Increasing organizational effectiveness by using the IT application in a more comprehensive and integrated manner to support higher level aspects of organizational work
	Outcome	The IT application is used within the organization to its fullest potential

In Figure 1.1, two change models (Armenakis et al. 2000; Lewin 1947) are laid over two system adoption process models (Cooper and Zmud 1990; Rogers 2003) to depict the isomorphism inherent in the two processes. The resulting model shows that system adoption is a change process. In the initiation stage, organizations identify problems which are embodied in the change message and communicated in a way that presents the change as an appropriate solution to the current problems.

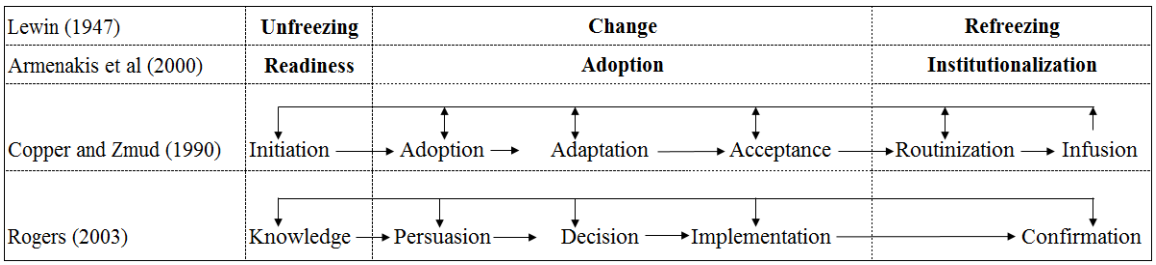


Figure 1.1 Adoption as a Change Process

Armenakis et al. (1993) described change readiness as "the cognitive precursor to the behaviors of either resistance to, or support for, a change effort" (p. 681). This study argues that the change message is embodied in organizational efforts, such as initiation (Cooper and Zmud 1990), knowledge and persuasion (Rogers 2003). These are necessary precursors to adoption through which change readiness is created. In the change readiness stage, organizational problems are identified and the opportunities for a new system are highlighted. It is here that the current way of doing things is questioned and the new system championed as a solution to the problems (Woodall 1996). By the end of this phase, the change message will have been successfully communicated if employees' backing and attitudes towards the organization, their work environment (Armenakis et al. 1993), and their perception of the organization's ability to successfully make changes (Eby et al. 2000) are sufficiently swayed.

The three models of change give an impression that the change/transition/ adoption stage is temporary and only transitory. Armenakis et al. (2000) describe it as "the act of behaving in the new way, on a trial basis" (p. 103), while the system adoption literature describes it with terms such as persuasion and adaptation (Cooper and Zmud 1990; Rogers 2003). Here, organizational members support the change message

communicated to them. The primary objective of any change initiative is to transition and be successful at the more permanent refreezing/new beginnings/institutionalization phase where the organization will settle at a new equilibrium. IS adoption literature describes these long-term states with terms such as routinization, infusion (Cooper and Zmud 1990) and confirmation (Bhattacherjee 2001), which are in line with the change model. "Despite their differing theoretical foundations, it would appear that approaches to change readiness based on the change message and based on stages of change are perhaps more similar than at first glance" (Stevens 2013, p. 339).

Research Objectives

The different adoption models in the extant IS literature have not addressed the role of change readiness in system adoption. The first objective of this dissertation is therefore to present change readiness as a lens through which system adoption can be viewed. The majority of existing theories and models of system adoption focus on post-implementation phase phenomena such as usefulness, ease of use, and output quality. However, change readiness focuses on pre-implementation (see Figure 1.1), a stage that extant IS literature has not adequately addressed.

Secondly, the extant literature identifies the emotional dimension of change readiness as important yet inadequately studied. Rafferty et al. (2013) note that change readiness researchers have so far focused on the cognitive dimension and "paid considerably less attention to the affective element of the change attitude dimension" (p. 111). The affective dimension should not be excluded when measuring change readiness because cognition and affect are integral to the overall evaluative judgment attitude (Breckler and Wiggins 1989; Sheeran 2002).

Thirdly, there exists an abundance of system adoption studies that address organization context, but there is still a dearth of studies that take a multilevel perspective, leaving a void in IS literature (Bélanger et al. 2014; Burton-Jones and Gallivan 2007). Furthermore, the literature has conceptualized change readiness as a multilevel and multifaceted construct, yet there is nonetheless a scarcity of empirical validation of the same, giving rise to a growing number of scholars calling for development of multilevel theories of change readiness (Bouckenooghe et al. 2009; Dansereau et al. 1999; Pettigrew et al. 2001). Taking a single-level perspective restricts research to either a macro or micro view, neither of which can adequately address organizational behavior by themselves (Kozlowski and Klein 2000). The macro view seeks to investigate phenomena at the organizational level without addressing the means by which individual behavior, interactions, perceptions and affects give rise to those higher level phenomena. On the other hand, the micro view suffers from the obverse problem (investigation of individual-level phenomena that do not account for organizational contexts in which individuals are embedded). A multilevel perspective facilitates a more holistic understanding of cognitive and affective change readiness – simultaneously at individual and workgroup levels – in the context of information system adoption.

Accordingly, the research questions central to this dissertation are:

RQ1: To what extent do individual-level cognitive and affective change readiness influence intention to adopt a new system?

RQ2: To what extent do workgroup-level cognitive and affective change readiness influence intention to adopt a new system?

Behavioral Intention (BI) is theorized to be the motivation necessary to engage in a particular behavior (Armitage and Conner 1999). Intention has been theorized as a better predictor of actual behavior (Ajzen and Fishbein 1980; Armitage and Conner 1999; Fishbein and Ajzen 1975) than other predictors such as attitude, temperaments, behavioral control and social influence because "intentions may be a central psychological variable differentiating reasoned from nonreasoned behaviors" (Bagozzi and Yi 1989, p. 266). However, the nature of the relationship between intention and actual behavior - and the appropriateness of measuring intentions as the outcome variable - have been criticized in IS literature (Taylor and Todd 1995) when the research is conducted post-implementation because it should be possible to measure actual behavior. In spite of these criticisms, this dissertation measures intention to adopt – and not actual adoption behavior – as the outcome variable for two reasons. First, this dissertation targets the pre-implementation phase which precedes system availability to users. Change readiness is most relevant in the pre-implementation stage which is a preparatory phase characterized by efforts geared towards swaying potential users' attitude toward accepting the new system in the future when it is implemented. Actual adoption and use behaviors come later in the process (Figure 1.1). Secondly, psychological theory underpins the role of intention as a reasonable predictor of actual behavior (Bagozzi 1981) and therefore, it is theoretically sound to expect that intention to adopt the new system features will reasonably predict actual adoption behavior when the changes are implemented.

Research Method

Data will be collected through a survey administered to employees of the State of Mississippi. The recognition of organizational hierarchy in our research design leads to collection of nested data with which it is possible to simultaneously investigate individual-level (within-group), and workgroup-level (between-groups) associations. The distinction between within-workgroup and between-workgroup associations is more than cosmetic because it provides the rationale for specifying a multilevel model for statistical analysis (Singer and Willett 2003).

Before data collection, preliminary procedures to enhance reliability and validity will include expert panel review which will address content validity by ensuring that items are concise, accurate, clearly worded and suitable for the study context. Pilot data will be collected for preliminary data analysis to ascertain reliability. After the main data collection, the SPSS statistics software will be used to run both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). These are conducted to assess construct reliability and validity before embarking on testing the relationships hypothesized in the research model. HLM software will be used to run multilevel analysis.

Contribution

In addition to contributing to IS and Management theory, results from this dissertation will have practical implications. The relevance of this dissertation is derived from the source of its inspiration: the Integrated Case Management System (ICMS), a system developed for implementation of the Workforce and Innovations Act (WIOA) in the State of Mississippi. Through this research, it is possible to identify key success

factors at the pre-implementation stage which are vital in guiding the implementation process. An assessment of "the cognitive precursors to the behaviors of either resistance to, or support for, a change effort" (Armenakis et al. 1993, p. 681), would give an early indication of whether employees have bought into the change initiative.

This dissertation is one of the first attempts to measure both the cognitive and affective aspects of change readiness. Evaluating change readiness without considering the affective aspect is to ignore a salient part of attitude (Breckler and Wiggins 1989). In addition to including the affect dimension, this dissertation presents an empirical multilevel perspective of the change readiness construct.

Organization of the Study

This dissertation is divided into five chapters. Chapter I introduces the research by outlining the research gaps in the literature; the scope, research questions and objectives; the research methods applied in analyzing data; and contributions made by this dissertation. Chapter II provides a review of current literature which explains the different variables contained in the proposed research model. Testable hypotheses are developed and offered. Chapter III details the methodological procedures used for collecting data, confirming validity, and testing the model. Key issues discussed in this chapter include: (1) the adaption of the items from validated scales to develop the survey instrument used for data collection, (2) data analysis strategies to confirm reliability and validity (e.g. expert panel reviews, pilot testing and confirmatory factor analysis), (3) the sampling frame, and (4) a brief description of the HLM statistical analysis tool that will be used to conduct empirical analysis. Chapter IV presents results from data analysis as described in Chapter III. Chapter V discusses the results in view of the research questions

and hypotheses tested to answer those questions. It also presents implications to research and practice as well as pointing out limitations of this study and directions for future studies.

CHAPTER II

LITERATURE REVIEW, RESEARCH MODEL, AND HYPOTHESES DEVELOPMENT

The term adoption, generally, refers to a very broad phenomenon which has been applied in diverse disciplines such as law, sociology, agriculture, and information systems. It carries the meaning from its Latin derivative – *adoptare* – which means to "select for oneself, or choose" (Stevenson 2010, p. 22). Research in the adoption of technologies has advanced from Ryan and Gross (1943) who undertook early studies of adoption of new farming practices, and Rogers (1961) who revolutionized the adoption of innovations research by advancing their work.

Before Rogers (1961), adoption was viewed as a function of communication about the innovation through a social system over time. Although this view (focusing on the characteristics of the technology) provides the theoretical grounding for a significant amount of related research (e.g., Agarwal and Prasad 1997; Moore and Benbasat 1991; Tornatzky and Klein 1982), views that focus on psychological factors such as behavior, attitudes, and intentions (Bagozzi 1981) provide an alternative explanation about factors that influence the adoption of technology and information systems.

Technology Acceptance and Utilization

The IS domain has developed several theories about technology acceptance and use. Some have focused on technology characteristics, others emphasize tasks, while others address end user psychological and contextual factors.

The Technology Acceptance Model (TAM; Davis 1989; Davis et al. 1989; Davis 1986) has received significant attention in the information systems research community. Davis (1989) argued that actual use of a system is a behavior demonstrated by system users and as such the Theory of Reasoned Action (TRA) can explain factors that influence information systems use. He therefore developed TAM based on the TRA nomological structure and theoretical reasoning, but contextualized to explain and predict information systems use.

TRA posits that beliefs lead to attitudes, which lead to behavioral intentions, which lead to the behavior itself. However, Davis et al. (1989) found that attitudes fell out of the model empirically, making their model more parsimonious. Accordingly, the resulting model (TAM) posits that the most important determinants of the individual's acceptance of IT are perceived usefulness and perceived ease of use.

Although TAM has contributed to adoption literature, it is criticized on at least three bases (Chuttur 2009). First, Bagozzi (2007), while acknowledging TAM's impact and the attempt to broaden the model by adding antecedents to Perceived Usefulness or intentions, notes the poor theoretical relationships between the different constructs formulated in TAM and "concluded that TAM could not be suitable for explaining and predicting system use" (Chuttur 2009, p. 17).

The second criticism questions the conceptualization of attitudes in TAM. Yang and Yoo (2004) attribute mixed results to the application of attitude as conceptualized in TAM. They retested TAM with attitude toward behavior as consisting of two dimensions: affective and cognitive attitudes. They expected that the two dimensions would mediate the impact of Perceived Usefulness (PU) and Perceived Ease of Use (PEU) on use. Although they didn't find support for affective attitude, they maintained that the conceptualization of attitude in TAM is flawed.

Finally, the methodology used to study TAM is criticized. Chuttur (2009) highlights three shortcomings: reliance on self-reported data to measure usefulness instead of measuring actual use (such as duration, frequency, and intensity; Venkatesh et al. 2008), collecting data from students who might not be an appropriate sample frame because results cannot be generalized to the real world (Lee et al. 2003), and are focused on voluntary contexts rather than mandatory contexts.

Jarvenpaa (1989) noted that system designers lacked theoretically based principles of designing technologies and as a result there was a mismatch between the tasks and technologies leading to technology that would hinder rather than aid its user. The case is made that performance on a task is influenced by the type of technology used. This led to what was referred to as the Technology-to-Performance Chain (TPC), which asserts that technology has positive impact on individual performance when two conditions exist: (1) good fit between technology and the task it supports, and (2) the technology is used (Goodhue and Thompson 1995).

Based on this foundation, Goodhue and Thompson (1995) developed the Task Technology Fit (TTF) Model. TTF combined two research streams: the utilization focus

stream and the fit focus stream. Goodhue and Thompson argue that these two streams have made valuable contributions to understanding IS success, and could be decomposed into detailed components which can be used as diagnosis tools for determining whether technologies meet users' needs (Goodhue and Thompson 1995).

Some extended models combine TTF and TAM (e.g., Dishaw and Strong 1999; Klopping and McKinney 2004) to find comprehensive explanations of factors that drive system adoption and utilization. Over time, extensions and modifications of TAM have created a multitude of models that force researchers to pick and choose constructs. As a result, TAM research has been reporting mixed results, and those TAM variations add only marginal, if any, value to the IS research (Benbasat and Barki 2007).

Venkatesh et al. (2003) synthesized competing models and extensions of TAM to develop the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT model included four moderators of key relationships (i.e. Gender, Age, Experience and Voluntariness of Use) and also identified four determinants of intention and usage (i.e. Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions).

UTAUT explains up to seventy percent of variance in behavioral intention for use of pre-existing systems. Venkatesh et al. (2003) attribute this explanatory power to the extensive study of technology acceptance, but noted "we may be approaching the practical limits of our ability to explain individual acceptance and usage decisions in organization" (p. 471). That might be the case with a TAM-based perspective of technology acceptance, but pre-implementation behavioral intention has not been studied as extensively. This dissertation therefore attempts to respond to address this gap in the

literature and provide a new theoretical lens through which adoption of information systems can be viewed.

Intention to Adopt

System implementation efforts are ultimately targeted at the end users' actual adoption behavior. Past research has explored various post-implementation considerations which end users rely upon when deciding whether to accept or reject a system. These include satisfaction (Ives et al. 1983), confirmation of expectations (Bhattacherjee 2001; Bhattacherjee and Premkumar 2004), perceptions of ease of use and usefulness (Davis 1989; Davis 1986; Venkatesh et al. 2003), and relative advantage (Moore and Benbasat 1991; Tornatzky and Klein 1982).

The relationship between attitudes and intentions has been long explored in psychology literature where seminal theories have been established. Some of the leading theories are the Theory of Reasoned Action (TRA) and its derivative, the Theory of Planned Behavior (TPB). These theories explain that an individual's attitudes influence their intentions and those intentions ultimately lead to the individual's behavior (Ajzen 1991; Fishbein and Ajzen 1975). Attitude toward the behavior refers to the degree of favorability toward the behavior in question. The focal premise of both theories is that an individual's performance of a given behavior is mostly determined by a person's intention to perform that behavior.

According to TPB, behavioral intentions are influenced by an individual's attitude towards the desired behavior and the influence of the person's social environment. As such, most theories and models used in the study of technology adoption combine

different attitudes and environmental factors that influence actual adoption, or usage behavior, or behavioral intention.

Change and Change Readiness Literature

The modification or introduction of an organizational artifact can affect behavior within the organization (Vroom and Von Solms 2004). Organizational behavior is categorized as organization-level, workgroup-level, or individual-level behavior, and change can influence any behavior within these levels. The impact of change on organizational behavior is extensively studied in the Organizational Behavior (OB) domain.

Change Theory

In his seminal work, Lewin (1947, 1951) advanced the three-stage theory of change. The first stage – unfreezing – involves overcoming inertia (status quo) and dismantling the existing mindset. Before this stage commences, the organization is considered to be at an equilibrium (Simon 1997) and change is intended to move the organization to a new level equilibrium. Change theory views behavior of employees in an organization as a dynamic balance of forces working in opposing directions. Driving forces promote change by pushing employees from status quo to the desired outcome. Restraining forces hinder change as they pull employees in the reverse direction.

Change involving adoption of information systems starts with activities such as initiation (Cooper and Zmud 1990; Kwon and Zmud 1987), knowledge gathering, and persuasion (Rogers 2003) which involve active and/or passive scanning of organizational problems and opportunities as well as seeking solutions to the current need. By the end of

this stage, a match is found between an IT solution and its application in the organization. Hopefully, employees will have bought into the idea and formed a willingness to embrace the solution (Bridges 1991).

The change phase involves adoption and implementation of the solution. Bridges (1991) refers to this stage as transition and describes it as a "psychological process people go through to come to terms with the new situation. Change is external; transition is internal" (p. 3). In the systems adoption literature, this is equivalent to the actual implementation phase – the physical change – which results in the technology being made available and ready to use (Cooper and Zmud 1990).

Organizational change should ultimately become institutionalized and accepted as the norm (Cooper and Zmud 1990). After implementation and employees transitioning to accept the changed status in the organization, the last phase involves stabilizing the organization at the new equilibrium. This new equilibrium marks refreezing, which in the IS literature is referred to as infusion (Cooper and Zmud 1990) and confirmation (Rogers 2003).

Although there seems to be little debate amongst scholars about what change means, people's attitudes towards change have elicited differences in meanings, labels, and definitions of constructs referring to attitude towards change. Bouckenooghe (2010) lists some of these as "readiness for change, resistance to change, cynicism about organizational change, commitment to change, openness to change, acceptance of change, coping with change, and adjustment to change" (p. 501). He goes on to explicate some of the differences and notes that a vast majority of attitudes towards change

literature are conceptual and focus on two attitudes: readiness to change and resistance to change.

Change Readiness

Jacobson (1957) initiated the idea of readiness by observing that the Coch and French (1948) study suggested "the possibility of a complementary construct of readiness to change" (p. 239), but "there is no analysis of readiness and no extended discussion of successful change" (p. 240). Ensuing change readiness research has used different labels to describe attitude toward change (Bouckenooghe 2010). Terms used in relation to readiness include "change readiness" (Eby et al. 2000; Vardaman et al. 2012), "readiness to change" (Snell 2001; Walinga 2008), "organizational change readiness" (Nesterkin 2013) and "readiness for organizational change" (George and Jones 2001; Harris and Cole 2007; Sonenshein 2010). The definition of these phenomena, regardless of terminology used, are close and resemble that provided by Armenakis et al. (1993): "an individual's beliefs, attitudes, and intentions regarding the extent to which changes are needed and the organization's capacity to successfully undertake those changes" (p. 681). The term "change readiness" and its definition by Armenakis et al. (1993) will be used in this dissertation.

Resistance to change continues to be studied in various disciplines despite Armenakis et al. (1993) having distinguished change readiness from resistance to change. Citing Coch and French (1948), Armenakis et al. (1993) argued that researchers as well as practitioners focused on reducing resistance instead of creating readiness. They define creating readiness as "proactive attempts by a change agent to influence the beliefs, attitudes, and ultimately the behavior of a change target. At its core, the creation of

readiness for change involves changing individual cognitions across a set of employees" (p. 683). The second part of their definition recognizes workplace reality; i.e., that an individual works in a workgroup context.

To understand this phenomenon further and provide a consistent empirical measurement instrument, Holt et al. (2007) undertook factor analyses of items developed and used by a multitude of studies. Up to that point, available instruments seemed to be measuring change readiness from different perspectives such as the change process, change content, change context, and individual attributes. From their analyses four factors emerged: appropriateness, management support, change efficacy, and personally beneficial. Subsequent replication, factor analysis, and validity testing supported the assertion that change readiness is a multidimensional construct with three dimensions: appropriateness, management support, and change efficacy. Their definitions are summarized in Table 2.1.

Table 2.1 Change Readiness Dimensions Defined

Dimension	Definition (Source)
Appropriateness	The belief among employees that the proposed change is appropriate for the organization (Holt et al. 2007).
	The belief that a specific change is correct for the situation that is being addressed (Holt and Vardaman 2013).
Management support (also referred to as principal support)	The belief that the organizational leaders were committed to the change (Holt et al. 2007).
	The belief that formal and informal leaders are committed to the success of the change and that it is not going to be another passing fad (Holt and Vardaman 2013)
Change efficacy	The belief that the change could be implemented (Holt et al. 2007).
	The belief that the individual can successfully implement the change (Holt and Vardaman 2013).

These three dimensions have been described as largely cognitive. Rafferty et al. (2013) note that "while there is substantial agreement about the key cognitions that underlie change readiness, researchers have not examined the affective element of this attitude." (p. 110). However, research in psychology has developed a scale – the Positive and Negative Affect Schedule (PANAS) scale – which is derived from and validated by Watson et al. (1988). Subsequent studies have confirmed that positive affect and negative affect consistently emerge as two relatively independent dimensions and Lindquist et al. (2015) used functional magnetic resonance imaging to ascertain that these two emotions are indeed independent and not bipolar opposites of each other.

