

UNIVERSITY OF JOHANNESBURG



CHANGE MANAGEMENT IN SOFTWARE IMPLEMENTATION PROJECTS

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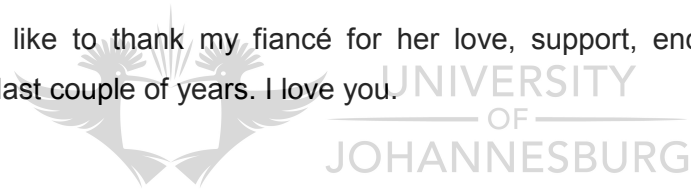
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...the LORD is with you when you are with Him. And if you seek Him, He will let you find Him; but if you forsake Him, He will forsake you. 2 Chron 15.2

ABSTRACT

Organizations sometimes invest in expensive and extensive operational software systems or packages in order to improve certain aspects of the organization. Change from one system to another is predominantly brought about by some sort of perceived added value. This added value is identified by a few individuals in an organization and must then be demonstrated and marketed to management as well as the system end-users, in order to obtain buy-in.

Although software systems have become a prominent fixture in organizations, the success rates for software implementation projects remain reportedly quite poor. Researchers noted that 56% - 90% of software implementation projects are late or over budget and only 30% are successful.

Potentially, the process of changing software systems is inherently fraught with resistance. This resistance towards this change and the management thereof can prove to be the deciding factor in the success or failure of the new software system. Presumably, there is a role for change management in software implementation projects.

In order to understand the role of change management in software implementation projects, the current research aims to carry out an extensive literature review on change management and software implementation project challenges.

Software implementation projects are often executed in a project management framework. Consequently, the literature review firstly investigates project management principles, standards and methodologies. Secondly, the literature review peers into several critical success factors that research has identified for software implementation projects. Lastly, the intricacies of change management psychology and organizational resistance are researched.

The findings of the research indicate that change management plays a pivotal role in the success of software implementation projects. The role of change management in software implementation projects is to manage the individuals' and organizational resistance such that the adoption of the new software or system is facilitated.

Despite the availability of information regarding change management, the research indicates that a lot of software implementation projects fail because the required change management effort is underestimated by the organization. The current research raises questions regarding the level of change management awareness and proficiency amongst project managers and the suitability of project management standards and methodologies for software implementation projects.

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LIST OF ABBREVIATIONS

CFF – Critical Failure Factor

CSF – Critical Success Factor

ERP - Enterprise Resource Planning

PMBok® - Project Management Body of Knowledge

PRINCE2™ - Projects in Controlled Environments 2



CHAPTER 1 - INTRODUCTION AND BACKGROUND

In the quest to keep abreast of technological change, organizations sometimes invest in expensive and extensive operational software systems or packages [34]. Change from one system to another is predominantly brought about by some sort of perceived added value of the new system over the existing system. This added value is sometimes identified by a few individuals in an organization and must then be demonstrated and marketed to management as well as the system end-users, in order to obtain buy-in[14] [15] [17].

System solution end-users may resist a change to a different solution because they are comfortable with the existing system. For this reason management must be convinced of the added value of the new solution, in order to successfully drive the change into the organisation [12]. Potentially, the process of changing operational software solutions is inherently fraught with resistance.

The manner in which this change, and the resistance thereof, is managed may prove to be the deciding factor in the success of the new operational software system [11]. Although software systems have become a prominent fixture in organizations, the success rates for software implementation projects remains reportedly quite poor [9][13][19]. Zhang noted that 90% of enterprise resource programme projects at the time were late or over budget and only 33% were successful [19]. Aiken and Keller indicate a figure of 30% success [21]. One of the more interesting challenges, for the author, in addressing this perceived poor success rate is the management of the change in order to minimise end-user resistance.

The goal of the current research is to review change management in software solution implementation projects. The current research does not set out to address all challenges around software development projects, but only the change management aspect.

This chapter outlines the research problem that the current research will investigate. The objectives of the research, the target audience as well as the research approach to be used are highlighted.

1.1 Introduction

The inherent nature of a software implementation undertaking is that it ideally occurs within a finite period of time, has well defined goals and is carried out within a limited budget. These ideal characteristics of a software implementation are also the classic characteristics that define a project [1] [2]. Consequently, software implementations are done as projects. The implied dependence on project management principles suggests that a good understanding of these principles is important to the success of software implementations. However, it should be born in mind that project management theory is often presented as being generic in nature and that thought should therefore be applied to the application thereof to such a specialised field of endeavour [1][8].

Large scale software implementations such as Enterprise Resource Planning (ERP) systems can be traced back to the 90s [14] [15]. However, regardless of the knowledge that is contained within project management theory and the knowledge base that has been built up since then, software system implementations represent a significant change in any organisation [15][17]. It is commonly understood that resistance to change is a common reaction to such endeavours [11] [12]. As such it is important to understand and manage these factors in such a way as to promote the overall implementation success. The current research aims to understand the framework in which software implementation projects are carried out and the role that change management plays in the success of software implementation projects.