Positive affect refers to the extent to which a person experiences a state of enthusiastic, high energy, full and pleasurable engagement that is evoked by a certain target. Conversely, negative affect is the extent to which a person experiences a state of subjective distress and unpleasurable engagement that is evoked by a certain target. These constructs have been the subject of the debate that the terms "positive affect and negative affect should be renamed positive activation and negative activation, respectively" (Crawford and Henry 2004, p. 246). It is argued that activation is missing in the description, and yet these emotions are in reality activated (Watson et al. 1999). The definitions used in this dissertation include the element of these emotions being evoked by the target. The inclusion of that aspect of the definition will hopefully help to better relate these constructs to the IS artifact.

The Multilevel Framework of the Antecedents and Outcomes of Change Readiness

Change readiness is an organizational phenomenon, yet there is a dearth of change readiness literature that takes a multilevel perspective. In order for multilevel

research to be insightful, the nature and structure of constructs at the individual- and workgroup-levels must be founded on sound theory. Rafferty et al. (2013) and Stevens (2013) provide such theoretical bases for the study of change readiness.

Rafferty et al. (2013) set out the antecedents and outcomes of change readiness at different levels (Figure 2.1). The lowest is the individual level and the core of the framework is individual- and workgroup-level change readiness. Change readiness is broken into cognitive, affective, and overall change readiness at individual and collective levels. They propose composition as the emergence process appropriate for a multilevel change readiness construct and recommend the referent-shift consensus model (Chan 1998) as the appropriate method of assessing change readiness at the collective level. The referent-shift model involves the use of survey items that contain wording which directs respondents' attention to the common experience of others in the workgroup. The referent-shift consensus method is appropriate here because it facilitates the determination of within-group consensus which is needed to justify aggregation of lower level elements for higher level constructs to emerge.

The wording of individual level items is changed in the referent-shift model so that the item refers to the group instead of the individual. For example, the item '*I believe I have the skills needed to make these changes work*' refers to the individual. In the referent-shift model, it is changed to refer to other members of the workgroup; that is, '*the other members of my workgroup believe they have the skills needed to make these changes work*'.

The Rafferty framework is too complex to be operationalized and tested as laid out because it has too many constructs and relationships to be modeled by current

statistical tools. This dissertation therefore commences a piece meal approach to empirically validate and test a portion of that framework.

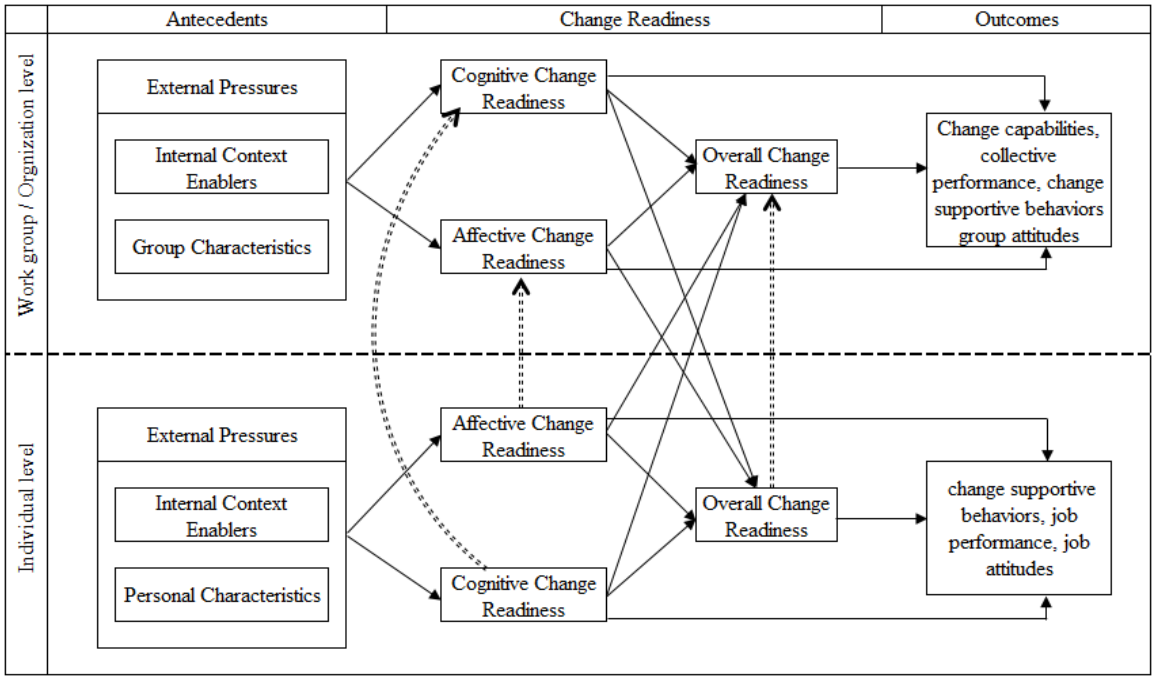


Figure 2.1 Multilevel Framework of the Antecedents and Consequences of Change Readiness (Rafferty et al. 2013, p. 113)

---------- Divide between individual and workgroup-/organizational-level

⇡ Emergence of higher-level collectives from lower level constructs

Stevens (2013) points to the diversity of issues surrounding conceptualization and measurement of change readiness and provides an exposition of terms and labels used to refer to concepts that are closely related to change readiness (such as openness, receptivity, willingness, commitment). These labels have confounded the four major conceptualizations of the change readiness construct (i.e., readiness as the change message, readiness as stages of change, readiness as commitment to change, and readiness as capacity). The distinction between the conceptualizations of "readiness as

the change message" and "readiness as capacity" justifies taking an incremental approach to testing the model. Stevens notes that:

> "the largest issue pertains to the differentiation between the conceptualizations based on intentions and reactions to organizational change (i.e. approaches based on the change message, stages of change, commitment, openness) and the conceptualizations based on contextual factors that may influence or interact with those intentions and reactions (i.e. individual and organizational capacities)" (p. 342).

Since the Rafferty model entails both conceptualizations there is need for cautious empirical testing, hence the piecemeal approach adopted in this dissertation.

Multilevel Constructs

The Bottom-up Emergence of Workgroup-level Constructs

Although cognition, affect, attitudes, and behavior are ordinarily attributed to individuals, they can also be attributed to groups and/or organizations. Kozlowski and Klein (2000) explain that this attribution results from the emergent properties of those characteristics, "which – through social interactions, exchanges, and amplifications" of individuals in groups, arise through a bottom-up process in order to be attributable to the group (p. 15). General System Theory (GST) is widely applied to explain the structure of emergence that describes the manner in which dynamic interactions among the lower-level elements result in higher level collectives.

GST was first advanced by Ludwig von Bertanlanffy in 1940 but did not gain prominence until the 1960s. It is a general theory of wholeness that applies isomorphism to provide a general explanation of how systems operate and thereby assimilates a broad

range of systems by naming and identifying patterns and processes common to all of them (Bausch 2002). General system theory posits that, "there exist models, principles, and laws that apply to generalized systems or their subclasses, irrespective of their particular kind, the nature of their component elements, and the relations or 'forces' between them." (Von Bertalanffy 1968, p. 31)

Although the extant literature calls for the conceptualization of change readiness as a multilevel construct, few – if any – studies have taken such an approach. Morgeson and Hofmann (1999) argue that, if a collective phenomenon exists, researchers should examine the process by which it emerges. It is therefore essential to address the underlying nature of the construct and provide sound theoretical bases for its operationalization and to justify the model used for the aggregation of lower-level elements (Bouckenooghe 2010). Failure to address these issues would potentially lead to poorly conceptualized multilevel constructs and/or committing one of two common cross-level inference mistakes. Atomistic fallacy refers to the incorrect assumption that "the relationships between variables observed at individual level apply at organizational level" while ecological fallacy is "incorrect assumption that aggregated variables are meaningful at individual level" (Barbour and Lammers 2015, p. 47). These fallacies can be overcome by "thinking multilevel" (Kozlowski and Klein 2000, p. 11) because multilevel analysis facilitates the analysis of measurements at both lower- and higher-levels simultaneously (Singer and Willett 2003).

Current multilevel literature avails two idealistic models of emergence: composition and compilation (Table 2.2). Composition describes a convergence of shared properties from a lower-level that yield higher-level properties which are essentially the

same as the constituent elements. On the other hand, compilation is based on the assumption of discontinuity which describes phenomena that are distinctly different across levels despite having a common domain. Despite the difference, compilational phenomena are functionally equivalent (Kozlowski and Klein 2000).

Table 2.2 Types of Emergence

Basis	Composition	Compilation
Key underlying assumption	Isomorphism	Discontinuity
Basis of higher level collective	Shared properties	Dissimilar properties
Elements of emergent construct	Same as lower-level and functionally equivalent	Different but functionally equivalent
Interaction processes/dynamics	Incremental and stable Low dispersion Uniform pattern	Irregular High in Dispersion No uniform pattern

Summarizes Kozlowski and Klein (2000) bases of determining the type of emergence – compilation or composition – that would lead to the emergence of higher level collectives from lower-level characteristics given the context under study.

Since these two methods of emergence represent the ends of a spectrum, the emergence of a specific construct might not fit exactly into one or the other method. Kozlowski and Klein (2000) explain that lower-level elements such as behavior, characteristics, beliefs, or perceptions might not coalesce, but vary within a group or organization, and yet the bottom-up emergence of the higher level collective may nevertheless occur. Rafferty et al. (2013) assert that change readiness is isomorphic when "all individuals perceive readiness along the same set of dimensions, or all work group or organizational members consider change readiness the same way" (p 112). Burton-Jones and Gallivan (2007) and Kozlowski and Klein (2000) are of the view that the emergence process should be assessed with regard to the context under study, and in particular, the patterns of lower-level characteristics, perceptions and interactions.

The Top-down Effects of the Workgroup-level Constructs

Change theory (Lewin 1947) is anchored on group dynamics. In multilevel analysis, the effect of higher level dynamics on lower-level elements are represented by the top-down relationship of the emergent constructs and lower-level constructs. Change theory posits three effects of group dynamics on individuals: (1) field forces which are clearly dependent on group pressure, (2) barriers which are obstacles to individual action due to group pressures and (3) locomotion which is individual's changing position within the group. The group dynamics espoused in these analyses lay the foundation for explaining the effects of the workgroup on the individual.

This top-down effect is not adequately investigated in extant IS literature (Burton-Jones and Gallivan 2007). The few instances of multilevel studies have that have studied this top-down effect include the project leader – project member relationship (Rai et al. 2009) and organizational citizenship behavior (Yang et al. 2015). Generally, higher-level units influence lower-level units in two ways: they may (1) have a direct effect, and/or (2) shape or moderate relationships and processes (Kozlowski and Klein 2000).

Hypotheses Development

Individual-level Change Readiness

The relationship between change readiness and intentions to adopt as conceptualized in extant change readiness literature is depicted in Figure 2.1. This relationship is supported by two main theories that explore the relationship between attitudes and intentions – the Theory of Reasoned Action (Ajzen 1987) and Theory of Planned Behavior (Ajzen 1991). This dissertation conceptualizes change readiness as

being composed of both cognitive change readiness and affective change readiness as advocated by Yang and Yoo (2004) and Rafferty et al. (2013).

Cognitive Change Readiness and Intention to Adopt

When organizations initiate change they typically employ different activities such as training and focus groups. They also use formal structures to communicate qualities of the new systems. The change message is communicated in such a way that end users' expectations are primed towards change supportive behavior. These behaviors are defined as "actions employees engage in to actively participate in, facilitate, and contribute to a planned change initiated by the organization" (Kim et al. 2011, p. 1665). Rafferty et al. (2013) identify positive job attitudes, including satisfaction and organizational commitment, as other outcomes of change readiness. These efforts are an integral part of the unfreezing phase of Lewin's change model.

Schein (1996) identifies three change efforts as necessary to achieve unfreezing: (1) disconfirmation of the validity of the status quo, (2) induction of guilt or survival anxiety, and (3) creation of psychological safety. He further argues that, "... unless sufficient psychological safety is created, the disconfirming information will be denied or in other ways defended against, no survival anxiety will be felt and consequently, no change will take place" (p. 61). Armenakis et al. (1993) underscores the importance of these dimensions by offering an alternate definition of change as "the cognitive precursor to the behavior of either resistance to, or support for, a change effort." To ascertain cognitive change readiness in this dissertation, the beliefs and thoughts held by organizational members about the outcomes of change (Bouckenooghe et al. 2009) are measured through the three dimensions of cognitive change readiness (Holt et al. 2007).

After they become aware of an impending change (but before the system is installed and changes implemented), users cognitively evaluate the change by assessing whether the change is appropriate, the extent to which managers and decision makers support the change, and their ability to successfully facilitate the change. As long as no action has been taken on that determination, the user harbors an intention of acting in a particular way in the future (Sheeran 2002). This argument is consistent with change readiness literature which points to the expectation that individuals will exhibit change-supportive behaviors when they are ready for change. Holt and Vardaman (2013) assert that,

> "change occurs in five cognitive stages, namely, precontemplation, contemplation, preparation, action and maintenance. Readiness for change equates to the preparation stage, whereby individuals have positive attitudes toward a change and indicate an inclination to take action in the immediate future" (p. 10).

This assertion connects cognition and behavior, whereby cognition refers to one's beliefs, opinions, and knowledge about one's environment while behavior is the action initiated in response to cognition and one's evaluation of that behavior (Bhattacherjee and Premkumar 2004). Taken together, as hypothesis H1, the three dimensions of cognitive change readiness will have a positive influence on employee's intention to adopt the new ICMS features. In order to represent the three dimensions of cognitive change readiness, the following hypotheses are necessary:

H1a –Appropriateness is positively associated with intention to adopt new ICMS features.

H1b - Management support is positively associated with intention to adopt new ICMS features.

H1c - Change efficacy is positively associated with intention to adopt new ICMS features.

Affective Change Readiness and Intention to Adopt

Change readiness is an attitude which has both cognitive and affective components (Scherer 2005). Failure to include either of these aspects would mean that an important independent variable is missing. Bouckenooghe et al. (2009) define this affective aspect of change readiness as emotional reactions toward change. Affect has two dimensions (positive affect and negative affect), which in this dissertation will be labeled as positive affective change readiness and negative affective change readiness. Their definitions are presented in Table 3.6.

In line with the Theory of Planned Behavior (Ajzen 1991; Fishbein and Ajzen 1975), increases in positive affective change readiness will increase intentions while increases in negative affective change readiness will reduce intention to adopt. These affective change readiness dimensions are capable of "motivating goal-directed behaviors" (Crawford and Henry 2004, p. 248), and will therefore impact employees' intentions to adopt the new ICMS features (Hypothesis H2). Since affect has two dimensions – negative and positive affect, hypothesis H2 is presented as:

H2a – Positive affect is positively associated with intention to adopt new ICMS *features.*

H2b – Negative affect is negatively associated with intention to adopt new ICMS *features.*

Workgroup-level Change Readiness

Workgroup members are embedded in a social system where they look to one another for clues as they try to make sense of events and circumstances (Armenakis et al. 1993). That reliance on others to shape one's thoughts and beliefs in the course of social interactions can increase sharing of perceptions, attitudes, beliefs and thoughts. The prevalence of shared elements amongst workgroup members leads to the emergence of workgroup-level collectives – in this case workgroup cognitive and affective change readiness – whose influence on the individual's behavior is relevant. Since these collectives emerge from shared properties such as perspectives, beliefs, and thoughts about change, the collective is similar to, but orthogonal from, the lower-level construct. The two constructs are isomorphic; i.e., they are functionally similar and perform the same theoretical function at the different levels which they operate (i.e., one at individual level and the other at workgroup level (Kozlowski and Klein 2000; Rousseau 1985)).

Change readiness constructs in extant literature are founded on individual-level theories and empirical tests. Through isomorphism (Tay et al. 2014), theories and relationships between individual-level latent constructs are assumed to hold at the workgroup-level. We therefore expect that the referent-shift workgroup level constructs derived for this study (which emerge from individual-level constructs through composition) are conceptually similar across levels.

Workgroup Affective Change Readiness and Intention to Adopt

The concept of groups sharing ideas and having shared thoughts and beliefs has received significant attention in group dynamics research. Organizational Behavior researchers (Barsade 2002; Forgas 2008; McAllister 1995) concede that taking a

cognitive view only, without considering emotional/affective aspects, gives an incomplete picture of group dynamics. Members of a workgroup can share emotions to form workgroup moods which, when considered in addition to the cognitive aspects, give a more complete view of group dynamics.

Workgroup moods (also known as collective moods) are an important aspect of the work environment. Collective moods are achieved through two main mechanisms – emotional comparison (Bartel and Saavedra 2000) and contagion (Barsade 2002). Once formed, they can help produce a normative affective aptitude for social situations and may affect members' motivation to attain collective goals (Bartel and Saavedra 2000: p198). Through these mechanisms workgroup members may synchronize their moods and emotions (both positive and negative affects).

When the organization is in the process of making changes to its systems, employees will compare their emotions towards the system in the course of interacting at work, leading to the formation of workgroup-level affective change readiness phenomena. Workgroup-level affective change readiness will impact employee's intention to adopt the new ICMS features (Hypothesis H3):

H3a –Positive workgroup affect is positively associated with intention to adopt new ICMS features.

H3b –Negative workgroup affect is negatively associated with intention to adopt new ICMS features.

Workgroup Cognitive Change Readiness and Intention to Adopt

Regarding collective cognitive change readiness, Rafferty et al. (2013) explain that collective change readiness is "influenced by (1) shared cognitive beliefs among

workgroup or organizational members that (a) the change is needed, (b) the workgroup or organization has the capability to successfully undertake change, and (c) change will have positive outcomes for the workgroup or organization" (p. 116). This leads to hypothesis H4; workgroup-level cognitive change readiness will therefore impact employee's intention to adopt the new ICMS features. Three dimensions represent cognitive change readiness:

H4a – Workgroup appropriateness is positively associated with intention to adopt new ICMS features.

H4b - Workgroup management support is positively associated with intention to adopt new ICMS features.

H4c - Workgroup change efficacy is positively associated with intention to adopt new ICMS features.

A research model (Figure 2.2) is derived from the theoretical bases discussed above. The model is extracted from the multilevel framework of antecedents and outcomes of change readiness (Figure 2.1) developed by Rafferty et al. (2013). This dissertation focuses on the change readiness constructs and proposes intention to adopt as the outcome variable.

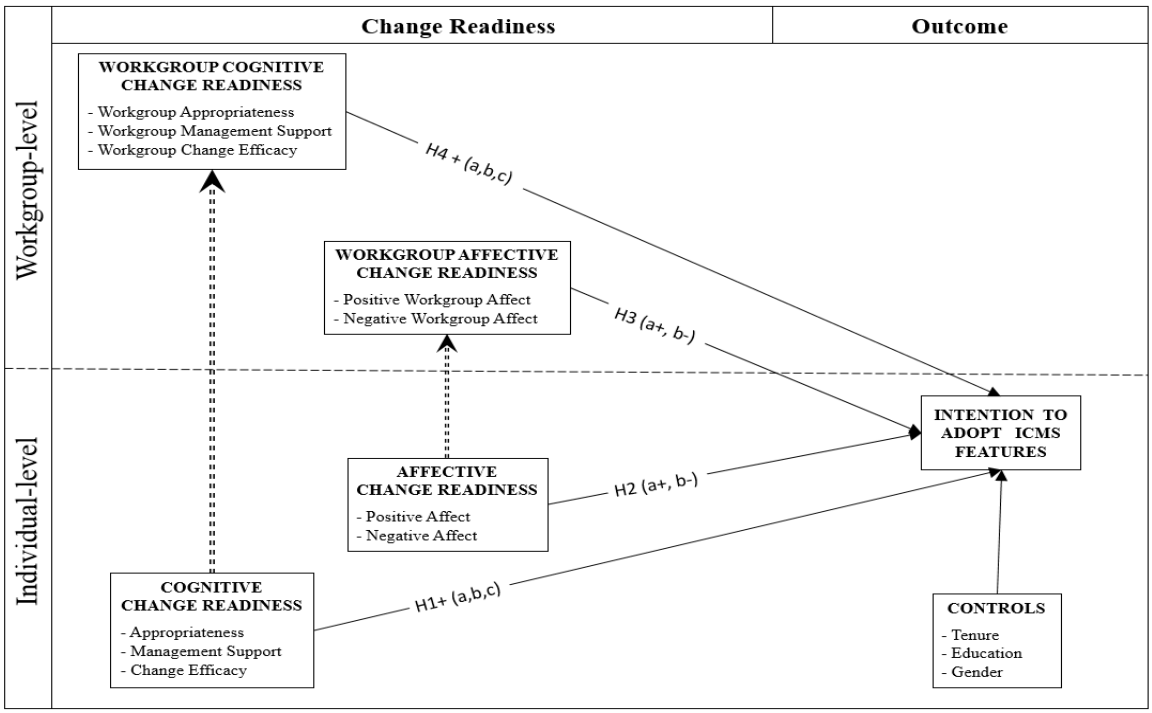


Figure 2.2 Research Model and Hypotheses

---------- Divide between individual- and workgroup-level

Referent-shift emergence of higher-level collectives from lower-level constructs

CHAPTER III

RESEARCH DESIGN AND DATA COLLECTION

This chapter discusses different strategies employed to integrate various methodological aspects of this dissertation into a logical process to facilitate data collection. It starts with a description of the study context and the sampling strategy used to optimize chances of collecting data from a sample that adequately represents the phenomenon of interest in the target population (Bhattacherjee 2012). Next, different components of the survey instrument are discussed, including measurement scales for each construct in the proposed research model. Surveys are prone to respondents' biases, which unabated could hurt validity. Several procedures are administered to address Common Method Variance (CMV), non-response bias and other measures taken to ensure overall reliability and validity (discriminant and convergent validity as well as face validity). Finally, the chapter concludes with the analytical techniques that will be used after data collection to test the relationships hypothesized in the research model.

Study Context and Sampling Strategy

This dissertation is inspired by the enactment of the Workforce Innovation and Opportunity Act (WIOA) which the US Congress passed into law in 2014. The goal of WIOA is to improve the quality of the workforce, reduce welfare dependency, increase economic self-sufficiency, meet skills requirements of employers, and enhance the productivity and competitiveness of the nation. WIOA targets the nation's core workforce

training programs by streamlining employment, training, adult education, and vocational rehabilitation which have largely operated in silos. The law requires all states to develop information systems which align the core programs in order to provide coordinated, comprehensive services (US Department of Labor 2016). In the State of Mississippi, the Integrated Case Management System (ICMS) is being developed to coordinate core functions within four departments involved with workforce development in the State of Mississippi (Figure 3.1). These are Mississippi Department of Employment Security (MDES), Mississippi Community College Board (MCCB), Mississippi Department of Human Services (MDHS) and Mississippi Department of Rehabilitation Services (MDRS).

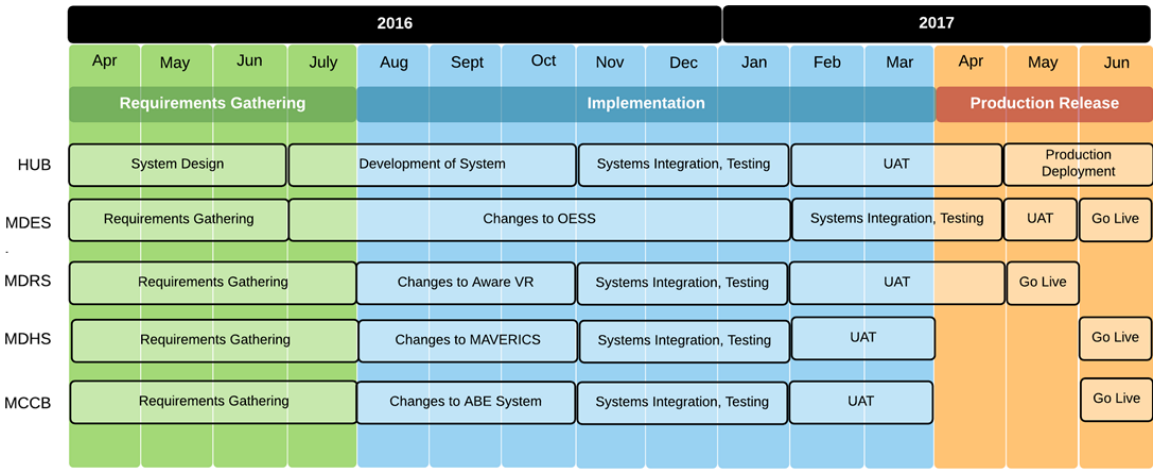


Figure 3.1 Integrated Case Management System Implementation Timeline

UAT – User Acceptance Testing,

Features of the ICMS will be added to legacy systems which are already deployed in each of the departments. The inclusion of these features will enable employees, in the departments involved, to perform new tasks to achieve WIOA goals. Data for this

dissertation was collected during the requirement gathering phase, and soon after employee training (Figure 3.1). Workgroups within each department will be predetermined and identified in the survey instrument. Survey instructions will be customized to reflect the idiosyncrasies of each workgroup's legacy systems (e.g., "Maverics" for MDES respondents and "MSWorks" for MDES.) This will reduce chances of confusion and enhance reliability.

To facilitate data collection, workgroups in each department will be identified and unique codes assigned to each so that survey responses are properly grouped for HLM analysis. Workgroup codes will be anonymized during data analysis to help ensure confidentiality, protect subject privacy, and reduce CMV.

Survey Instrument and Measures of Key Constructs

Instrument Design

Data will be collected through a cross-sectional field survey. The cross-sectional field survey design is appropriate for several reasons. First, the phenomenon of interest – change readiness and intention to adopt – are not observable and "surveys are an excellent vehicle for measuring a wide variety of unobservable data such as people's preferences…traits… attitudes…[and] behavior" and secondly, surveys are "best suited for studies that have individuals people as the unit of analysis" (Bhattacherjee 2012, p. 73).

Measures were adapted from studies whose conceptualization of the various constructs were comparable to the constructs in this dissertation. Study contexts, construct definitions, and measurement items were considered appropriate bases of comparison. Some of the validated scales are long and because respondent fatigue and

noncooperation is an issue with self-administered surveys (Cortina 1993; DeVellis 2012), shorter versions are derived for this study. To derive the shorter versions, items were culled from the original scale leaving items with the highest factor loadings (Netemeyer et al. 1996).

All the items are measured using fully anchored seven-point Likert scale and scored from 1 (Not at All) to 7 (Very Much) for PANAS items (Baumgartner et al. 2008), while all other items are scored from 1 (Strongly Agree) to 7 (Strongly Disagree). For demographic questions, response formats are suited to the nature of question. Finally, two open-ended questions are included at the end of the survey to allow respondents to contribute any information they would like to share about ICMS and the change.

Measures of Key Constructs

One objective of this dissertation is to empirically test the framework of antecedents and outcomes of change readiness as proposed by Rafferty et al (2003). Key constructs are measured using an instrument derived from validated measures.

Cognitive Change Readiness

The three dimensions of change readiness are defined in Table 3.2. The items were validated through a review process conducted by a panel of experts.

Table 3.2 Definitions of Cognitive Change Readiness Constructs

Construct	Definition (Holt et al. 2007)
Appropriateness	The belief that this change is the correct course of action for the current situation.
Management Support	The belief that the organizational leaders were committed to this change.
Change Efficacy	The belief that the individual can successfully implement this change.

Measurement for each of these dimensions (i.e., appropriateness, Table 3.3; management support, Table 3.4; and change efficacy, Table 3.5) are based on items adapted from Holt et al. (2007). The original scales had more items, (e.g., appropriateness, 10 items; management support, 6 items; and change efficacy, 6 items), but to manage the length of our survey instrument, only the highest loading items were used (Netemeyer et al. 1996).

Table 3.3 Appropriateness Scale

Item ID	Item	Original Item (Holt et al. 2007)
	Regarding the appropriateness of the change,	
AP01	I think the organization will benefit from these changes.	I think the organization will benefit from this change.
AP02	It doesn't make much sense for the organization to initiate these changes.	It doesn't make much sense for us to initiate this change.
AP03	These changes will improve the organization's overall efficiency.	This change will improve the organization's overall efficiency.
AP04	There are rational reasons for these changes to be made.	There are a number of rational reasons for this change to be made
AP05	In the long run, I feel it will be worthwhile if the organization implements these changes.	In the long run, I feel it will be worthwhile for me if the organization adopts this change.

Table 3.4 Management Support Scale

Item ID	Item	Original Item (Holt et al. 2007)
	In relation to management support for the change;	
MS01	Senior leaders have encouraged me to embrace these changes.	Our senior leaders have encouraged all of us to embrace this change (Holt et al. 2007).
MS02	Top decision makers in the organization have put all their support behind the change efforts.	Our organization's top decision makers put all their support behind this change effort (Holt et al. 2007).
MS03	Most senior managers have stressed the importance of these changes.	Every senior manager has stressed the importance of this change (Holt et al. 2007).
MS04	Senior management is committed to these changes.	The organizations most senior leader is committed to this change (Holt et al. 2007).

Table 3.5 Change Efficacy Scale

Item ID	Item	Original Item (Holt et al. 2007)
	Thinking about the ability to handle these changes;	
CE01	I do not anticipate any problems adjusting to the work I will have when these changes are implemented.	I do not anticipate any problems adjusting to the work I will have when this change is adopted.
CE02	There are some tasks that will be required when we change that I don't think I can do well.	There are some tasks that will be required when we change that I don't think I can do well.
CE03	When we implement these changes I feel I can handle them with ease.	When we implement this change I feel I can handle it with ease.
CE04	I have the skills needed to make these changes work.	I have the skills needed to make this change work.

Affective Change Readiness

To measure affect, we adapt items from the Positive and Negative Affect Schedule (PANAS) scale which consists of 10 items for each dimension. These items

were derived by Zevon and Tellegen (1982), and further refined by Watson et al. (1988). Subsequent studies (Crawford and Henry 2004; Crocker 1997; Lindquist et al. 2015; Mehrabian 1997) have confirmed that affect has two orthogonal dimensions – positive affect and negative affect. Separately, Lindquist et al. (2015) conducted a meta-analysis of functional magnetic resonance imaging (fMRI) and positron emission tomography studies to test the neural basis of the bipolarity of positive and negative affect. Different stimuli were presented to participants and brain activity measured. Multilevel peak kernel density analysis were then conducted and maps generated

> "for study contrasts comparing: 1) "positive affect" versus "neutral", 2) "negative affect" versus "neutral" 3) positive affect versus negative affect, and 4 "negative affect" versus "positive affect" task conditions."(Lindquist et al. 2015, p. 4)

Their study ascertained that these two emotions are indeed independent and not bipolar opposites of each other. Table 3.6 provides the definitions used for these factors in this dissertation.

Table 3.6 Definitions of Positive and Negative Affect Constructs

Construct	Definition (Crawford and Henry 2004)
Positive Affect	The extent to which a person experiences a state of enthusiastic, high energy, full and pleasurable engagement evoked by a given target.
Negative Affect	The extent to which a person experiences a state of subjective distress and unpleasurable engagement evoked by a given target.

Long survey instruments have been shown to induce fatigue and thereby compromise reliability (Cortina 1993; Nunnally and Bernstein 1994). The PANAS scale has twenty items. The panel of experts observed that using all the items in this study would add significant length to the instrument. They recommended selecting six items

(out of the twenty) on the basis of: (1) relevance to the research context. Items that remotely apply to the adoption of a new system were excluded. For instance, two of the omitted items are “guilt” and “strong” in the positive and negative schedule respectively. The reasoning is that there is low likelihood that the new system would evoke moods such as “guilt”. (2) Factor loading - items with poor loading in extant literature were not included in our instrument. This resulted in measures presented in Table 3.7 and Table 3.8. Items for each of these two dimensions are expected to exhibit discriminant validity i.e., load separately on their corresponding factors, and the influence of each factor on the DV to be distinct.

Table 3.7 Positive Affect Scale

Item ID	**Item (**adapted from Crawford and Henry (2004))
	Think about the positive outcomes you anticipate about the new system. To what extent do you feel:
PA01	Optimistic?
PA02	Confident?
PA03	Excited?
PA04	Enthusiastic?
PA05	Delighted?
PA06	Interested?

Table 3.8 Negative Affect Scale

Item ID	**Item (**adapted from Crawford and Henry (2004))
	Think about the negative outcomes you anticipate about the new system. To what extent do you feel:
NA01	Worried?
NA02	Anxious?
NA03	Uncomfortable?
NA04	Nervous?
NA05	Afraid?
NA06	Scared?

Emergent Multilevel Constructs

Organization structure creates environments that affect their members (James and Jones 1976). Workgroups are common in organizations but IS research often ignores or fails to control for their effects, thus leading to flawed analyses (Burton-Jones and Gallivan 2007). It is essential to acknowledge that "groups have their own personalities, distinct from a summation of individual personalities" (Sarker and Valacich 2010, p. 780). Summation of individual measures is flawed because an average is not a construct that is capable of representing different dimensions or be amenable to statistical analysis and inferences as would a latent construct. Inferences made from such flawed measures are inherently fallacious (Barbour and Lammers 2015; Burton-Jones and Gallivan 2007; Kozlowski and Klein 2000). In their place, constructs conceptualized at the workgroup level should be developed and measured.

Although workgroups may have their own characteristics, those characteristics result from members in the group interacting and having shared perceptions, beliefs, and behaviors. Group dynamics vary greatly and affect the means and nature of workgroup characteristics. Current literature has identified two methods of emergence – composition and compilation (Table 2.2). The composition method applies in contexts where, and for phenomena which, workgroup-level constructs arise from members' shared properties that are uniform/similar. The elements of emergent constructs are similar and functionally equivalent to the lower-level construct elements (Kozlowski and Klein 2000).

Chan (1998) provides a typology of five compositional models that can be used to address situations in which data from a lower level are used to establish the higher level construct: additive, direct consensus, referent-shift consensus, dispersion, and process

composition. Additive models are applicable where the variance in lower level units has no theoretical or operational relation to the composition of higher level construct from the lower level construct. Higher level constructs are generated through summation of lower level units.

Direct consensus models use within-group agreement of lower level units as the functional relationship to specify how the conceptualization and operationalization of higher level constructs are isomorphic to the lower level constructs (Chan 1998; Klein et al. 2001; Tay et al. 2014). High within-group consensus justifies aggregation of lower level constructs to form the higher level construct. On the other hand, the referent-shift consensus models involve conceptualizing lower and higher level constructs as being not only distinct, but also orthogonal – even though the higher level construct is derived from the lower level one. To derive the higher level construct, the basic content of the lower level construct remain unchanged but the referent of the content shifts to the higher level unit of analysis.

Consensus models treat within-group agreement as a pre-condition that is necessary to justify the emergence of higher level constructs. However, dispersion models view within-group (or dispersion) as theoretically significant phenomenon in its own right (James et al. 1984). In these models there is more focus on the higher level constructs and dispersion is used to support their operationalization using within-group agreement. Dispersion models are therefore best suited for "specifying the nature of higher level constructs represented by dispersion along some lower-level variable" (Chan 1998, p. 240).

Process models are complex and fundamentally different from the other models because they focus on mechanisms (or processes) that explicate the functional parameters that are essential in analogous interrelation of lower level constructs to higher level constructs. In these models, higher level parameters are homologues of the lower level elements, and there is no simple algorithm (such as within-group agreement) to compose the lower level process to higher levels. Instead, equivalents at different levels in the process are used to connect homologous parameters at the various levels.

When workgroup members are contemplating change readiness, they consider very similar elements (i.e., appropriateness of the change, management support and self-efficacy) which will be the same considerations used at workgroup-level to evaluate the change. It is for these reasons that the referent-shift consensus model is considered appropriate to derive workgroup-level change readiness constructs.

The definitions of the resultant constructs are presented on Table 3.9. These definitions are also derived from the individual-level definitions. However, these resultant workgroup constructs are conceptually distinct from the original individual-level units, from which they arise, because “the referent of the content has changed” from the individual to the workgroup (Chan 1998, p. 238).

Table 3.9 Definitions of Workgroup Multilevel Constructs

Construct	Definition (adapted from Crawford and Henry, (2004))
Workgroup appropriateness	The belief shared amongst members of the workgroup that this change is the correct course of action for the current situation.
Workgroup management support	The belief shared amongst members of the workgroup that the organizational leaders are committed to this change.
Workgroup change efficacy	Workgroup members' shared belief in their conjoint capabilities to organize and execute the courses of action required to implement change successfully
Positive workgroup affect	The sense shared amongst members of the workgroup that a state of enthusiastic, high energy, full and pleasurable engagement is evoked by a given target.
Negative workgroup affect	The sense shared amongst members of the workgroup that a state of subjective distress and unpleasurable engagement is evoked by a given target.

Collectives are generated by using the group-referenced-item form of the corresponding individual-level constructs (Chan 1998; Klein et al. 2001). Converting construct items from individual form to group-referenced form is the appropriate method to operationalize higher-level constructs (James and Jones 1976; Klein et al. 2001; Kozlowski and Klein 2000). For instance, one of the items used to measure individual level appropriateness, is in the form of; "I think the organization will benefit from these changes." (Item AP01). Conversely, in the group-referenced form to measure workgroup appropriateness, the item is; "the other members of my workgroup believe that the organization will benefit from these changes." (Item RAP01).

Workgroup Appropriateness

Table 3.10 Workgroup Appropriateness Scale

Item ID	**Item** (adapted from Holt et al. 2007)
	Regarding the appropriateness of these changes, the **other members of my workgroup** believe that…
RAP01	…the organization will benefit from these changes.
RAP02	…it doesn't make much sense for the organization to initiate these changes.
RAP03	…these changes will improve their overall efficiency.
RAP04	…there are rational reasons for these changes to be made.
RAP06	…in the long run, it will be worthwhile if the organization adopts these changes.

Workgroup Management Support

Table 3.11 Workgroup Management Support Scale

Item ID	**Item** (adapted from Holt et al. 2007)
	In relation to management support for these changes, the **other members of my workgroup** believe that…
RMS01	…the senior leaders have encouraged them to embrace these changes.
RMS02	…the organization's top decision makers have put all their support behind the change efforts.
RMS03	…most senior managers have stressed the importance of these changes.
RMS04	…senior management is committed to these changes.

Workgroup Change Efficacy

Table 3.12 Workgroup Change Efficacy Scale

Item ID	**Item** (adapted from Holt et al. 2007)
	Thinking about ability to handle these changes, **the other members of my workgroup** . . .
RCE01	…do not anticipate any problems adjusting to the work they will have when these changes are implemented.
RCE02	…believe there are some tasks, required after these changes, which they cannot do well.
RCE03	…feel that, when these changes are implemented, they can handle them with ease.
RCE04	…believe they have the skills needed to make these changes work.

Workgroup Positive Affect

Table 3.13 Workgroup Positive Affect Scale

Item ID	**Item** (adapted from Crawford and Henry. 2004)
	Think about the positive outcomes, anticipated by the other members of your workgroup, due to the changes introduced by the ICMS. To what extent do **other members of your workgroup** feel:
RPA01	Optimistic?
RPA02	Confident?
RPA03	Excited?
RPA04	Enthusiastic?
RPA05	Delighted?
RPA06	Interested?

Workgroup Negative Affect

Table 3.14 Workgroup Negative Affect Scale

Item ID	**Item** (adapted from Crawford and Henry. 2004)
	Think about the negative outcomes, anticipated by the other members of your workgroup, due to the changes introduced by the ICMS. To what extent **do other members of your workgroup** feel:
RNA01	Worried?
RNA02	Anxious?
RNA03	Uncomfortable?
RNA04	Nervous?
RNA05	Afraid?
RNA06	Scared?

Outcome of Change Readiness

Intention to Adopt the New Integrated Case Management System Features

Ajzen and Fishbein (1980) outline dimensions of behavioral specificity: action, target, context, and time. Our measurement items address these aspects by assessing respondents' behavioral intention to adopt (action) the new features (target) in their work environment (context) when the ICMS is implemented (time). Further, adoption means "to choose for oneself, to select" (Stevenson 2010). Employees invest various resources (e.g., time and effort) to accommodate the implementation effort by forming the intention to adopt the new system. Items are adapted from extant literature to capture the different dimensions of intention to adopt. Modifications are made to the items to accommodate the study context.

Table 3.15 Intention to Adopt the Common Case Management System Scale

Item ID	Item	Original Item (Source)
	Based on what I know now about the Integrated Case Management System. . .	
INT01	…I contemplate using the new features when implemented.	I am contemplating to adopt FEDI in a year's time (Teo et al. 2003).
INT02	…I am likely to adopt the new features in when implemented.	I am likely to adopt FEDI in a year's time (Teo et al. 2003).
INT03	…I am willing to use the new features when implemented.	Assuming I have access to the system, I intend to use it (Venkatesh and Davis 2000).
INT04	…I expect to use the new features when implemented.	I expect to use MDS frequently in the future (Hong and Tam. 2006)

Data Analysis Strategy

Ignoring the nesting of employees within workgroups is problematic conceptually and analytically because using a single-level approach would not adequately represent organizational reality (i.e., it commits atomistic and ecological fallacies; Barbour and Lammers 2015; Kozlowski and Klein 2000). Referent-shift instruments are used to measure the emergent workgroup constructs which converge over time as a result of people working in groups and organizational subunits where they are exposed to common features, events, and processes (Kozlowski and Klein 2000). Multilevel analysis tools such as HLM facilitate analyses of these constructs. The sampling frame consists of state employees who are nested within various workgroups in each state department. Multilevel analysis methods are therefore utilized to test the relationships hypothesized in the research model.

After data collection, data analyses will be conducted to confirm validity of all the constructs and collectives through confirmatory factor analyses (CFA) followed by hypotheses testing.

Reliability and Validity

Construct reliability and validity are two critical intrinsic values that latent variables must possess and without which statistical analyses would be worthless. Reliability refers to "the proportion of variance that is attributable to the true score of a latent variable" (DeVellis 2012, p. 31). It is indicated by a Cronbach's alpha (Cronbach 1951) that is equal to or greater than 0.70 (Nunnally 1978). Validity is the extent to which an operational measure truly reflects the concept being investigated (Netemeyer et al.

2003, p. 71). To attain these qualities in this dissertation, the following procedural measures were taken.