1.2 Research Methodology

The current research aims to understand the environment of software implementation projects and the role of change management therein. In order to achieve this, the preliminary exploratory research indicates the need for an extensive literature review on the following:

- Project management principles, standards and methodologies ;
- Software implementation success and failure factors ; and
- Individual and organizational change management theory.

The current research will then analyse and discuss the results of the literature review and conclude on the role that change management plays in software implementation project and the success thereof. Figure 1 illustrates a flow chart of a business research methodology as illustrated by Zikmund *et al* [18].



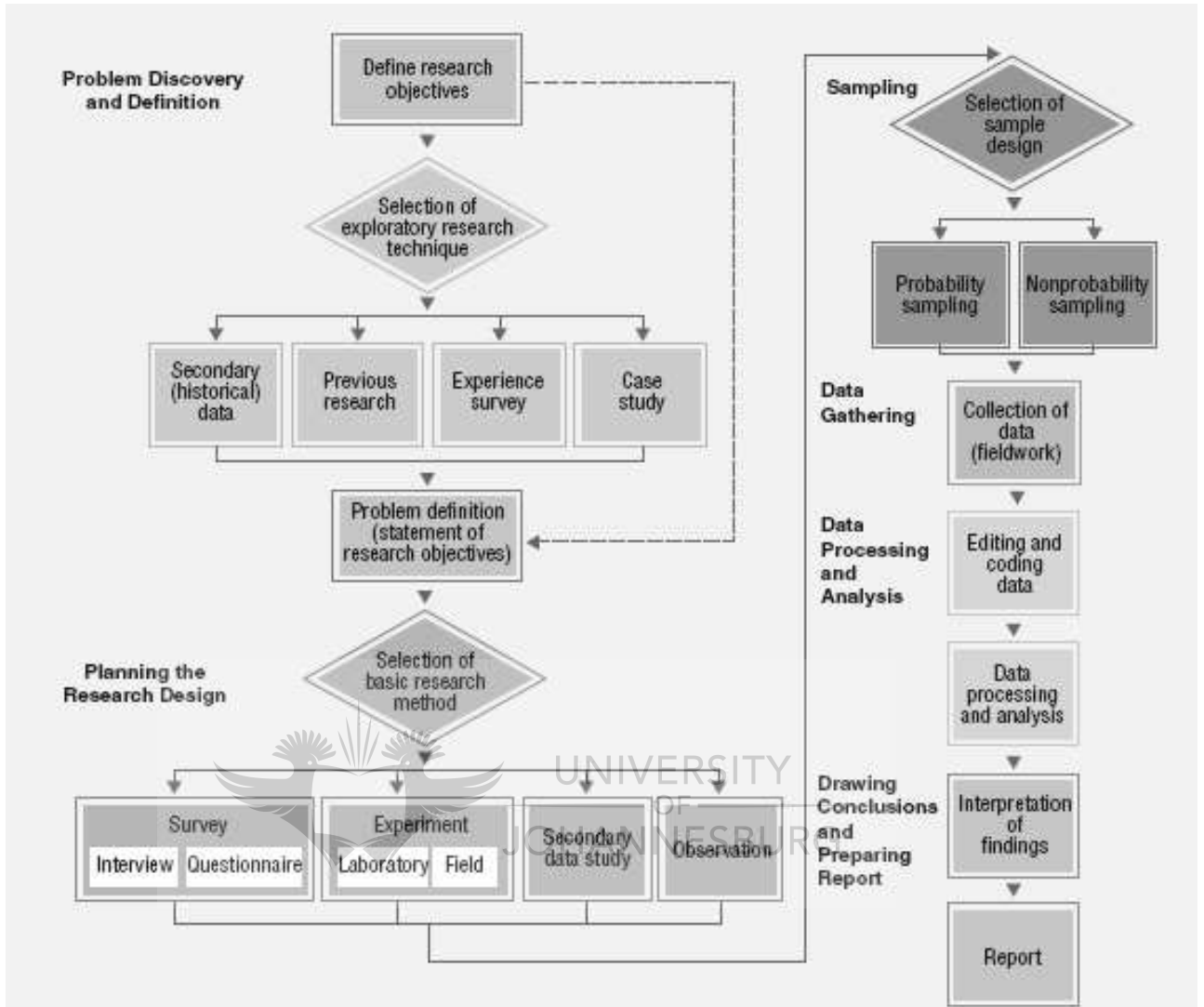


Figure 1: Research Methodology Flowchart [18]

Based on the resources available to the researcher, this research methodology will be used with the following choices where applicable:

- Exploratory Research Technique: Previous Research (incorporating case studies);
- Basic Research Method: Secondary Data Study; and
- Sample Design: Not applied as survey data is not used in this research.