Expert Panel Review

Survey items should be clear, concise (Dillman 1978), and capable of being understood such that a similar meaning is derived by all respondents (Netemeyer et al. 2003). In order to maximize the likelihood of developing a content-valid, well-constructed data collection instrument, a panel of experts was constituted (Davis 1992). The panel had faculty, who are subject matter experts, drawn from Marketing, Management and Information Systems areas. Doctoral students who had passed advanced scale development courses were also included in the panel. After assessing the items and constructs, members of the review panel suggested changes to improve face and content validity. Appropriate updates were made resulting in the final survey instrument (APPENDIX A).

Attention Check Questions

When survey questions are cognitively demanding, respondents engage in satisficing behaviors (Krosnick 1991). To identify such behavior, two attention check questions (Table 3.16) are included in the survey instrument. The attention check items were designed to be of similar length and response format as other items near them (Oppenheimer et al. 2009). These questions ask participants to ignore the standard response format and instead select a specific answer. During data analysis, responses from participants who fail one or both items will be deleted.

Table 3.16 Attention Check Items

Item ID	Item
ATC1	For this question please select “neutral”.
ATC2	…for this question please choose “strongly agree.”

Common Method Variance Proxy

When raters provide data for the independent variable (IV) and dependent variable (DV) at the same time, there are chances the correlation between the DV and the IVs might suffer superficial inflation or deflation which is an artifact of the data collection method. This method-induced inflation (or deflation) is known as Common Method Variance (CMV; Malhotra et al. 2006). Furthermore, self-reported data is prone to bias (Bhattacherjee 2012) as respondents might provide answers that are not necessarily an honest assessment and indication of their feelings, but what they consider to be acceptable.

Scholars disagree about the nature and/or prevalence of CMV (Lindell and Whitney 2001; Podsakoff et al. 2003; Simmering et al. 2015); however, numerous measures are employed in this dissertation to deal with various biases common with self-reported data. The first measure deals with socially desirable response bias (Mick 1996). Social desirability bias individuals’ tendency to make themselves look good with respect to cultural norms when answering research questions. To dissuade this tendency, instructions in the preamble of the survey are provided to the effect that there are no right or wrong answers, and that honest opinions are the essence of the survey. Respondents’ anonymity is assured by not linking responses to respondents’ identity.

Secondly, a marker variable (Table 3.17) was included to act as a proxy for CMV (if any) in our data. The marker variable approach is a partial correlation procedure which involves assessing structural parameters both with and without the marker variable to determine CMV effect (Lindell and Whitney 2001). If CMV is significant, the spurious correlation found between the marker variable and other variables is partialled out. Simmering et al. (2015) recommend placing the marker variable between the IVs and the ultimate DV in the survey instrument.

The choice of a marker variable for this study was based on "the degree to which it (a) is influenced by the same causes of CMV (e.g., affectivity, acquiescence) as a set of substantive variables, but (b) is not theoretically related to those substantive variables" (Simmering et al. 2015, p. 474). In relation to the variables in this dissertation, blue attitude meets the two criteria and is therefore suitable for identifying attitudinally-related CMV that might be present in the data collected using the survey instrument. The marker variable measures respondents' attitude toward the color blue. Theoretically, there is no relationship between color blue and the respondents' attitude toward the change or their intention to adopt system features. Any correlation between these key constructs and the marker variable would therefore be considered spurious, and indicate that data has significant influence of common method variance.

Although the marker variable items might seem to stand out because they are unique and not drawn from the study domain, their suitability is counterintuitive. They are useful because their attitudinal nature, through which they "might elicit response processes similar to those required in replying to other attitudinal measures, and thus, make this marker similarly susceptible to CMV" (Simmering et al. 2015, p. 487)

Table 3.17 Marker Variable Scale

Item ID	Item	Source
MV01	I like the color blue.	Simmering et al. (2015)
MV02	I prefer blue to other colors.	
MV03	I like blue clothes.	
MV04	I hope my next car is blue.	
MV05	I think blue cars are ugly (RS)	Miller and Chiodo (2008)
MV06	I don't think blue is a pretty color (RS)	
MV07	I don't like blue clothes (RS)	
MV08	I really don't like the color blue (RS)	

Factor Analysis

Before data analysis, it is crucial to ensure that construct reliability and validity thresholds are attained. Measures used in the survey instrument are adapted from validated scales. However, items were modified to suit the study context necessitating factor analysis to ensure reliability and validity. Structural equation modeling will be conducted using the two-step approach advocated by Anderson and Gerbing (1988). After establishing validity, the relationships hypothesized to exist between constructs may be estimated and inferences made regarding the sampling frame and, by extension, the population.

Exploratory Factor Analysis

For the Exploratory Factor Analysis (EFA), the aim will be to establish unidimensionality. Unidimensionality is the existence of one latent trait or construct underlying a set of items or measures (Hattie 1985), and should be established before conducting tests of other properties such as internal consistency and validity (Netemeyer et al. 2003).

An assessment of construct internal consistency will also be made by analysis of coefficient alpha score for each construct. The coefficient alpha measures the degree of relatedness among a set of items designed to measure a single construct (Cortina 1993; Netemeyer et al. 2003). Although debate continues amongst psychometricians (Clark and Watson 1995), measures in applied research such as this one should attain a reliability score as indicated by a coefficient alpha of at least 0.80 (Nunnally 1978).

Before proceeding to CFA, an important aspect of the EFA step is the assessment of item loadings for *prima facie* evidence of convergent and discriminant validity. Convergent validity is indicated by item loadings greater than 0.70 (Straub et al. 2004), while discriminant validity is shown by items cross-load (loading on factors other than the one they are intended to measure) by less than 0.40 (Hair et al. 1998).

Confirmatory Factor Analysis

Once unidimensionality is established, we shall follow the CFA model (Jöreskog 1974) to confirm construct validity by assessing both discriminant and convergent validity. Construct validity refers to the extent to which a measure adequately represents the underlying construct. Having already addressed face and content validity (see Instrument Design section), here we focus on convergent and discriminant validity. Discriminant validity is the degree to which items that measure a construct are significantly correlated. It is indicated by factor loadings which show the absence of correlation between measures of unrelated constructs (DeVellis 2012). Convergent validity, on the other hand is, the degree to which items are related to the construct they are supposed to measure. CFA is more rigorous because, unlike EFA, items are not allowed to correlate freely (Garver and Mentzer 1999) because the covariance matrix of

the constructs is restricted. Average Variance Extracted (AVE) measures will be calculated for each construct to verify discriminant and convergent validity. Each construct's AVE measure must be greater than 0.5 to indicate convergent validity and, to indicate discriminant validity, the variance shared between any set of two constructs must not exceed the corresponding constructs' AVEs (Fornell and Larcker 1981).

Intraclass Correlation Coefficients

Validity of the emergent constructs will also be measured. There are two main methodologies used to assess the validity of collectives. Consensus- or agreement-based approaches (e.g. r_{WG} or $r_{WG(j)}$) evaluate within-group variance against a hypothetical expected-variance term, and consistency- or reliability-based approaches (e.g., ICC(1), ICC(2)), to evaluate between-group variances against total (between and within) variance (Bliese 2000).

Intraclass Correlation Coefficients - ICC (Bartko 1976; Bryk and Raudenbush 1992; Shrout and Fleiss 1979) - will be used to measure the reliability of the workgroup constructs in this dissertation. The ICC has two forms. ICC(1) represents the reliability of a single assessment of a group-level property; it is the expected reliability of a single judge's ratings (Shrout and Fleiss 1979). ICC(2) provides an estimate of reliability of the group means (Bliese 1998; James 1982). Both forms are derived from a one-way ANOVA using the following formulas (Bartko 1976; Bliese 2000);

$$ICC(1)=\frac{MSB-MSW}{MSB+[(k-1)*MSW]} \tag{3.1}$$

and

$$ICC(2)=\frac{MSB-MSW}{MSB} \tag{3.2}$$

Where:

MSB is Mean Squares Between-groups,

MSW is Mean Squares Within-groups,

k is group size (average where groups are unequal)

The two forms of intraclass correlation coefficients have different acceptability standards: To be acceptable, ICC(1) should have a value greater than 0 (Bliese 2000). However, it is possible to get negative ICC values (i.e., where MSW > MSB; Bliese 2000). A score of 1 shows high reliability indicating that "a single rating from an individual is likely to provide relatively reliable rating of the group mean" (Bliese 2000, p. 356). A score above 0.7 is acceptable for ICC(2) because high ICC(2) values are key to detecting emergent relationships: a score between 0.5 and 0.7 is considered only marginal (Shrout and Fleiss 1979).

It is therefore necessary to also confirm non-independence (the degree to which responses from members of a group are dependent on, influenced by, or cluster by those groups) in order to justify the use of hierarchical linear modeling. Hierarchical data violates the classical General Linear Modeling (GLM) assumption of independent residuals. When residuals are not independent, it means that the method used to select the sample creates correlated responses amongst individuals (Finch et al. 2014). For non-independence that is theorized to emanate from group membership, a non-zero ICC(1) value indicates that group membership is related to the lower-level observations.

McGraw and Wong (1996) provide a flow chart (p. 40) for selecting appropriate ICCs (APPENDIX B). The process starts with selecting the effects model that suits the

research design. Per Shrout and Fleiss (1979) this study's design matches case 2 because "A random sample of *k* judges is selected from a large population, and each judge rates each target, that is, each judge rates *n* targets altogether." (p. 421). The reference to judges and target in Shrout and Fleiss (1979) will correspond to respondents and survey items in this study respectively.

Type 2 workgroup-level ICCs will be derived through the two-way random effects model. The conceptual difference between the absolute agreement reliability and consistency reliability is based on how each method defines the ICC denominator (McGraw and Wong 1996): "for consistency measures, column variance is excluded from denominator variance, and for absolute agreement it is not. Column variance is excluded from the denominators of consistency measures because it is deemed to be an irrelevant source of variance." (p. 33). They further explain that,

> "In this case [absolute agreement], when measurements disagree in absolute value, regardless of the reason, they are viewed as disagreements. Thus, paired scores (2,4), (4,6), and (6,8) are in perfect agreement using a consistency definition [ICC(C,1)=1.00] but not an absolute agreement definition [ICC(A,1)=.67]." (p. 34).

Since this study conforms to model 2 in Shrout and Fleiss (1979), a set of four more ICCs will be derived for each construct to measure (a) Intrarater consistency - ICC(C,1), (b) intrarater agreement - ICC(A,1), (c) interrater consistency - ICC(C,k) and (d) interrater agreement – ICC(A,k).

Multilevel Analysis in HLM

Statistical analysis frameworks and tools help to explain the relationships between dependent or outcome variables and independent or predictor variables. The General Linear Modeling (GLM) framework serves as the basis for using a multilevel model to analyze a set of data (Finch et al. 2014). The choice of method used to analyze data under GLM is based on whether the data meets five key GLM assumptions: (1) linearity – the assumption that the relationship between the DV and the IV is linear, (Hair et al. 1998), (2) residuals are normally distributed in a population, (3) the independent variable (x) is measured without error and is unrelated to the model error term ε, (4) homoscedasticity – that the variance in the residuals is constant regardless of the value of x_i.(i.e., the independent variable score related to individual i), and (5) residuals for any two individuals in a population are independent.

Regression is appropriate where all these assumptions are met, but violation of any one of them calls for different remedies. For instance, data collected from a context where the unit of analysis is clustered or nested in a hierarchy would violate the assumption of independent errors because the clusters share factors that exert additional impact of the dependent variable (Finch et al. 2014). In such cases, multilevel analysis is the recommended method to analyze clustered data. We shall therefore use HLM version 7 (Bryk et al. 1988; Raudenbush et al. 2011) to test the multilevel relationships hypothesized in this dissertation. Multilevel modeling will allow us to address within-workgroup and between-workgroup relationships simultaneously.

CHAPTER IV

DATA COLLECTION, ANALYSIS AND RESULTS

Data for this study were obtained through a survey taken by case management workers who will use the common case management system when it is implemented. Respondents were drawn from two state departments involved in the implementation of the Integrated Case Management System. The respondents are posted in county offices which are located throughout the state. Each county office is treated as a single workgroup.

Data is collected in two phases; a pilot study (phase one) whose purpose is the preliminary examination of construct reliability of the measurement items used to capture latent constructs in the measurement instrument, and a main study (phase two). The procedures recommended by Churchill (1979) and Anderson and Gerbing (1988) were followed to confirm reliability and validity for individual-level constructs. Scales for the workgroup-level constructs were derived from individual-level scale items through the referent-shift consensus method (Chan 1998; Klein et al. 2001). Evidence of reliability of the workgroup-level constructs was established using various procedures (mainly those proposed by James et al. 1984; James et al. 1993; McGraw and Wong 1996; Van Mierlo et al. 2009) and indices such as ICCs (Bartko 1976) and $r_{WG(j)}$ (James et al. 1993).

After confirming reliability, the main study (phase two) was launched. Non-conforming cases (missing data and failed attention checks) were eliminated from each of

the data sets (pilot and main studies). Further analyses – EFA, CFA and HLM – were then conducted on the combined data to obtain the results presented by this study.

Pilot Study Data

Online survey links were sent to 232 employees who were drawn from 36 county offices of two state departments involved in the implementation of the Workforce Innovation and Opportunity Act. 204 responses were received (88% response rate). Table 4.1 summarizes details of the respondents' demographic composition.

Table 4.1 Pilot Study Demographics

Demographic	Details	Response	Frequency*
Education	Less than High School	0	0%
	High School Diploma/GED	7	4%
	Some College (no degree)	36	20%
	Associate's/Technical Degree	14	8%
	Bachelor's Degree	96	53%
	Graduate/Professional Degree	27	15%
	Prefer not to answer	20	*10%
Tenure	1 - 9years	79	58%
	10 - 19years	43	32%
	20 - 29years	11	8%
	30 - 34years	3	2%
	Prefer not to answer	64	*32%
Sex	Female	124	76%
	Male	40	24%
	Prefer not to answer	36	*18%

Total frequency might be greater than 100% because the "prefer not to answer group" is a percentage of all respondents while the rest are based on those who provided the requisite data.

Out of the responses received, 4 cases with incomplete and/or missing data were excluded, and 76 more were eliminated because of failing attention check questions. Attention check questions are an effective way of improving data quality by screening out inattentive respondents (Goodman et al. 2013; Peer et al. 2014), or by increasing

attention when respondents are made aware of their presence in the survey. Two attention check questions were included amongst the survey questions: ATC01 was programed to be presented early while ATC02 appeared later in the survey. The failure pattern presented in Table 4.2 shows that the questions were effective in identifying respondents who paid attention early in the survey but not so as the survey progressed.

Table 4.2 Pilot Study Attention Check Effectiveness

Question	Failed	Frequency Compared to all respondents
ATC01 only	3	4%
Both	9	12%
ATC02 only	64	84%
Total	**76**	**100%**

Since this data will be used to conduct group analysis, further scrutiny was necessary to identify instances where – as a result of deleted cases - group sizes had reduced to below two members. Four such cases were eliminated, leaving a final sample size of 120 individual respondents and 29 groups, leading to an average group size of 4.1.

Construct Validation

Preliminary and exploratory factor analyses were conducted to assess reliability; i.e., items consistently measure what they are intended to measure (Bhattacherjee 2012), and valid; i.e., they are accurate. There are two main approaches to establishing reliability in psychometric literature (a) test-retest, (b) internal consistency – the interrelatedness among items or set of items in the scale (Netemeyer et al. 2003), and the internal consistency approach is used here. The scales in this study measure constructs at different

levels (individual- and workgroup-level), and validation of each requires different criteria, theories and procedures.

Individual-level Constructs

Phase one data is used to conduct preliminary and exploratory factor analysis in order to establish evidence of reliability before the survey instrument is used for the main study data collection. These analyses are conducted using IBM® SPSS® version 24. The following criteria were set;

a. Cronbach's alpha (α) to be greater than .70 (Nunnally 1978),
b. Squared Multiple Correlation (SMC), for each item, to be greater than .50 (Fornell and Larcker 1981),
c. Each item in a scale to have its "Cronbach's alpha if item deleted" less than the construct's reported alpha,
d. Items to load on their respective constructs with factors loading scores higher than .70 (Netemeyer et al. 2003).

Items that don't satisfy this criteria were identified and removed. Items can be eliminated without hurting the content validity of the constructs because of their reflective nature (Petter et al. 2007).

Individual-level affective change readiness was measured using two constructs – negative affect and positive affect while cognitive change readiness was measured using three constructs – appropriateness, change efficacy and management support. Together with the dependent variable – intention to adopt – a total of six individual-level constructs were analyzed. Table 4.3 presents the various SPSS indices which are compared to reliability and validity thresholds in the set criteria.

Table 4.3 Pilot Study Individual-level Constructs Factor Loadings

Items	SMC	Alpha if item deleted	Factor Loading					
			N.A.	P. A.	AP.	C. E.	M. S.	INT
NA01	.888	.953	.937					
NA03	.737	.967	.883					
NA04	.846	.959	.923					
NA05	.917	.957	.944					
NA06	.923	.956	.944					
α =		**.966**						
PA01	.728	.932		.865				
PA02	.659	.941		.825				
PA03	.822	.926		.894				
PA04	.796	.923		.905				
PA05	.811	.929		.884				
α =		**.944**						
AP01	.762	.888			.886			
AP03	.762	.891			.865			
AP04	.585	.923			.762			
AP05	.688	.902			.832			
α =		**.924**						
CE01	.525	.805				.801		
CE03	.648	.680				.826		
CE04	.457	.839				.697		
α =		**.839**						
MS01	.853	.932					.903	
MS02	.797	.941					.835	
MS03	.854	.928					.891	
MS04	.828	.929					.892	
α =		**.949**						
INT02	.824	.975						.880
INT03	.922	.964						.931
INT04	.911	.964						.929
INT05	.915	.962						.916
α =		**.977**						

N for all constructs =124
N.A. = Negative Affect, P.A. = Positive Affect, AP = Appropriateness
C.E. = Change Efficacy, M.S.= Management Support, INT = Intention to Adopt
α = Cronbach's Alpha

The results in Table 4.3 indicate acceptable levels of reliability for all the individual level constructs as all Cronbach Alphas calculated are well above .70. After establishing reliability of factor indicators, principal component analysis with varimax rotation was used to extract the underlying factors. Here, all items were allowed to correlate freely without an underlying model and six factors that explain 85.9% of total variance were extracted.

An assessment of these factor loadings show evidence of convergent validity (Table 4.3) because all items loaded on their respective factors with values greater than .70 (Campbell and Fiske 1959; Straub et al. 2004). Further, there was evidence of discriminant validity because all items had cross-loading scores below the .40 threshold (Hair et al. 1998; Hair et al. 2009). Through these analyses, unidimensionality is also established for all the constructs because items in the scale seem to measure only a single factor (DeVellis 2012; Netemeyer et al. 2003).

Workgroup-level Constructs

In order to justify the application of multilevel data analysis proposed in this study, it is necessary to establish evidence of the reliability and validity of the five workgroup-level constructs. The five-step procedure for validating multilevel constructs developed by Chen et al. (2004) provide a validation framework which requires;

1. Construct definition – Construct's meaning, dimensionality and nature based on theory – at each level of analysis – is addressed. For this study, Table 3.2, Table 3.6 and Table 3.9 present definitions for every construct at both the individual- and workgroup-level of analysis.

2. Articulation of the nature of the aggregate construct – involves determining the type of aggregate-level measures used to capture the higher-level manifestation of the constructs. This step is treated in Chapter II; justifying the referent-shift model and the composition model of emergence.
3. Examination of psychometric properties of construct across levels of analysis – this step involves examination of factor structure across levels of analysis, assessment of internal consistency, and assessing whether within-unit agreement justifies aggregation.
4. Assessment of construct variability between units – there should be appropriate variance both within and between units of analysis. Inter-member reliability indices (often ICCs) are used to assess this variability.
5. Testing construct function across levels of analysis – this step focuses on constructs' relationship with other constructs at various levels of analysis as hypothesized in a theoretical model. The HLM section of this chapter addresses this last validation step.

Since steps 1 and 2 are covered in previous chapters, this chapter addresses steps 3, 4 and 5 for both the pilot and main data. To assess each workgroup-level constructs' psychometric properties and variability across levels of analysis, their ICC and $r_{WG(j)}$ indices are evaluated.

Intraclass Correlation Coefficients

The referent-shift consensus method was used to aggregate workgroup-level constructs (Chan 1998). To assess whether the constructs that emerge at the aggregate level, their Type 1 and Type 2 ICCs are assessed. Type 1 ICCs are calculated using the

Bartko (1976) one-way random effects ANOVA approach (Equation 3.1 and 3.2). Using SPSS, groups were treated as independent variables and responses as dependent variables in one-way ANOVAs. The results provide the two parameters (Mean Squares Between (MSB) and Mean Squares Within (MSW)) required to calculate the Type 1 ICCs.

These ICCs evaluate shared properties for each variable across the sample (i.e., interrater reliability) by calculating the proportion of between-group variance relative to total variance. Kozlowski and Klein (2000) note the diversity of approaches used to determine and interpret reliability of higher-level constructs. This study evaluates Types 1 ICCs, Type 2 ICCs and $r_{WG(j)}$.

Type 1 ICC has two indices: ICC (1) which assesses the existence of group effects on the measure of interest, and ICC (2) which represents the reliability of group means (Bliese 2000). This study has five workgroup-level variables. Table 4.4 presents their Type 1 ICCs.

Table 4.4 Pilot Study Type 1 ICCs For Workgroup-level Constructs

Construct		ICC(1)	ICC(2)
RNA	Referent-shift Negative Affect	.06	.21
RPA	Referent-shift Positive Affect	.19	.49
RAP	Referent-shift Appropriateness	.08	.25
RCE	Referent-shift Change Efficacy	.10	.30
RMS	Referent-shift Management Support	.16	.43

Equation 3.1 is used to calculate ICC(1) and results for the pilot study data presented in Table 4.4. To show indicate reliability of the measurements and emergence of the referent-shift variable, ICC(1) just need to be positive. Values for the constructs in this study range from 0.06 to 0.19. On the other hand, Equation 3.2 is used to calculate

ICC(2), which measure the reliability of group means. Although values above .50 are usually considered acceptable (Bliese 2000; Klein and Kozlowski 2000b), Bliese (1998) demonstrated that higher ICC(2) can be attained by manipulating group size (k).

This study is consistent with model 2 in Shrout and Fleiss (1979). Therefore, a set of four more ICCs are derived for each construct to measure (a) Intrarater consistency - ICC(C,1), (b) intrarater agreement - ICC(A,1), (c) interrater consistency - ICC(C,k) and (d) interrater agreement – ICC(A,k). The intrarater ICCs are calculated from single measurements (Table 4.5), while interrater ICCs are calculated by taking averages of k raters' measurements (Table 4.6) using two-way random effects ANOVA models.

Table 4.5 Pilot Study Two-way Random Effects ICC – Single Measures

Construct	ICC(C,1)*	95% Confidence Interval			ICC(A,1)**	95% Confidence Interval	
		Lower Bound	Upper Bound			Lower Bound	Upper Bound
Referent-shift Negative Affect	0.791	.742	.837		.788	.737	.834
Referent-shift Positive Affect	0.803	.755	.847		.791	.739	.838
Referent-shift Appropriateness	0.830	0.783	.870		.826	.778	.868
Referent-shift Change Efficacy	0.677	0.593	.751		.629	.491	.734
Referent-shift Management Support	0.824	0.776	.865		.825	.777	.866

*Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance. **Type A intraclass correlation coefficients using an absolute agreement definition. (See APPENDIX B for further details)

Table 4.6 Pilot Study Two-way Random Effects ICC – Average Measures

Construct	ICC(C,k)*	95% Confidence Interval			ICC(A,k)**	95% Confidence Interval	
		Lower Bound	Upper Bound			Lower Bound	Upper Bound
Referent-shift Negative Affect	.958	.945	.969		.957	.944	.968
Referent-shift Positive Affect	.961	.949	.971		.958	.944	.969
Referent-shift Appropriateness	.951	.935	.964		.950	.934	.963
Referent-shift Change Efficacy	.863	.814	.900		.836	.743	.892
Referent-shift Management Support	.949	.933	.963		.950	.933	.963

*Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance. **Type A intraclass correlation coefficients using an absolute agreement definition. (See APPENDIX B for further details)

Type 2 ICC for each referent-shift construct should be greater than the 0.70 threshold (James et al. 1984; Lance et al. 2006). For the single measures (Table 4.5), all but referent-shift Change Efficacy meet this lower bound requirement. Since this study's results will focus on individuals nested within workgroups, the average ICC measures (Table 4.6) are more relevant: where all constructs are well above the threshold.

Main Study Data

The refined scale was used to collect data for the main study. 438 employees of one department that will be involved in the implementation of WIOA in the State were invited to participate in data collection. These employees were drawn from county offices and their demographic diversity is summarized in Table 4.7. 402 individual responses were received (92% response rate). Out of these, 3 cases were rejected for missing and/or incomplete data.

Table 4.7 Main Study Demographics

Demographic	Details	Response	Frequency*
Education	Less than High School	0	0%
	High School Diploma/GED	27	7%
	Some College (no degree)	92	25%
	Associate's/Technical Degree	100	27%
	Bachelor's Degree	130	35%
	Graduate/Professional Degree	24	6%
	Prefer not to answer	26	* 7%
Tenure	1 – 9 years	140	44%
	10 – 19 years	74	23%
	20 – 29 years	72	23%
	30 – 44 years	31	10%
	Prefer not to answer	82	*21%
Sex	Female	349	97%
	Male	11	3%
	Prefer not to answer	39	*10%

*Total frequency might be greater than 100% because the "prefer not to answer group" is a percentage of all respondents while the rest are based on those who provided the requisite data.

In addition, 187 were eliminated because of failing attention check questions. The survey included to attention check questions; ATC01 was programed to be presented early in the survey while ATC02 appeared later. The failure pattern of those who failed these questions (Table 4.8) indicate that the questions were effective in identifying respondents whose attention waned as the survey progressed.

Table 4.8 Main Study Attention Check Effectiveness

Question	Failed	Frequency Compared to all respondents
ATC01 only	7	4%
Both	20	11%
ATC02 only	160	85%
Total	**187**	**100%**

As a result of the data cleansing processes described above, some groups had been reduced to less than two members. For purposes of workgroup-level analyses, 11 cases

were excluded to ensure that each workgroup had at least two members. That data was combined with similarly cleansed pilot data resulting in a dataset with a total of 401 individuals and 99 groups. This data set is used for the remainder of the analyses. Statistical analyses and procedures are conducted using IBM® SPSS® version 24, IBM® Amos™ version 24, and HLM™ version 7 for hierarchical linear modeling.

Exploratory Factor Analysis

The instrument used to collect pilot study data was updated with minor changes which were necessary to capture differences in agency names and the legacy systems. The items used to capture the various constructs remained unchanged. Conducting exploratory factor analyses here provides evidence of internal consistency related to the main study. The criteria used to assess evidence of each construct's reliability is exactly the same as for the pilot data. For a construct to exhibit evidence of reliability, it should have a Cronbach Alpha of at least .70 (Nunnally 1978). Further, each of the items used to calculate a construct's Alpha have an SMC scores greater than .5 (Fornell and Larcker 1981) and their corresponding "Alpha if item deleted" should be lower than reported Alpha.

The EFA results are presented below in Table 4.9. Each construct's Cronbach's Alpha is greater than .70 (Nunnally 1978) which indicates that the items used to measure each of the construct exhibit adequate internal consistency.

Table 4.9 Main Study Individual-level Constructs Factor Loadings

Items	SMC	Alpha if item deleted	Factor Loading					
			N.A.	P.A.	A.P	C.E.	M.S.	INT
NA01	.813	.949	.926					
NA03	.700	.960	.874					
NA04	.800	.951	.918					
NA05	.866	.949	.934					
NA06	.880	.946	.943					
α =		**.960**						
PA01	.738	.937		.853				
PA02	.659	.943		.816				
PA03	.803	.935		.883				
PA04	.830	.931		.899				
PA05	.810	.937		.881				
α =		**.948**						
AP01	.769	.875			.849			
AP03	.726	.890			.837			
AP04	.535	.925			.757			
AP05	.708	.886			.810			
α =		**.919**						
CE01	.526	.782				.790		
CE03	.622	.671				.817		
CE04	.421	.832				.714		
α =		**.835**						
MS01	.717	.900					.864	
MS02	.607	.921					.804	
MS03	.711	.898					.863	
MS04	.745	.892					.866	
α =		**.925**						
INT02	.841	.977						.885
INT03	.887	.970						.913
INT04	.914	.968						.920
INT05	.937	.963						.929
α =		**.977**						

N for all constructs = 401
N.A. = Negative Affect, P.A. = Positive Affect, AP = Appropriateness
C.E. = Change Efficacy, M.S.= Management Support, INT = Intention to Adopt
α = Cronbach's Alpha

After confirming internal consistency, factor analysis using varimax rotation was conducted where six factors emerged; explaining 81.5% variance. Further analyses provide evidence of convergent and discriminant validity because each item loads on its factor with loading scores greater than .7 and cross loading scores less than .4 (Campbell and Fiske 1959; Hair et al. 1998; Straub et al. 2004).

Confirmatory Factor Analysis

AMOS™ version 24 was used in this phase of validity testing. Confirmatory factor analysis was run through a measurement model. Here the data is fit to a model to confirm whether a hypothesized factor structure, based on prior literature, sufficiently fits the data (Garver and Mentzer 1999). Unlike in EFA where items are allowed to correlate freely, CFA is based on a measurement model and items are not left to freely correlate. Instead, restrictions are placed on how measurement items relate to latent constructs (Bollen and Lennox 1991).

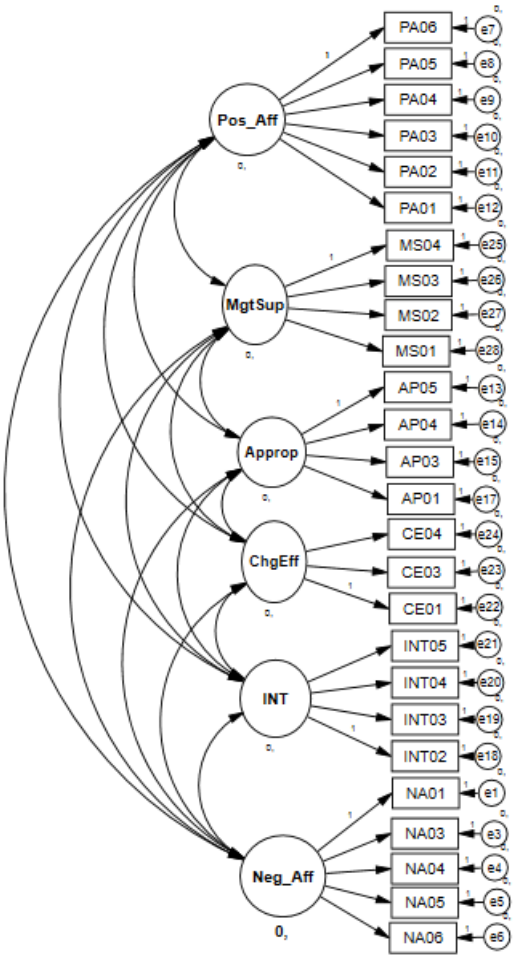


Figure 4.1 The CFA Measurement Model

The measurement model presents evidence of validity because all items' SMCs were greater than 0.50, and their individual parameter estimates, λ_x, were greater than 0.70 (Garver and Mentzer 1999). Modification indices were not large enough to warrant covariance of error terms, and model fit statistics indicated that the measurement model fits the data adequately (Table 4.10).

Table 4.10 Measurement Model Fit Statistics

Goodness of Fit Statistic	Recommended threshold	Observed Value
$\chi 2$ (chi-square)		599.17
Degrees of Freedom (df)		282
$\chi 2$ statistical significance (p-value)		.000
$\chi 2$ index (chi-square/df)	≤ 3 index ≤ 5	2.125
Normal Fit Index (NFI)	$\geq .90$	.947
Incremental Fit Index (IFI)	$\geq .90$	.971
Tucker-Lewis Index (TLI)	$\geq .90$	.967
Comparative Fit Index (CFI)	$\geq .90$	.971
Root Mean Square Error of Approximation (RMSEA)	$\leq .06$ RMSEA $\leq .08$	.053

Convergent and discriminant validity were also assessed. Convergent validity refers to the degree to which a measurement item relates to the construct it is supposed to measure (Churchill 1979). Constructs exhibit convergent validity by having an average variance extracted (AVE) value greater than 0.50 (Fornell and Larcker 1981). Conversely, discriminant validity measures the degree to which items related to different constructs are differentiated from each other (DeVellis 2012). It is established when variance shared between constructs does not exceed the corresponding constructs' AVEs. (Fornell and Larcker 1981). Correlations amongst the latent constructs in this study (Table 4.11) indicate that all the constructs meet the set criteria for validity.

Table 4.11 Individual-level Construct Intercorrelations

	Factor	Mean	S.D.	AVE	C.R.	1	2	3	4	5	6
1	NA	2.08	1.20	.821	.958	**.906**					
2	PA	3.67	1.05	.751	.947	-.163	**.867**				
3	Ap	3.47	1.02	.746	.921	-.222	.568	**.864**			
4	CE	3.51	1.07	.647	.844	-.368	.456	.460	**.804**		
5	MS	4.17	.78	.760	.927	-.074	.327	.418	.438	**.872**	
6	intadpt	4.26	.62	.915	.977	-.132	.309	.377	.431	.513	**.957**

Items were measured on a 5 points likert scale (e.g., from 1= Strongly Disagree to 5= Strongly Agree). Bolded values in the diagonal are each construct's AVE (Average Variance Extracted)

NA – Negative Affect PA – Positive Affect Ap – Appropriateness
CE – Change Efficacy MS – Management Support intadpt – Intention to adopt

Following EFA and CFA, a summary of the constructs and their indicators is presented (Table 4.12) with key reliability and validity indices.

Table 4.12 Composite Reliability and Standardized Factor Loadings

	S. F. L.	t value
Negative Affect ρ = .958		
Think about the negative outcomes you anticipate due to the changes introduced by the ICMS. To what extent do you feel;		
Worried?	.931	**
Uncomfortable?	.860	27.06
Nervous?	.922	32.99
Afraid?	.900	30.53
Scared?	.915	32.08
Positive Affect ρ = .947		
Think about the positive outcomes you anticipate due to the changes introduced by the ICMS. To what extent do you feel;		
Interested?	.798	**
Optimistic?	.876	20.73
Confident?	.822	18.94
Excited?	.882	20.90
Enthusiastic?	.936	22.82
Delighted?	.877	20.73

Table 4.12 (Continued)

Appropriateness ρ = .921		
Regarding the appropriateness of the changes:		
In the long run, I feel it will be worthwhile if [the agency] implements these changes	.883	**
I think [the agency] will benefit from these changes	.922	27.19
These changes will improve [the agency's] efficiency	.885	25.11
There are rational reasons for these changes to be made	.755	18.76
Change Efficacy ρ = .844		
Thinking about my ability to handle these changes;		
I do not anticipate any problems adjusting to the work I will have when these changes are adopted	.783	**
When we implement these changes I feel I can handle them with ease	.911	17.57
I have the skills needed to make these changes work	.705	14.40
Management Support ρ = .927		
In relation to [the agency] management's support for the changes;		
Senior management is committed to these changes	.908	**
Senior leaders have encouraged me to embrace these changes	.883	26.34
Top decision makers have put their support behind the change effort	.811	22.06
Most senior managers have stressed the importance of the changes	.881	26.20
Intention to Adopt ρ = .977		
In view of everything you know about the WIOA Smart Start Integrated Case Management System (ICMS)…		
…I am willing to adopt the new ICMS features when implemented in [the agency's legacy system]	.925	**
…I predict that I will use the new ICMS features when implemented in [the agency's legacy system]	.950	37.61
…I expect that I would use the new ICMS features when implemented in [the agency's legacy system]	.966	40.26
…I intend to use the new ICMS features when implemented in [the agency's legacy system]	.984	43.68
Model Fit Statistics - $\chi 2$= 599.168; DF= 282; CFI= 0.971; NFI= 0.947; RMSEA= 0.053. S.F.L. = Standardized Factor Loading, ρ = Composite Reliability, ** denotes a constrained relationship to 1.00 for identification purposes		

Workgroup-level Constructs

The steps followed with the pilot data to ascertain emergence of the workgroup-level constructs, and to establish evidence of reliability and validity (using the various agreement and reliability indices), are employed for the main study data.

Intraclass Correlation Coefficients

To ascertain the reliability of workgroup-level constructs, intraclass correlation coefficients were calculated using the same approach as with the pilot study data.

Table 4.13 Main Study Type 1 ICCs For Workgroup-level Constructs

Construct		ICC(1)	ICC(2)
RNA	Referent-shift Negative Affect	.10	.31
RPA	Referent-shift Positive Affect	.13	.38
RAP	Referent-shift Appropriateness	.13	.37
RCE	Referent-shift Change Efficacy	.16	.43
RMS	Referent-shift Management Support	.16	.44

All ICCs are within the recommended ranges and therefore there is evidence of (a) non-independence as shown by ICC(1)s within .05 and .20, and (b) initial indication of reliable measurement of workgroup-level constructs. With evidence of the emergence of workgroup-level constructs, their reliability (consistency and agreement) is assessed using the two-way random effects ICCs. Table 4.14 and Table 4.15 represent SPSS results for single measurement and average measurement respectively.

Table 4.14 Two-way Random Effects ICC – Single Measures

Construct	ICC(C,1)*	95% Confidence Interval		ICC(A,1)**	95% Confidence Interval	
		Lower Bound	Upper Bound		Lower Bound	Upper Bound
Referent-shift Negative Affect	.814	.789	.837	.808	.781	.832
Referent-shift Positive Affect	.813	.788	.836	.801	.771	.829
Referent-shift Appropriateness	.750	.716	.781	.747	.712	.779
Referent-shift Change Efficacy	.636	.588	.682	.580	.450	.677
Referent-shift Management Support	.817	.791	.842	.818	.791	.842

*Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance. **Type A intraclass correlation coefficients using an absolute agreement definition. (See APPENDIX B for further details)

Table 4.15 Two-way Random Effects ICC – Average Measures

Construct	ICC(C,k)*	95% Confidence Interval		ICC(A,k)**	95% Confidence Interval	
		Lower Bound	Upper Bound		Lower Bound	Upper Bound
Referent-shift Negative Affect	.963	.957	.969	.962	.955	.968
Referent-shift Positive Affect	.963	.957	.968	.960	.953	.967
Referent-shift Appropriateness	.923	.910	.935	.922	.908	.934
Referent-shift Change Efficacy	.840	.811	.865	.805	.710	.863
Referent-shift Management Support	.947	.938	.955	.947	.938	.955

*Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance. **Type A intraclass correlation coefficients using an absolute agreement definition. (See APPENDIX B for further details)

Similar to the pilot data results, referent-shift Change Efficacy has low reliability scores under single measurement. Others are within the 0.7 threshold (Lance et al. 2006). The lowest ICCs calculated with the average measurement is 0.805 which is well above the 0.70 threshold.

Within-Group Agreement

Preceding steps have provided evidence of the emergence of workgroup-level constructs (e.g., confirmation of non-independence) and therefore justification for aggregation, and the reliability of each construct's measurement. Within-group agreement provides evidence of validity (Chen et al. 2004; LeBreton et al. 2003; LeBreton and Senter 2007).

Table 4.16 Within-group Agreement Index – $r_{WG(j)}$

Construct	$r_{WG(j)}$
Referent-shift Negative Affect (NWA)	.711
Referent-shift Positive Affect (PWA)	.711
Referent-shift Appropriateness (WAP)	.854
Referent-shift Change Efficacy (WCE)	.851
Referent-shift Management Support (WMS)	.898

A rectangular uniform null distribution (James et al. 1993; LeBreton and Senter 2007) was used to calculate the $r_{WG(j)}$ index for each workgroup-level construct (Table 4.16). All of them are above the 0.70 threshold (George 1990; James et al. 1984; Nunnally 1978); this indicates that valid constructs have emerged.

Hierarchical Linear Model Analyses

To address the research questions posed in Chapter I, a multilevel perspective is required and, accordingly, data were collected from 401 employees who are nested within

99 workgroups. The average group size is 4.1, which is comparable to other multilevel studies (Maas and Hox 2005; Vardaman et al. 2016). After confirming the reliability and validity of the measurements, and emergent constructs, the structural relationships hypothesized in the research model are now tested by assessing parameters estimated from fitting the data into different models.

Hierarchical Linear Model results address within-group and between-group regression simultaneously, thereby facilitating a micro-view while paying attention to the macro effects (Klein and Kozlowski 2000a; Kozlowski and Klein 2000). To statistically achieve that goal from the data set obtained for this study, predictor variables were added to the fully unconditional model (Model 1) to result in a series of subsequent models with (a) individual-level factors and (b) workgroup-level factors to produce the full model (Model 4). From Model 4, additional models are systematically fitted by elimination of nonsignificant factors to arrive at a model with significant predictors only – at both levels.

Centering the Individual-level Variables

Appropriately centering Level 1 predictors is vital to the interpretation of intercept and slope parameters (Enders and Tofighi 2007). There are three ways of centering variables – Raw metric (RAS), grand mean centering (CGM) and group mean centering (CWC). Centering is achieved by subtracting the mean (group- or grand-mean) score from the original X scores, and each approach "partitions the relationship between X and Y ways that produce different interpretations of the MLM parameters" (Enders and Tofighi 2007, p. 123). The intercept variance and meaning of the intercept differs with the choice of centering approach (Hofmann and Gavin 1998; Snijders and Bosker 1999).

Using CGM yields composite variables that contain both within- and between cluster variations. The resulting scores are therefore correlated with variables at both levels of the hierarchy. This serves to confound the CGM estimates of the intercept and slope variance, making the interpretation of the slope variance ambiguous (Enders and Tofighi 2007). Interpretation of the slope variance is important when assessing interactions effects. Since the Research Questions in this study address main effects only, all level 1 predictors – apart from the control variable 'gender' (GEN) – will be centered on the grand mean. Gender will be uncentered because there is no theoretical basis for alternative centering.

Models and Analyses

The fully unconditional model (Model 1 on Table 4.17) results from fitting data into a one-way random effects ANOVA model which involves the outcome variable (intention to adopt new ICMS features) and no predictor variables. Here, the level-1 model for individual *i* in workgroup *j*, and the level-2 model for the intercept are:

$$intadpt_{ij} = \beta_{0j} + r_{ij} \quad (4.1)$$

$$\beta_{0j} = \gamma_{00} + u_{0j} \quad (4.2)$$

In these analyses it is assumed that all residuals (individual- and workgroup-level) are mutually independent and have population means of zero.

The individual-level residual is $r_{ij,}$ (Equation 4.1), and its variance component is σ^2, while the workgroup-level residual is u_{0j}, (Equation 4.2). The variance component related to σ^2 is τ^2. HLM has two methods for estimating these parameters: Maximum Likelihood (ML) and Restricted Maximum Likelihood (REML). ML is used to estimate variance components in this study because "the ML approach has many desirable

properties: Parameter estimates are consistent and asymptotically unbiased" (Raudenbush and Bryk 2002, p. 13).

The two variance components obtained in Equation 4.1 and 4.2 are used to calculate the ICC (ρ) associated with the fully unconditional model (Equation 4.3). This Type 1 ICC serves two main purposes: (a) to measure the reliability associated with a single assessment of the group mean, and (b) to assess non-independence. A nonzero ICC indicates that group membership affects lower-level observations (i.e., 'cluster effect'). It is the proportion of variance in the outcome that is between groups (Raudenbush and Bryk 2002), and represents the theoretically maximal amount of the total variance in the outcome variable explained by all the group-level factors (Snijders and Bosker 1999).

$$\text{ICC } (\rho) = \tau^2_{00}/(\sigma^2+\tau^2_{00}) \qquad (4.3)$$

$$= .011/(.343+.011)$$

$$= 3\%$$

A positive ICC from Equation 4.3 indicates the presence of 'cluster effects' i.e., workgroups have an effect on the individuals responses to the outcome variable. Cluster effect violates OLS assumptions and hierarchical linear modeling is therefore warranted.

Table 4.17 Summary of HLM Models Fitted and Results

Fixed Effects	Model1	Model2	Model3	Model4	Model5
Individual-level Variables					
Intercept, γ_{00}	4.26***(.03)	4.18***(.11)	4.25***(.02)	4.25***(.02)	4.25***(.02)
Positive Affect			.03 (.04)	.04 (.04)	
Negative Affect			-.007 (.03)	-.009 (.03)	
Appropriateness			.11*(.05)	.12*(.04)	.13**(.04)
Management Support			.29***(.05)	.28***(.05)	.27***(.05)
Change Efficacy			.15***(.04)	.15***(.05)	.17***(.04)
Tenure		.006*(.002)	.005*(.002)	.005*(.002)	.005*(.002)
Level of Education		.005 (.01)			
Male gender		.051 (.15)			
Female gender		.169 (.12)			
Cross-level Effects of Workgroup-level Variables on the Intercept β_0					
Negative Workgroup Affect				-.02 (.02)	
Positive Workgroup Affect				-.05* (.02)	-.06**(.02)
Workgroup Appropriateness				.03 (.03)	
Workgroup Management Support				.1**(.04)	.09**(.04)
Workgroup Change Efficacy				-.01 (.05)	

Model fit Stats.	Model1	Model2	Model3	Model4	Model5
Deviance	719.81	712.32	567.41	555.43	558.06
Parameters	3	7	9	14	
Δ Deviance from previous model		-7.49	-144.91***	-11.98**	

Model1: fully unconditional model; Model2: demographic covariates model; Model3: individual level factors added to significant demographic covariates; Model4: workgroup-level covariates added to model3; Model5: model with only significant individual- and workgroup-level predictors. *p<0.05;**p<0.01; ***p<0.001; Standard errors in parentheses.

Model 2 is fitted with demographics data (control variables) to test whether the control variables play a role in explaining variance is the outcome variable. Demographic measured for this study include – tenure (TEN), years of formal education (EDU), two dummy variables for gender (MALE and FEMALE), and "prefer not to respond" (PNR). Only MALE and FEMALE are included in the model, as PNR is used as the base

category. A majority of the demographic covariates have non-significant *p* values, and are therefore excluded from subsequent model(s). Only tenure influenced intention to adopt and is retained for the rest of the analyses.

For Model 3, individual-level cognitive and affective change readiness variables are added at level 1. After running the model, the *p* value of changes in deviance and number of parameters estimated indicates a significant improvement (p=0.00). To proceed with analysis, variables with insignificant *p* values are ordinarily excluded from subsequent models. In this case however, all the level 1 variables are retained to test whether the referent-shift variables (added in subsequent models) have significant influence on intercepts and slopes of the level 1 variables' (Snijders and Bosker 1999).

In Model.4, both individual- and workgroup-level variables are included. Iterations of this model are fitted as variables whose coefficients have *p* values greater than 0.100 are methodically excluded. Insignificant referent-shift variables are eliminated first and then level-1 variables. The process leads to the final model which has only variables with significant *p* values at both levels (Model 5).

A comparison of the deviance and number of parameters estimated between Model 4 and Model 5 does not indicate a significant improvement (p=0.75). However, Model 5 is a parsimonious representation of factors that explain the relationship between the predictor variables and the outcome variable.

For each of the four last models, covariate slopes of level 1 variables (u_1, u_2, u_3, u_4, u_5 and u_6) were fixed to zero. Fixing the error terms to zero is not only consistent with the research model, it also improves model stability by reducing the number of parameters to be estimated. Goodness of fit statistics were attained by comparing changes

in deviance and the number of parameters estimated from one model to the next. The Soper (2017) 'online *p* value calculator for a chi-square test' was used to calculate *p* values related to those changes.

CHAPTER V

DISCUSSION OF RESULTS AND CONCLUSIONS

This study sought to address two research questions: (1) to what extent do individual-level cognitive and affective change readiness influence intention to adopt a new system, and (2) to what extent do workgroup-level cognitive and affective change readiness influence intention to adopt a new system?

The reliability of measurements for the latent variable at both individual- and workgroup-levels was established and the validity of those variables confirmed, and then data were fitted to a series of nested HLM models to assess multilevel results and indices.

First, the fully unconditional model was run to determine whether there was any cluster effects. The results (Table 4.17) show that 3% of the variance in the outcome variable is between groups and, as such, there is evidence that employees are influenced by the workgroups in which they are nested. Therefore, hierarchical linear modeling appropriately analyzes the data to yield results that sufficiently address the Research Questions posed by this study. The results support hypothesized relationships to varying degrees.

Model 5 results indicate that individuals' intention to adopt is influenced by both cognitive and affective change readiness. Some referent-shift cognitive and affective change readiness factors are also shown to have significant impact on the outcome variable. However, affective change readiness has no significant impact at individual-

level, while cognitive change readiness is shown to play a role at the individual-level only.

Discussion of Results

Model 1 – the fully unconditional model – estimated three key parameters: the intercept (γ_{00}=4.26), the variance of the intercept slope (τ^2_{00}=0.011), and the variance of level-1 residual (σ^2=0.343). From these parameters, it can be deduced that the average score of the outcome variable (intention to adopt new ICMS features) is 4.26 (i.e., on the Likert type scale used to collect data, a respondent drawn randomly from the population of respondents will have answered "strongly agree"). It can further be deduced from the ICC of 3% that the variation in responses is attributable to groups. This indicates that most of the variation in intention to adopt is within groups, rather than between groups.

The second model tests whether demographics (control variables) play a role in explaining variance in the outcome variable. Demographics measured for this study include tenure (the average tenure computed from the main study data is 14.7 years), level of education (a majority of the respondents had at least high school education), and gender (the majority of respondents were female). Education and gender are not significant and although tenure is significant in Model 2, its importance diminished as more predictors were added. In the final model, it is significant at 10% level but its coefficient and standard errors are very low and, as such, deemed not relevant.

Model 3 treats all individual level predictors and its results are similar to an OLS regression. The results of this model answer Research Question 1. Individual-level affective change readiness is found not to significantly influence intention to adopt the new ICMS features. Based on their coefficients, the individual-level cognitive change

readiness dimensions impact intentions to adopt to different extents: management support has the greatest impact (γ_{40}=0.30, p<0.001), while change efficacy (γ_{50}=0.15, p<0.001) and appropriateness (γ_{30}=0.11, p=0.03) have lesser influence.

Although individual-level affective change readiness is found to be insignificant in Model 3, the variables have to be included in Model 4 in order to assess whether workgroup-level constructs have any significant influence on them (Snijders and Bosker 1999). Model 4 is the full model that includes predictor variables at both levels and seeks to address Research Question 2.

A series of submodels are fitted from Model 4 by methodically eliminating factors whose *p* values are greater than .100 until a model consisting of significant factors only (Model 5) is derived. Consistent with observation from the individual-level model, all the affective change readiness constructs drop out of the model as their influence on the outcome is reported as insignificant.

The final results model (Model 5), explains the outcome variable for a randomly selected individual *i* from a randomly selected workgroup *j*. Intention to adopt (γ_{00}=4.25, p<0.001) has a standard error of .03 which indicates that, within 95% confidence interval, the average intadpt scores are ($4.19>\gamma_{00}<4.31$). This corresponds to “agree” on the Likert scale used in the survey. The variance in intention to adopt is explained by both individual- and workgroup-level cognitive change readiness factors.

To assess the effect of individual-level predictors, we examine their level 2 gamma (γ) coefficient values which represent the fixed regression slope across workgroups. For instance, management support (γ_{20}=0.28, p<0.001) has the greatest impact. This means that for an average employee in an average workgroup, every unit

change in management support score, their intention to adopt score increases by 0.28. For change efficacy (γ_{30}=0.17, p<0.001), a unit change in change efficacy score leads to a 0.17 change in their intention to adopt score. Similar interpretation can be made for appropriateness (γ_{10}=0.13, p=0.002). These results support H1a – c.

Two workgroup-level (referent-shift) change readiness constructs have significant impact on intention to adopt: workgroup management support (γ_{02}=0.09, p=0.009) and workgroup positive affect (γ_{01}=-0.06, p=0.006). This means that the average workgroup management support and positive workgroup affect are important factors in the within-group process associated with average intention to adopt. In this case, workgroup management support has a positive association with intention to adopt. Given the data set in this study, the average intention to adopt score of all individuals in group *j* will increase by 0.09 for every unit increase in workgroup management support score.

Positive workgroup affect has a negative relationship with the outcome variable, i.e., the average intention to adopt score of all individuals in group *j* will decline by 0.06 for every unit increase in positive workgroup affect score. The direction of this relationship is unexpected and not in line with H3a. It can be interpreted that individuals intend to adopt the new features despite other members of their workgroups not being excited about the changes, or vice versa.

Ten relationships were hypothesized. This study found support for four of the hypotheses (Table 5.1). The three hypotheses that postulate the individual-level relationship between cognitive change readiness and intention to adopt (H1) were fully supported. This is in line with extant literature (Armenakis et al. 2000; Armenakis et al.

1993; Holt et al. 2007; Holt et al. 2010; Holt and Vardaman 2013; Rafferty et al. 2013) that relates cognitive change readiness and various types of behavior and outcomes.

Table 5.1 Support for Hypothesized Relationships

Hypothesis			Supported?
H1	1a	Appropriateness is positively associated with intention to adopt new ICMS features	YES
	1b	Management Support is positively associated with intention to adopt new ICMS features	YES
	1c	Change Efficacy is positively associated with intention to adopt new ICMS features	YES
H2	2a	Positive Affect is positively associated with intention to adopt new ICMS features	NO
	2b	Negative Affect is negatively associated with intention to adopt new ICMS features	NO
H3	3a	Positive Workgroup Affect is positively associated with intention to adopt new ICMS features	NO
	3b	Negative Workgroup Affect is negatively associated with intention to adopt new ICMS features	NO
H4	4a	Workgroup Appropriateness is positively associated with intention to adopt new ICMS features	NO
	4b	Workgroup Management Support is positively associated with intention to adopt new ICMS features	YES
	4c	Workgroup Change Efficacy is positively associated with intention to adopt new ICMS features	NO

Cognitive change readiness at the workgroup-level (H4) received partial support. Workgroup management support (H4b) was supported but workgroup appropriateness (H4a) and workgroup change efficacy (H4c) did not influence individual's intentions to adopt. Although further scrutiny is necessary, tenure is a plausible reason that could explain why change efficacy was insignificant. The average tenure in the survey sample was 14.7 years. With such a high level of retention individuals in workgroups have learned to work together and, furthermore, this might not be the first time they are going through organizational change together. As such, they are confident in each other's

ability to carry out work related tasks and processes to an extent that the "belief that other members of the workgroup can successfully implement the change" might not significantly influence their decisions about the change – e.g., the adoption of new features.

Hypotheses related to affective change readiness (H2 at individual-level, and H3 at workgroup-level) were not supported. Although their validity was confirmed, the constructs related to affect were found to have insignificant influence on intention to adopt. H3a postulated a positive relationship between positive workgroup affect and intention to adopt the new ICMS features, but a negative one was found. Although this could be noise in the data without any practical significance, it could also be a consequence of the workgroup environment.

The results from this study are generalizable to state departments that will be adopting the new ICMS features, and can be used to explain how change readiness will influence the intention to adopt new features.

Theoretical Contribution

Extant organizational behavior literature calls for change readiness to be treated as multilevel and multidimensional (Bouckenooghe 2010; Bouckenooghe et al. 2009; Rafferty et al. 2013). This dissertation contributes to theory by empirically testing change readiness as a multilevel construct that constitutes both the cognitive and affective dimensions. It establishes evidence of the reliability of the scales used to capture change readiness and validity of the individual- and workgroup-level constructs, thereby conforming the multilevel nature of change readiness.

Further, this study commences the process of testing the multilevel framework of antecedents and consequences of change readiness as proposed by Rafferty et al. (2013). Apart from providing the basis of conceptualizing a multidimensional and multilevel change readiness construct, Rafferty et al. (2013) note the dearth of research that addresses outcomes of change readiness. The positive association between cognitive change readiness and intention to adopt underscores the relationship between attitudes and intentions as postulated by the Theory of Reasoned Action. This study therefore contributes to theory by conceptualizing and empirically testing intention to adopt as an outcome of change readiness.

Extant IS literature calls for alternatives to TAM and its derivatives such as TAM2, TAM3, UTAUT (Benbasat and Barki 2007; Chuttur 2009). This dissertation presents change readiness as an alternative lens through which adoption of information systems can be viewed. Unlike the existing points of view, change readiness addresses adoption from a pre-implementation perspective, an angle not previously addressed.

The insignificance of affective change readiness variables might have a theoretical implication. It is plausible that the construal level theory of psychological distance (Trope and Liberman 2010; Williams et al. 2014) influences change readiness over time. The survey was administered more than six months before the expected implantation when users can actually interact with the new features, thus creating a psychological distance.

In order to relate to future events, respondents would have to transcend the here and now – a process that entails mental construal – and the farther removed an object is from direct experience, the higher (more abstract) the level of construal of that object

(Trope and Liberman 2010, p. 440). Further, Bouckenooghe et al. (2009) note the assumption that, "intentional, cognitive, and affective reactions toward change come into play at different stages in the change process, and do not necessarily coincide." These factors might have confounded respondents' assessment of their feeling regarding the change process.

Practical Implications

For organizations to successfully transition from one way to another way of doing things, change must include people's attitudes and behavior (Kotter and Cohen 2002). Readiness to change gives managers an indication of the extent to which employees are likely to embrace the new way of doing things. Assessing employees' attitudes before implementation of the actual change is beneficial to organizations because (a) impediments to change can be identified and addressed before investments are made and (b) after assessing change readiness, change messages can be tailored to specific concerns thereby increasing the chances of successful transition.

This study found that individuals' perceptions of the extent to which management supports the change, appropriateness of the changes, and their ability to do what is needed to achieve the change are important factors that influence their intentions to adopt the new ICMS features. However, employees' thoughts regarding other members of their workgroup had limited and unexpectedly negative influence on intentions to adopt the new ICMS features. Workgroup management support was found to influence the outcome variable, but neither workgroup change efficacy nor workgroup appropriateness were significant. As such, organizations which are implementing change should ensure

that managers consistently show their support to positively influence employees' intentions to adopt the change.

Cross-level Effects

A positive association between positive workgroup affect and intention to adopt new ICMS features was stipulated because intention to adopt is likely to increase with the individual's thought that other members of the workgroup are excited, and look forward to the change. However, a negative relationship (-.06, p=0.006) was found. This anomaly is both unexpected and worthy of further scrutiny.

It appears that individuals are – at a personal level – excited about the change and they intend to adopt the new features. However, they don't think other members of their workgroups are as excited about the change. This disparity potentially indicates two phenomena: (1) social desirability bias (Podsakoff and Organ 1986; Ross et al. 1977) where individuals don't want to admit to something that is viewed as socially unacceptable and (2) revelation of a precursor to what Marakas and Hornik (1996) refer to as "Passive Resistance Misuse (PRM)" and define it as "a recalcitrant, covert behavior resulting from both fear and stress stemming from the intrusion of the technology into the previously stable world of the user (p. 209)."

Similar disparities that emerge as a result of comparing individuals to members of their workgroup have been found in other contexts. For instance, to demonstrate how members of a group affect individuals, Stouffer et al. (1949) found that;

> "inexperienced soldiers in veteran units were less likely to say that they were ready for combat than inexperienced soldiers in inexperienced units – an indication of the influence of the veterans (who generally said the inexperienced

soldiers were not ready for combat) on the inexperienced soldiers" (Firebaugh 1980, p. 45)

In order to reduce the covert recalcitrance, which could lead to maladaptive behavior after the system is implemented (Marakas and Hornik 1996), management needs to be aware of this disparity and address it before implementing the new features. Positive workgroup affect could be improved by introducing activities such as focus groups or targeted communication to get employees excited about the change.

Unlike positive workgroup affect, workgroup management support - the other significant cross-level effect in this study, is consistent with theory. Its effect also corresponds with individual level. This implies that management support plays an important role – both as individuals and within workgroups – in shaping individuals' view of the change and ultimately their intentions to adopt.

Limitations and Future Research

This study is not without limitations. First, change readiness might be mediating the effect of its antecedents and outcomes (in this case intention to adopt). The influence of those antecedents on intention to adopt should be investigated in future research. Some of the antecedents identified in Rafferty et al. (2013) include internal enablers, external pressures, and personal characteristics.

The effects of change readiness on adoption might not remain static through the technology adoption phases; for example, "relationships between phenomena at different levels may prove bidirectional or reciprocal" (Kozlowski and Klein 2000, p. 22). As such, the notion of time represents an important contribution of the process because of "the dynamic and continuous nature of change" (Stevens 2013, p. 347). We expect that

future studies will take a longitudinal view to assess how the influence of change readiness differs though adoption phases since it is very likely that individuals and workgroups may develop readiness differently across changing conditions.

A major assumption that underlies this dissertation is that "most human social behavior is under volitional control and, hence, can be predicted from intentions alone." (Ajzen 2002, p. 666). Furthermore, the intention to adopt is an important predictor of adoption because "if we do not succeed in changing the intention, we cannot expect a change in behavior" (Ajzen and Fishbein 1980, p. 81). However, work environment factors such as internal enablers, social influence, and beliefs are possible antecedents of change readiness factors.

Consistent with Yang and Yoo (2004) who didn't find support for affective attitude when they retested TAM, in this study affect seems to have insignificant influence on intention to adopt. Future research is required to ascertain whether this finding is a result of construal effects of psychological distance (Trope and Liberman 2010; Williams et al. 2014). Given that implementation is more than six months out, users' emotions might not be at play compared to if implementation was planned within a shorter period of time where their emotions would be crystalizing. Future research should conduct longitudinal studies to determine if indeed users' emotions change with implementation time.

The negative relationship between positive workgroup affect and intention to adopt found in this study is discussed as a precursor to PRM (Marakas and Hornik 1996). More studies are required to replicate it, and explore its nature, theoretical underpinning and whether it is indeed related to social desirability bias and PRM. Further, PRM is a

post-implementation phenomenon and, future research should therefore strive to establish the relationship between intention to adopt (in the pre-implementation phase) and PRM.

This dissertation focuses on main effects of the workgroup-level on individual-level relationships, and yet workgroup factors might also have interaction effects on some of the individual-level relationships. Future research should review appropriate theories in group dynamics – such as social exchange theory (Bearman 1997; Emerson 1976), social conformity (Bernheim 1994; Warren 1969), – that might provide sound conceptual foundation to explicate interaction effects.

Post-implementation studies are also necessary to measure actual behavior. The temptation toward social bias is a major liability of planned change (Weick 2000). The outcome variable here is a behavioral intention which, although appropriate for this pre-implementation phase, might be prone to recent criticisms of the assumption that intentions automatically lead to behavior (Sutton 1998). Confounding factors such as the stability of intention over time, anticipated regret, and past behavior have been found to moderate and/or mediate the relationship between intention and behavior (Sheeran and Abraham 2003). Future research should therefore relate change readiness and intention to adopt to actual behavior. Such an endeavor would call for a longitudinal study because change readiness and intention to adopt are in the pre-implementation phase while actual behavior manifest post-implementation.

Idiosyncrasies of the study context, (e.g., the average of 14 years tenure in this study) might affect the results and therefore generalizability of the findings. The Workforce Innovation and Opportunity Act is being implemented nationally and future

research should include more states/and contexts. Studying other states might help eliminate the effects of the context/state idiosyncrasies in this study.

REFERENCES

Agarwal, R., and Prasad, J. (1997). The Role of Innovation Characteristics and Perceived Voluntariness in the Acceptance of Information Technologies. *Decision Science, 28*(3), 557-582.

Ajzen, I. (1987). Attitudes, Traits, and Actions: Dispositional Prediction of Behavior in Personality and Social Psychology. *Advances in Experimental Social Psychology, 20*(1), 1-63.

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Ajzen, I. (2002). Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology, 32*(4), 665-683.

Ajzen, I., and Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behaviour*. Englewood Cliffs, NJ: Prentice-Hall Inc.

Anderson, J. C., and Gerbing, D. W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin, 103*(3), 411-423.

Armenakis, A. A., Harris, S. G., and Feild, H. S. (2000). Making Change Permanent a Model for Institutionalizing Change Interventions. *Research in Organizational Change and Development, 12*, 97-128.

Armenakis, A. A., Harris, S. G., and Mossholder, K. W. (1993). Creating Readiness for Organizational Change. *Human Relations, 46*(6), 681-703.

Armitage, C. J., and Conner, M. (1999). The Theory of Planned Behaviour: Assessment of Predictive Validity and Perceived Control. *British Journal of Social Psychology, 38*(1), 35-54.

Bagozzi, R. P. (1981). Attitudes, Intentions, and Behavior: A Test of Some Key Hypotheses. *Journal of Personality and Social Psychology, 41*(4), 607-627.

Bagozzi, R. P. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift. *Journal of the Association for Information Systems, 8*(4), 244-254.

Bagozzi, R. P., and Yi, Y. (1989). The Degree of Intention Formation as a Moderator of the Attitude-Behavior Relationship. *Social Psychology Quarterly, 52*(4), 266-279.

Barbour, J. B., and Lammers, J. C. (2015). Measuring Professional Identity: A Review of the Literature and a Multilevel Confirmatory Factor Analysis of Professional Identity Constructs. *Journal of Professions and Organization, 2*(1), 38-60.

Barsade, S. G. (2002). The Ripple Effect: Emotional Contagion and Its Influence on Group Behavior. *Administrative Science Quarterly, 47*(4), 644-675.

Bartel, C. A., and Saavedra, R. (2000). The Collective Construction of Work Group Moods. *Administrative Science Quarterly, 45*(2), 197-231.

Bartko, J. J. (1976). On Various Intraclass Correlation Reliability Coefficients. *Psychological Bulletin, 83*(5), 762-765.

Baumgartner, H., Pieters, R., and Bagozzi, R. P. (2008). Future-Oriented Emotions: Conceptualization and Behavioral Effects. *European Journal of Social Psychology, 38*(4), 685-696.

Bausch, K. C. (2002). Roots and Branches: A Brief, Picaresque, Personal History of Systems Theory. *Systems Research and Behavioral Science, 19*(5), 417-428.

Bearman, P. (1997). Generalized Exchange. *American journal of sociology, 102*(5), 1383-1415.

Bélanger, F., Cefaratti, M., Carte, T., and Markham, S. E. (2014). Multilevel Research in Information Systems: Concepts, Strategies, Problems, and Pitfalls. *Journal of the Association for Information Systems, 15*(9), 614-650.

Benbasat, I., and Barki, H. (2007). *Quo Vadis*, Tam? *Journal of the Association for Information Systems, 8*(4), 211-218.

Bernheim, B. D. (1994). A Theory of Conformity. *Journal of Political Economy, 102*(5), 841-877.

Bhattacherjee, A. (2001). Understanding Information Systems Continuance: An Expectation-Confirmation Model. *MIS Quarterly, 25*(3), 351-370.

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices*. Open Access Textbooks: Book 3.

Bhattacherjee, A., and Premkumar, G. (2004). Understanding Changes in Belief and Attitude toward Information Technology Usage: A Theoretical Model and Longitudinal Test. *MIS Quarterly, 28*(2), 229-254.

Bliese, P. D. (1998). Group Size, Icc Values, and Group-Level Correlations: A Simulation. *Organizational Research Methods, 1*(4), 355-373.

Bliese, P. D. (2000). Within-Group Agreement, Non-Independence, and Reliability: Implications for Data Aggregation and Analysis. In K. J. Klein and S. W. J. Kozlowski (Eds.), *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions* (pp. 349-381). San Francisco, CA: Jossey-Bass.

Bollen, K., and Lennox, R. (1991). Conventional Wisdom on Measurement: A Structural Equation Perspective. *Psychological Bulletin, 110*(2), 305-314.

Bouckenooghe, D. (2010). Positioning Change Recipients' Attitudes toward Change in the Organizational Change Literature. *The Journal of Applied Behavioral Science, 46*(4), 500-531.

Bouckenooghe, D., Devos, G., and Van den Broeck, H. (2009). Organizational Change Questionnaire–Climate of Change, Processes, and Readiness: Development of a New Instrument. *The Journal of Psychology, 143*(6), 559-599.

Breckler, S. J., and Wiggins, E. C. (1989). Affect Versus Evaluation in the Structure of Attitudes. *Journal of Experimental Social Psychology, 25*(3), 253-271.

Bridges, W. (1991). *Managing Transitions: Making the Most of Change*. Reading, MA: Addison-Wesley.

Bryk, A. S., and Raudenbush, S. W. (1992). *Hierarchical Linear Models*. Thousand Oaks, CA: Sage.

Bryk, A. S., Raudenbush, S. W., Seltzer, M., and Congdon, R. (1988). An Introduction to Hlm: Computer Program and Users Manual. *Chicago: University of Chicago Department of Education*.

Burton-Jones, A., and Gallivan, M. J. (2007). Toward a Deeper Understanding of System Usage in Organizations: A Multilevel Perspective. *MIS Quarterly, 31*(4), 657-679.

Campbell, D. T., and Fiske, D. W. (1959). Convergent and Discriminant Validation by the Multitrait-Multimethod Matrix. *Psychological Bulletin, 56*(2), 81-105.

Chan, D. (1998). Functional Relations among Constructs in the Same Content Domain at Different Levels of Analysis: A Typology of Composition Models. *Journal of Applied Psychology, 83*(2), 234-246.

Chen, E., and Weber, I. (2006). Assessment of an Electronic Auction System: Beliefs About Usage, System and Institutions on Intention to Use. *Proceedings of Group Decision and Negotiation*, 106-107.

Chen, G., Mathieu, J. E., and Bliese, P. D. (2004). A Framework for Conducting Multi-Level Construct Validation. In F. J. Yammarino and F. Dansereau (Eds.), *Multi-Level Issues in Organizational Behavior and Processes* (Vol. 3, pp. 273-303). Oxford, UK: Emerald Group Publishing Limited.

Churchill, G. A. (1979). A Paradigm for Developing Better Measures of Marketing Constructs. *Journal of Marketing Research, 16*(1), 64-73.

Chuttur, M. Y. (2009). Overview of the Technology Acceptance Model: Origins, Developments and Future Directions. *Working Papers on Information Systems, 9*(37), 9-37.

Coch, L., and French, J. J. R. (1948). Overcoming Resistance to Change. *Human Relations, 1*(4), 512-532.

Cooper, R. B., and Zmud, R. W. (1990). Information Technology Implementation Research: A Technological Diffusion Approach. *Management Science, 36*(2), 123-139.

Cortina, J. M. (1993). What Is Coefficient Alpha? An Examination of Theory and Applications. *Journal of Applied Psychology, 78*(1), 98-104.

Crawford, J. R., and Henry, J. D. (2004). The Positive and Negative Affect Schedule (Panas): Construct Validity, Measurement Properties and Normative Data in a Large Non-Clinical Sample. *British Journal of Clinical Psychology, 43*(3), 245-265.

Crocker, P. R. (1997). A Confirmatory Factor Analysis of the Positive Affect Negative Affect Schedule (Panas) with a Youth Sport Sample. *Journal of Sport & Exercise Psychology, 19*(1), 91-97.

Dansereau, F., Yammarino, F. J., and Kohles, J. C. (1999). Multiple Levels of Analysis from a Longitudinal Perspective: Some Implications for Theory Building. *Academy of Management Review, 24*(2), 346-357.

Davis, F. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 319-340.

Davis, F., Bagozzi, R., and Warshaw, P. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science, 35*(8), 982-1003.

Davis, F. D. J. (1986). *A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results.* Unpublished Doctoral Dissertation, Massachusetts Institute of Technology.

Davis, L. L. (1992). Instrument Review: Getting the Most from a Panel of Experts. *Applied Nursing Research, 5*(4), 194-197.

DeLone, W. H., and McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research, 3*(1), 60-95.

DeLone, W. H., and McLean, E. R. (2003). The Delone and Mclean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems, 19*(4), 9-30.

DeVellis, R. F. (2012). *Scale Development: Theory and Applications* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Dillman, D. A. (1978). *Mail and Telephone Surveys: The Total Design Method*. New York: Wiley.

Dishaw, M. T., and Strong, D. M. (1999). Extending the Technology Acceptance Model with Task–Technology Fit Constructs. *Information & Management, 36*(1), 9-21.

Eby, L. T., Adams, D. M., Russell, J. E., and Gaby, S. H. (2000). Perceptions of Organizational Readiness for Change: Factors Related to Employees' Reactions to the Implementation of Team-Based Selling. *Human Relations, 53*(3), 419-442.

Emerson, R. M. (1976). Social Exchange Theory. *Annual review of sociology, 2*(1), 335-362.

Enders, C. K., and Tofighi, D. (2007). Centering Predictor Variables in Cross-Sectional Multilevel Models: A New Look at an Old Issue. *Psychological Methods, 12*(2), 121-138.

Finch, W. H., Bolin, J. E., and Kelley, K. (2014). *Multilevel Modeling Using R*. Boca Raton, FL: CRC Press.

Firebaugh, G. (1980). Groups as Contexts and Frog Ponds. In H. R. Karlene and B. Leigh (Eds.), *Issues in Aggregation: New Directions for Methodology of Social and Behavioral Science* (Vol. Number 6 1980, pp. 43-52). San Francisco: Jossey-Bass Inc.

Fishbein, M., and Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.

Forgas, J. P. (2008). Affect and Cognition. *Perspectives on psychological science, 3*(2), 94-101.

Fornell, C., and Larcker, D. F. (1981). Evaluating Structural Equations Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research, 18*(1), 39-50.

Garver, M. S., and Mentzer, J. T. (1999). Logistics Research Methods: Employing Structural Equation Modeling to Test for Construct Validity. *Journal of Business Logistics, 20*(1), 33-57.

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

George, J. M., and Jones, G. R. (2001). Towards a Process Model of Individual Change in Organizations. *Human Relations, 54*(4), 419-444.

Goodhue, D. L., and Thompson, R. L. (1995). Task-Technology Fit and Individual Performance. *MIS Quarterly, 19*(2), 213-236.

Goodman, J. K., Cryder, C. E., and Cheema, A. (2013). Data Collection in a Flat World: The Strengths and Weaknesses of Mechanical Turk Samples. *Journal of Behavioral Decision Making, 26*(3), 213-224.

Hair, J. F., Anderson, R. E., Ronald, T. L., and William, B. C. (1998). *Multivariate Data Analysis* (5th ed.). Upper Saddle River, NJ: Prentice-Hall Inc.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R., and Tatham, R. E. (2009). *Multivariate Data Analysis*: Upper Saddle River, New Jersey, Pearson Prentice Hall, USA.

Harris, S. G., and Cole, M. S. (2007). A Stages of Change Perspective on Managers' Motivation to Learn in a Leadership Development Context. *Journal of Organizational Change Management, 20*(6), 774-793.

Hattie, J. (1985). Methodology Review: Assessing Unidimensionality of Tests and Ltems. *Applied Psychological Measurement, 9*(2), 139-164.

Henderson, G. M. (2002). Transformative Learning as a Condition for Transformational Change in Organizations. *Human Resource Development Review, 1*(2), 186-214.

Hofmann, D. A., and Gavin, M. B. (1998). Centering Decisions in Hierarchical Linear Models: Implications for Research in Organizations. *Journal of Management, 24*(5), 623-641.

Holt, D. T., Armenakis, A. A., Feild, H. S., and Harris, S. G. (2007). Readiness for Organizational Change the Systematic Development of a Scale. *The Journal of Applied Behavioral Science, 43*(2), 232-255.

Holt, D. T., Helfrich, C. D., Hall, C. G., and Weiner, B. J. (2010). Are You Ready? How Health Professionals Can Comprehensively Conceptualize Readiness for Change. *Journa of General Internal Medicine, 25*(1), 50-55.

Holt, D. T., and Vardaman, J. M. (2013). Toward a Comprehensive Understanding of Readiness for Change: The Case for an Expanded Conceptualization. *Journal of Change Management, 13*(1), 9-18.

Ives, B., Olson, M. H., and Baroudi, J. J. (1983). The Measurement of User Information Satisfaction. *Communications of the ACM, 26*(10), 785-793.

Jacobson, E. H. (1957). The Effect of Changing Industrial Methods and Automation on Personnel. In *Symposium on Preventive and Social Psychology*. Washinton DC.

James, L. R. (1982). Aggregation Bias in Estimates of Perceptual Agreement. *Journal of Applied Psychology, 67*(2), 219-241.

James, L. R., Demaree, R. G., and Wolf, G. (1984). Estimating within-Group Interrater Reliability with and without Response Bias. *Journal of Applied Psychology, 69*(1), 85.

James, L. R., Demaree, R. G., and Wolf, G. (1993). R Wg: An Assessment of within-Group Interrater Agreement. *Journal of Applied Psychology, 78*(2), 306-309.

James, L. R., and Jones, A. P. (1976). Organizational Structure: A Review of Structural Dimensions and Their Conceptual Relationships with Individual Attitudes and Behavior. *Organizational Behavior and Human Performance, 16*(1), 74-113.

Jarvenpaa, S. L. (1989). The Effect of Task Demands and Graphical Format on Information Processing Strategies. *Management Science, 35*(3), 285-303.

Jöreskog, K. G. (1974). Analyzing Psychological Data by Structural Analysis of Covariance Matrices. In R. C. Atkinson, D. H. Krantz, R. D. Luce and P. Suppes (Eds.), *Contemporary Developments in Mathematical Psychology* (Vol. 2, pp. 1-56). San Francisco: Freeman.

Kim, T. G., Hornung, S., and Rousseau, D. M. (2011). Change-Supportive Employee Behavior: Antecedents and the Moderating Role of Time. *Journal of Management, 37*(6), 1664-1693.

Klein, K. J., Conn, A. B., Smith, D. B., and Sorra, J. S. (2001). Is Everyone in Agreement? An Exploration of within-Group Agreement in Employee Perceptions of the Work Environment. *Journal of Applied Psychology, 86*(1), 3-16.

Klein, K. J., and Kozlowski, S. W. (2000a). From Micro to Meso: Critical Steps in Conceptualizing and Conducting Multilevel Research. *Organizational Research Methods, 3*(3), 211-236.

Klein, K. J., and Kozlowski, S. W. (2000b). *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions*. San Francisco, CA: Jossey-Bass.

Klopping, I. M., and McKinney, E. (2004). Extending the Technology Acceptance Model and the Task-Technology Fit Model to Consumer E-Commerce. *Information Technology, Learning, and Performance Journal, 22*(1), 35-48.

Kotter, J. P., and Cohen, D. S. (2002). *The Heart of Change: Real-Life Stories of How People Change Their Organizations*: Harvard Business Press.

Kozlowski, S. W. J., and Klein, K. J. (2000). A Multilevel Approach to Theory and Research in Organizations: Contextual, Temporal, and Emergent Processes. In K. J. Klein and S. W. Kozlowski (Eds.), *Multilevel Theory, Research, and Methods in Organizations: Foundations, Extensions, and New Directions* (pp. 3-90). San Franisco, CA: Jossey-Bass.

Krosnick, J. A. (1991). Response Strategies for Coping with the Cognitive Demands of Attitude Measures in Surveys. *Applied Cognitive Psychology, 5*(3), 213-236.

Kwon, T. H., and Zmud, R. W. (1987). Unifying the Fragmented Models of Information Systems Implementation. In *Critical Issues in Information Systems Research* (pp. 227-251): John Wiley & Sons, Inc.

Lance, C. E., Butts, M. M., and Michels, L. C. (2006). The Sources of Four Commonly Reported Cutoff Criteria What Did They Really Say? *Organizational Research Methods, 9*(2), 202-220.

LeBreton, J. M., Burgess, J. R., Kaiser, R. B., Atchley, E. K., and James, L. R. (2003). The Restriction of Variance Hypothesis and Interrater Reliability and Agreement: Are Ratings from Multiple Sources Really Dissimilar? *Organizational Research Methods, 6*(1), 80-128.

LeBreton, J. M., and Senter, J. L. (2007). Answers to 20 Questions About Interrater Reliability and Interrater Agreement. *Organizational Research Methods, 11*(4), 815-852.

Lee, Y., Kozar, K. A., and Larsen, K. R. (2003). The Technology Acceptance Model: Past, Present, and Future. *Communications of the Association for Information Systems, 12*(1), 752-780.

Lewin, K. (1947a). Change Management Model. New York, NY: McGraw Hill.

Lewin, K. (1947b). Frontiers in Group Dynamics. Concept, Method and Reality in Social Science; Social Equilibria and Social Change. *Human Relations, 1*(1), 5-41.

Lindell, M. K., and Whitney, D. J. (2001). Accounting for Common Method Variance in Cross-Sectional Research Designs. *Journal of Applied Psychology, 86*(1), 114-121.

Lindquist, K. A., Satpute, A. B., Wager, T. D., Weber, J., and Barrett, L. F. (2015). The Brain Basis of Positive and Negative Affect: Evidence from a Meta-Analysis of the Human Neuroimaging Literature. *Cerebral Cortex*, 1-13.

Maas, C. J., and Hox, J. J. (2005). Sufficient Sample Sizes for Multilevel Modeling. *Methodology, 1*(3), 86-92.

Malhotra, N. K., Kim, S. 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.

Malhotra, Y., and Galletta, D. F. (1999). Extending the Technology Acceptance Model to Account for Social Influence: Theoretical Bases and Empirical Validation. In *Proceedings of the 32nd Annual Hawaii International Conference on Systems Science, 1999 (HICSS-32)*. Maui, Hawaii, USA: IEEE.

Marakas, G. M., and Hornik, S. (1996). Passive Resistance Misuse: Overt Support and Covert Recalcitrance in IS Implementation. *European Journal of Information Systems, 5*(3), 208-219.

McAllister, D. J. (1995). Affect-and Cognition-Based Trust as Foundations for Interpersonal Cooperation in Organizations. *Academy of Management Journal, 38*(1), 24-59.

McGraw, K. O., and Wong, S. P. (1996). Forming Inferences About Some Intraclass Correlation Coefficients. *Psychological Methods, 1*(1), 30.

Mehrabian, A. (1997). Comparison of the Pad and Panas as Models for Describing Emotions and for Differentiating Anxiety from Depression. *Journal of Psychopathology and Behavioral Assessment, 19*(4), 331-357.

Mick, D. G. (1996). Are Studies of Dark Side Variables Confounded by Socially Desirable Responding? The Case of Materialism. *Journal of Consumer Research, 23*(2), 106-119.

Miller, B., and Chiodo, B. (2008). Academic Entitlement: Adapting the Equity Preference Questionnaire for a University Setting. In *Southern Management Association meeting, St. Pete Beach, FL*.

Moore, G., C., and Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting and Information Technology Innovation. *Information Systems Research, 2*(3), 192-222.

Morgeson, F. P., and Hofmann, D. A. (1999). The Structure and Function of Collective Constructs: Implications for Multilevel Research and Theory Development. *Academy of Management Review, 24*(2), 249-265.

Nesterkin, D. A. (2013). Organizational Change and Psychological Reactance. *Journal of Organizational Change Management, 26*(3), 573-594.

Netemeyer, R. G., Bearden, W. O., and Sharma, S. (2003). *Scaling Procedures: Issues and Applications*. Thousand Oaks, CA: Sage Publications.

Netemeyer, R. G., Boles, J. S., and McMurrian, R. (1996). Development and Validation of Work–Family Conflict and Family–Work Conflict Scales. *Journal of Applied Psychology, 81*(4), 400-410.

Nunnally, J. C. (1978). *Psychometric Methods*. New York, NY: McGraw-Hill.

Nunnally, J. C., and Bernstein, I. H. (1994). *Psychometric Theory* (3rd ed.). New York, NY: McGraw-Hill.

Oppenheimer, D. M., Meyvis, T., and Davidenko, N. (2009). Instructional Manipulation Checks: Detecting Satisficing to Increase Statistical Power. *Journal of Experimental Social Psychology, 45*(4), 867-872.

Peer, E., Vosgerau, J., and Acquisti, A. (2014). Reputation as a Sufficient Condition for Data Quality on Amazon Mechanical Turk. *Behavior Research Methods, 46*(4), 1023-1031.

Petter, S., Straub, D., and Rai, A. (2007). Specifying Formative Constructs in Information Systems Research. *MIS Quarterly, 31*(4), 623-656.

Pettigrew, A. M., Woodman, R. W., and Cameron, K. S. (2001). Studying Organizational Change and Development: Challenges for Future Research. *Academy of Management Journal, 44*(4), 697-713.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., and Podsakoff, N. P. (2003). Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies. *Journal of Applied Psychology, 88*(5), 879-903.

Podsakoff, P. M., and Organ, D. W. (1986). Self-Reports in Organizational Research: Problems and Prospects. *Journal of Management, 12*(4), 531-544.

Rafferty, A. E., Jimmieson, N. L., and Armenakis, A. A. (2013). Change Readiness : A Multilevel Review. *Journal of Management, 39*(1), 110-135.

Rai, A., Maruping, L. M., and Venkatesh, V. (2009). Offshore Information Systems Project Success: The Role of Social Embeddedness and Cultural Characteristics. *MIS Quarterly, 33*(3), 617-641.

Raudenbush, S., Bryk, A., Cheong, Y., Congdon, R., and du Toit, M. (2011). Hlm 7. *Lincolnwood, IL: Scientific Software International Inc*.

Raudenbush, S. W., and Bryk, A. S. (2002). *Hierarchical Linear Models: Applications and Data Analysis Methods* (Vol. 1): Sage.

Rogers, E. M. (1961). Characteristics of Agricultural Innovators and Other Adopter Categories. *Research Bulletin No. 882*, (Wooster, OH: Ohio Agricultural Experiment Station).

Rogers, E. M. (1962). *Adoption, Diffusion of Innovations*. New York, NY: The Free Press.

Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York, NY: The Free Press.

Ross, L., Greene, D., and House, P. (1977). The "False Consensus Effect": An Egocentric Bias in Social Perception and Attribution Processes. *Journal of Experimental Social Psychology, 13*(3), 279-301.

Rousseau, D. M. (1985). Issues of Level in Organizational Research: Multi-Level and Cross-Level Perspectives. *Research in Organizational Behavior, 7*(1), 1-37.

Ryan, B., and Gross, N. C. (1943). The Diffusion of Hybrid Seed Corn in Two Iowa Communities. *Rural Sociology, 8*(1), 15-24.

Sarker, S., and Valacich, J. S. (2010). An Alternative to Methodological Individualism: A Non-Reductionist Approach to Studying Technology Adoption by Groups. *MIS Quarterly, 34*(4), 779-808.

Schein, E. H. (1996). Kurt Lewin's Change Theory in the Field and in the Classroom: Notes toward a Model of Managed Learning. *Systems Practice, 9*(1), 27-47.

Scherer, K. R. (2005). What Are Emotions? And How Can They Be Measured? *Social Science Information, 44*(4), 695-729.

Sheeran, P. (2002). Intention—Behavior Relations: A Conceptual and Empirical Review. *European Review of Social Psychology, 12*(1), 1-36.

Sheeran, P., and Abraham, C. (2003). Mediator of Moderators: Temporal Stability of Intention and the Intention-Behavior Relation. *Personality and Social Psychology Bulletin, 29*(2), 205-215.

Shrout, P. E., and Fleiss, J. L. (1979). Intraclass Correlations: Uses in Assessing Rater Reliability. *Psychological Bulletin, 86*(2), 420-428.

Simmering, M. J., Fuller, C. M., Richardson, H. A., Ocal, Y., and Atinc, G. M. (2015). Marker Variable Choice, Reporting, and Interpretation in the Detection of Common Method Variance a Review and Demonstration. *Organizational Research Methods, 18*(3), 473-511.

Simon, H. A. (1997). *Administrative Behavior*. New York, NY: The Free Press.

Singer, J. D., and Willett, J. B. (2003). *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence*. New York, NY: Oxford University Press.

Snell, R. S. (2001). Moral Foundations of the Learning Organization. *Human Relations, 54*(3), 319-342.

Snijders, T., and Bosker, R. (1999). *Multilevel Analysis: An Introduction to Basic and Applied Multilevel Analysis*: London: Sage.

Sonenshein, S. (2010). We're Changing—or Are We? Untangling the Role of Progressive, Regressive, and Stability Narratives During Strategic Change Implementation. *Academy of Management Journal, 53*(3), 477-512.

Soper, D. S. (2017). P-Value Calculator for a Chi-Square Test [Software].

Stevens, G. W. (2013). Toward a Process-Based Approach of Conceptualizing Change Readiness. *The Journal of Applied Behavioral Science, 49*(3), 333-360.

Stevenson, A. (2010). *Oxford Dictionary of English* (3rd Revised ed.). New York, NY: Oxford University Press, USA.

Stouffer, S. A., Suchman, E. A., DeVinney, L. C., Star, S. A., and Williams Jr, R. M. (1949). *The American Soldier: Adjustment During Army Life.(Studies in Social Psychology in World War II)* (Vol. 1). Oxford, England: Princeton Univ. Press.

Straub, D., Boudreau, M.-C., and Gefen, D. (2004). Validation Guidelines for Is Positivist Research. *Communications of the Association for Information Systems, 2004*(13), 380-427.

Sutton, S. (1998). Predicting and Explaining Intentions and Behavior: How Well Are We Doing? *Journal of Applied Social Psychology, 28*(15), 1317-1338.

Tay, L., Woo, S. E., and Vermunt, J. K. (2014). A Conceptual and Methodological Framework for Psychometric Isomorphism: Validation of Multilevel Construct Measures. *Organizational Research Methods, 17*(1), 77-106.

Taylor, S., and Todd, P. (1995). Decomposition and Crossover Effects in the Theory of Planned Behavior: A Study of Consumer Adoption Intentions. *International Journal of Research in Marketing, 12*(2), 137-155.

Tornatzky, L. G., and Klein, K. J. (1982). Innovation Characteristics and Innovation Adoption-Implementation: A Meta-Analysis of Findings. *IEEE Transactions On Engineering Management, 1*, 28-45.

Trope, Y., and Liberman, N. (2010). Construal-Level Theory of Psychological Distance. *Psychological Review, 117*(2), 440-463.

Van Mierlo, H., Vermunt, J. K., and Rutte, C. G. (2009). Composing Group-Level Constructs from Individual-Level Survey Data. *Organizational Research Methods, 12*(2), 368-392.

Vardaman, J. M., Allen, D. G., Otondo, R. F., Hancock, J. I., Shore, L. M., and Rogers, B. L. (2016). Social Comparisons and Organizational Support: Implications for Commitment and Retention. *Human Relations, 69*(7), 1483-1505.

Vardaman, J. M., Amis, J. M., Dyson, B. P., Wright, P. M., and Van de Graaff Randolph, R. (2012). Interpreting Change as Controllable: The Role of Network Centrality and Self-Efficacy. *Human Relations, 65*(7), 835-859.

Venkatesh, V., Brown, S. A., Maruping, L. M., and Bala, H. (2008). Predicting Different Conceptualizations of System Use: The Competing Roles of Behavioral Intention, Facilitating Conditions, and Behavioral Expectation. *MIS Quarterly, 32*(3), 483-502.

Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly, 27*(3), 425-478.

Von Bertalanffy, L. (1968). The Meaning of General System Theory: The Quest for a General System Theory. In G. Braziller (Ed.), *General System Theory. Foundations, Development, Applications* (pp. 30-53). New York: NY: George Braziller Inc.

Vroom, C., and Von Solms, R. (2004). Towards Information Security Behavioural Compliance. *Computers & Security, 23*(3), 191-198.

Walinga, J. (2008). Toward a Theory of Change Readiness: The Roles of Appraisal, Focus, and Perceived Control. *The Journal of Applied Behavioral Science, 44*(3), 315-347.

Warren, D. I. (1969). The Effects of Power Bases and Peer Groups on Conformity in Formal Organizations. *Administrative Science Quarterly, 14*(4), 544-556.

Watson, D., Clark, L. A., and Tellegen, A. (1988). Development and Validation of Brief Measures of Positive and Negative Affect: The Panas Scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.

Watson, D., Wiese, D., Vaidya, J., and Tellegen, A. (1999). The Two General Activation Systems of Affect: Structural Findings, Evolutionary Considerations, and Psychobiological Evidence. *Journal of Personality and Social Psychology, 76*(5), 820-838.

Weick, K. E. (2000). Emergent Change as a Universal in Organizations. In M. Beer and N. Nohria (Eds.), *Breaking the Code of Change* (pp. 223-241). Boston, MA: Havard Business Press.

Williams, L. E., Stein, R., and Galguera, L. (2014). The Distinct Affective Consequences of Psychological Distance and Construal Level. *Journal of Consumer Research, 40*(6), 1123-1138.

Woodall, J. (1996). Managing Culture Change: Can It Ever Be Ethical? *Personnel Review, 25*(6), 26-40.

Yang, C., Ding, C. G., and Lo, K. W. (2015). Ethical Leadership and Multidimensional Organizational Citizenship Behaviors the Mediating Effects of Self-Efficacy, Respect, and Leader–Member Exchange. *Group & Organization Management, 40*(2), 1-32.

Yang, H. D., and Yoo, Y. (2004). It's All About Attitude: Revisiting the Technology Acceptance Model. *Decision Support Systems, 38*(1), 19-31.

Zand, D. E., and Sorensen, R. E. (1975). Theory of Change and the Effective Use of Management Science. *Administrative Science Quarterly, 20*, 532-545.

Zevon, M. A., and Tellegen, A. (1982). The Structure of Mood Change: An Idiographic/Nomothetic Analysis. *Journal of Personality and Social Psychology, 43*(1), 111-122.

APPENDIX A

THE SURVEY INSTRUMENT

Mississippi State University

Informed Consent Form for Participation in Research

Title of Research Study: The WIOA Smart Start Integrated Case Management System Survey.

The purpose of this research project is to collect data on your thoughts, feelings and opinions regarding the changes associated with the WIOA Smart Start Integrated Case Management System (ICMS). The State of [one State in the South of continental USA] is using ICMS to implement the Workforce Innovation and Opportunity Act (WIOA). When implemented, you will see ICMS features integrated into [agency's legacy system] so that you are able to share clients' data with other state agencies.

Your responses are anonymous, and your **participation is voluntary**, and your **refusal to participate will involve no penalty or loss** of benefits which you are otherwise entitled. You **may discontinue your participation** at any time.

The survey should take between 20 and 25 minutes to complete. There are no known risks related to participating in this research project. Your completion of the research procedures indicate consent. If you have decided to participate, click the "NEXT" button below to start the survey, otherwise exit this page by closing the browser.

If you have any questions please contact

Contact	Phone	Email
Martin Ndicu	(662) 418-0842	mng120@msstate.edu
Robert Otondo	(662) 325-1961	rotondo@business.msstate.edu
Regulatory Compliance Office	(662) 325-3994	irb@research.msstate.edu

Thank you for accepting our request to respond to this survey.

As you know, the State of [one State in the South of continental USA] is in the process of introducing the WIOA Smart Start Integrated Case Management System (ICMS) whose features will be integrated into [the agency's legacy system] so that you are able to share clients' information with other departments.

The **questions in this survey do not have right or wrong answers**. Please give your honest opinions of how strongly you agree or disagree with statements regarding the new ICMS features, WIOA, the changes and some work-environment factors.

Think about the negative outcomes you anticipate due to the changes introduced by the new system. To what extent do you feel;		Very much		Neutral		Not at all
NA01	Worried?	o	o	o	o	o
NA02	Anxious?	o	o	o	o	o
NA03	Uncomfortable?	o	o	o	o	o
NA04	Nervous?	o	o	o	o	o
NA05	Afraid?	o	o	o	o	o
NA06	Scared?	o	o	o	o	o

Think about the positive outcomes you anticipate due to the changes introduced by the new system. To what extent do you feel;		Very much		Neutral		Not at all
PA01	Optimistic?	o	o	o	o	o
PA02	Confident?	o	o	o	o	o
PA03	Excited?	o	o	o	o	o
PA04	Enthusiastic?	o	o	o	o	o
PA05	Delighted?	o	o	o	o	o
PA06	Interested?	o	o	o	o	o

Regarding the appropriateness of the changes;		Strongly Agree		Neutral		Strongly Disagree
AP01	I think [the agency] will benefit from these changes.	o	o	o	o	o
AP02	It doesn't make much sense for [the agency] to initiate these changes.	o	o	o	o	o
AP03	These changes will improve [the agency] overall efficiency.	o	o	o	o	o

AP04	There are rational reasons for these changes to be made.	o	o	o	o	o
AP05	In the long run, I feel it will be worthwhile if [the agency] implements these changes.	o	o	o	o	o

Thinking about my ability to handle the changes;		Strongly Agree		Neutral		Strongly Disagree
CE01	I do not anticipate any problems adjusting to the work I will have when these changes are adopted.	o	o	o	o	o
CE02	There are some tasks that will be required when we change that I don't think I can do well.	o	o	o	o	o
CE03	When we implement these changes I feel I can handle them with ease.	o	o	o	o	o
CE04	I have the skills needed to make these changes work.	o	o	o	o	o

How much have you heard or read about….		A great deal	much	Some what	Just a little	Not at all
HR01	…the Integrated Case Management System (ICMS)?	o	o	o	o	o
HR02	…the Workforce Innovation and Opportunity Act (WIOA)?	o	o	o	o	o
HR03	…the new features in [the agency's legacy system] when ICMS is implemented?	o	o	o	o	o

How many ICMS related events (meetings, trainings, focus groups) have you attended?	
None	o
1-3	o
4-7	o
8-10	o
More than 10	o

How much have you discussed with your colleagues about….		A great deal	much	Some what	Just a little	Not at all
DC01	…the Integrated Case Management System (ICMS)?	o	o	o	o	o
DC02	…the Workforce Innovation and Opportunity Act (WIOA)?	o	o	o	o	o

DC03	…the new features in [the agency's legacy system] when ICMS is implemented?	o	o	o	o	o

How many times have you discussed with your colleagues about ICMS and the new features in [the agency's legacy system] when ICMS is implemented?	
I haven't	o
1-3	o
4-7	o
8-10	o
More than 10	o

In relation to management support for the changes;		Strongly Agree		Neutral		Strongly Disagree
MS01	Senior leaders have encouraged me to embrace these changes.	o	o	o	o	o
MS02	Top decision makers in the organization have put all their support behind the change effort.	o	o	o	o	o
MS03	Most senior managers have stressed the importance of these changes.	o	o	o	o	o
MS04	Senior management is committed to these changes.	o	o	o	o	o

(*The term "work-group" refers to your colleagues who you work most closely with and whose tasks are closely related or similar to yours. You often consult them in the course of your work. It is common to be in the same team/unit or department and report to the same supervisor/manager.)

Regarding the appropriateness of these changes, the **other members of my work-group** believe that…		Strongly Agree		Neutral		Strongly Disagree
RAP01	…the organization will benefit from these changes.	o	o	o	o	o
RAP02	…it doesn't make much sense for the organization to initiate these changes.	o	o	o	o	o
RAP03	…these changes will improve their overall efficiency.	o	o	o	o	o
RAP04	…there are rational reasons for these changes to be made.	o	o	o	o	o
RAP06	…in the long run, it will be worthwhile if the organization adopts these changes.	o	o	o	o	o

RAP01	…the organization will benefit from these changes.	o	o	o	o	o

In relation to management support for the change, the **other members of my work-group** believe that…		Strongly Agree		Neutral		Strongly Disagree
RMS01	…the senior leaders have encouraged them to embrace these changes.	o	o	o	o	o
RMS02	…the [agency's] top decision makers have put all their support behind the change efforts.	o	o	o	o	o
RMS03	…most senior managers have stressed the importance of these changes.	o	o	o	o	o
RMS04	…senior management is committed to these changes.	o	o	o	o	o

Think about the negative outcomes, anticipated by the other members of your work-group, due to the changes introduced by the new system. To what extent **do other members of your work-group** feel;		Not at all		Neutral		Very much
RNA01	Worried?	o	o	o	o	o
RNA02	Anxious?	o	o	o	o	o
RNA03	Uncomfortable?	o	o	o	o	o
RNA04	Nervous?	o	o	o	o	o
RNA05	Afraid?	o	o	o	o	o
RNA06	Scared?	o	o	o	o	o

Think about the positive outcomes, anticipated by the other members of your work-group, due to the changes introduced by the new system. To what extent do **other members of your work-group** feel;		Not at all		Neutral		Very much
RPA01	Optimistic?	o	o	o	o	o
RPA02	Confident?	o	o	o	o	o
RPA03	Excited?	o	o	o	o	o
RPA04	Enthusiastic?	o	o	o	o	o
RPA05	Delighted?	o	o	o	o	o
RPA06	Interested?	o	o	o	o	o

Thinking about their ability to handle these changes, **the other members of my work-group**. . .		Strongly Agree		Neutral		Strongly Disagree
RCE01	…do not anticipate any problems adjusting to the work they will have when these changes are implemented.	o	o	o	o	o
RCE02	…believe there are some tasks, required after these changes, which they cannot do well.	o	o	o	o	o
RCE03	…feel that, when these changes are implemented, they can handle them with ease.	o	o	o	o	o
RCE04	…believe they have the skills needed to make these changes work.	o	o	o	o	o

To what extent do you agree with these statements?		Strongly Agree		Neutral		Strongly Disagree
MV01	I like the color blue.	o	o	o	o	o
MV02	I think blue cars are ugly.	o	o	o	o	o
MV03	I prefer blue to other colors.	o	o	o	o	o
MV04	I don't think blue is a pretty color.	o	o	o	o	o
MV05	I like blue clothes.	o	o	o	o	o
MV06	I don't like blue clothes.	o	o	o	o	o
MV07	I am attracted to blue objects.	o	o	o	o	o
MV08	I really don't like the color blue.	o	o	o	o	o

In view of everything you know about the WIOA Smart Start Integrated Case Management System (ICMS)…		Strongly Agree		Neutral		Strongly Disagree
INT01	…I contemplate using the new ICMS features when implemented in [the agency's legacy system].	o	o	o	o	o
INT02	…I am willing to adopt the new ICMS features when implemented in [the agency's legacy system].	o	o	o	o	o
INT03	…I expect that I would use the new ICMS features when implemented in [the agency's legacy system].	o	o	o	o	o
INT04	…I predict that I will use the new features when implemented in [the agency's legacy system].	o	o	o	o	o

INT05	…I intend to use the new ICMS features when implemented in [the agency's legacy system].	o	o	o	o	o

Please tell us about yourself;			Prefer not to answer
DG01	Which year did start working at [the agency]?		o
DG02	What is the highest level of education you have attained?		o
DG03	Are you male or female?		o
DG04	Is there anything else you would like to say about the new system?		
DG05	Is there anything else you would like to say about the changes introduced by the new system?		

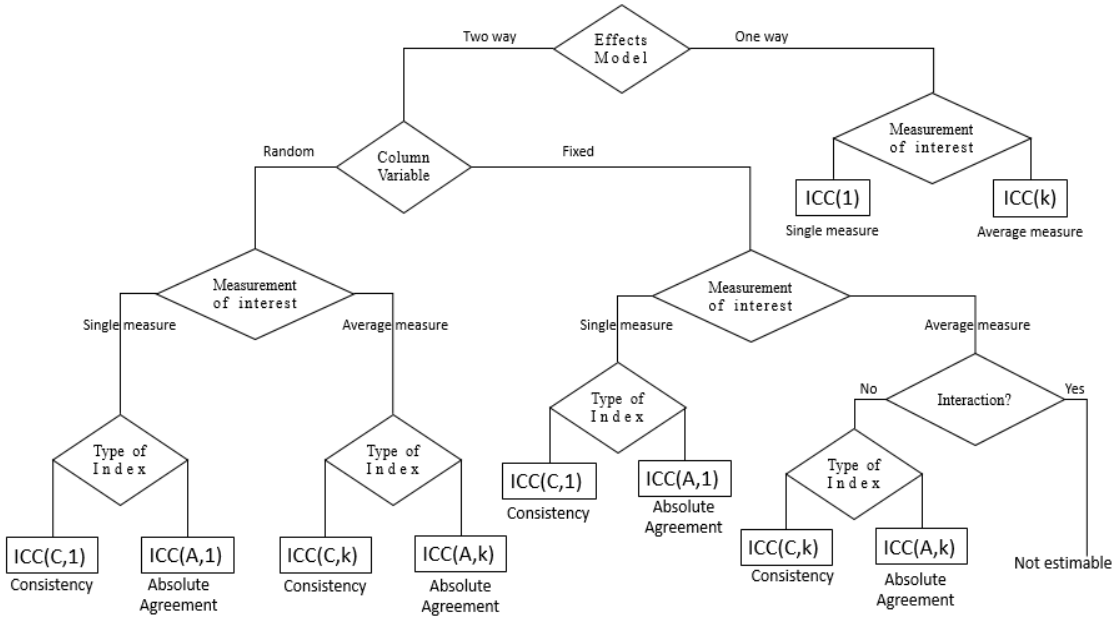
Thank you.

SUBMIT

APPENDIX B

FLOW CHART FOR SELECTING THE APPROPRIATE INTRACLASS CORRELATION COEFFICIENT (ICC)

A Flow Chart for Selecting an ICC - adopted from McGraw and Wong (1996) – Figure 1 (p. 40).



Intraclass Correlation Coefficients play an important role in the process of testing the reliability and validity of higher-level constructs. The decision on when, and which ICC, to calculate is determined by a number of factors. Shrout and Fleiss (1979) explain the different effect models and the different formula for calculating random effects, and the definition and estimation of ICCs, for each of the cases.

The differentiation of cases in Shrout and Fleiss (1979) is based on the relationship between raters/judges and targets, which McGraw and Wong (1996) address as columns. Based on the nature of columns, the employees who responded to the survey in this study represent a random sample of all possible employees who will work with the new ICMS features. Each respondent assessed each item in the survey and each measurement is traceable to the unique identifier of the respondent it came from, and the respondent's workgroup. This justifies ICCs derived through the two-way random model.

Yang, H. D., and Yoo, Y. (2004). It's All About Attitude: Revisiting the Technology Acceptance Model. *Decision Support Systems, 38*(1), 19-31.