1.2.1 Basic Research Method

The current research is a secondary data study using a qualitative research approach. A secondary data study is defined as a study based on data that was acquired by others prior to the current research and for purposes other than the current research. Qualitative research is defined as a technique that allows a researcher to provide elaborate interpretations without depending on numerical measurements [18]. In contrast, quantitative research is defined research that addresses objectives using numerical measurement and analysis. The nature of the current research is such that secondary data in the form of previously published research will be used to gather data. It must be noted that some of the published research is based on case studies; hence the current research will inherently incorporate and benefit from case studies. The qualitative approach will be used to infer conclusions from the gathered data.

1.2.2 Data Collection



Data collection is performed through the use of an extensive literature review. This entails a directed search of relevant published works that include periodicals and books as well as trade association sources.

1.2.3 Data Analysis

Fact finding is used to extract project information from the data collected. Grounded theory is also applied to the analysis of the data. Grounded Theory is a technique that can be used to reverse engineer a hypothesis or theory from data. This technique is described as “an inductive investigation in which the researcher poses questions about information provided by respondents or taken from historical records” [18].

1.3 Problem Statement

Organizational Software implementation projects have reportedly poor success rates [9] [13] [19]. This is despite the fact that large software implementation project initiatives can be traced back to the 90s [14] [15]. There are reportedly many factors that can lead to success or failure of a software implementation project [14] [19]. One of the identified factors that can lead to the failure of software implementation projects is the management of change within the organization [32]. The possibility that a software implementation project can fail because of resistance to change indicates that change management can play a role in the successful implementation of software implementation projects. The current research will research the role and importance of change management in software implementation projects and how this can bolster the chances of success.

1.4 Research Objectives

The current research has the following objectives:

- Review literature on project management standards and methodologies;
- Review literature on software factors that affect the success and failure of software implementation projects;
- Review literature on individual and organizational change management theory;
- Review literature on models for software implementation projects;
- Identify the role and importance of change management in software implementation projects;
- Identify the factors to be managed in order for the change to be managed and for end-user resistance to be minimised;
- Discuss challenges identified in the review of the literature; and
- Make recommendations on further research.

The current research does not aim to provide a definition of success for software implementation projects, but rather to research the role that change management plays in the success or failure of software implementation projects.



CHAPTER 2 - PROJECT MANAGEMENT AND PROJECT METHODOLOGIES

This chapter reviews the standards and methodologies that are applicable to project management. The most prominent standard and methodology are compared and the relationship between the two is also investigated.

There are a number of structured approaches that can be applied to the management of projects. The objective of using such an approach is to increase the probability of successfully completing a project. There are several approaches to use but none more prominent than the Project Management Institute's (PMI) Project Management Body of Knowledge (PMBok®) and the Cabinet Office's Projects In Controlled Environments version 2 (PRINCE2™). PMBoK® and PRINCE2™ are seen to be the de facto project management standards in America and the UK respectively [3].



2.1 Guide to the Project Management Body of Knowledge (PMBok® Guide)

The PMBOK® Guide is a standard, a guideline, a collection of best practices for successfully achieving project success. It represents an in-depth look into the aspects that need to be managed in order to complete a project successfully [1]. The theoretical nature of the standard alludes to the fact that it is only a **guide** for project management and not a **methodology** for implementing them [4]. There are various project management methodologies [4] of which PRINCE2™ is one.

The PMBOK® Guide was first published as a project management practices standardisation whitepaper in 1983. The whitepaper subsequently led to the publication of the first and second editions in 1996 and 2000. The four year revision cycle continued with the publication of the third and fourth editions in 2004 and 2008 respectively. The fourth edition is the current version of the PMBOK® Guide but the fifth edition is due to be published in the fourth quarter of 2012 [7].

The PMBOK® Guide defines project management as the application of skills, tools, techniques and knowledge to meet the requirements of a project. The guide also advocates the management of processes as a manner of applying knowledge. A process is defined as a set of interconnected activities that produce a predefined result. Each process has specific inputs that it requires and specific outputs that it produces. These inputs and outputs form the interconnecting links between processes in project management i.e. the output of one process becomes the input to another process. The PMBOK® Guide defines 42 processes that are further grouped into five Process Groups. The five process groups are:

- Initiating – processes that define a new project;
- Planning – processes that establish scope, requirements, objectives etc.;
- Executing – processes that execute the predefined work;
- Monitoring and Control – process that track, review monitor and effect changes;
and
- Closing – processes that finalise all activities across the process groups.

The PMBOK® defines these as the processes that must occur to achieve successful completion. Although defined as discrete and independent events, the processes interact, overlap and are sometimes iterative in nature. They can occur over the project life cycle or within a stage of a project life cycle. Figures 2 and 3 illustrate the interrelation between the different process groups.

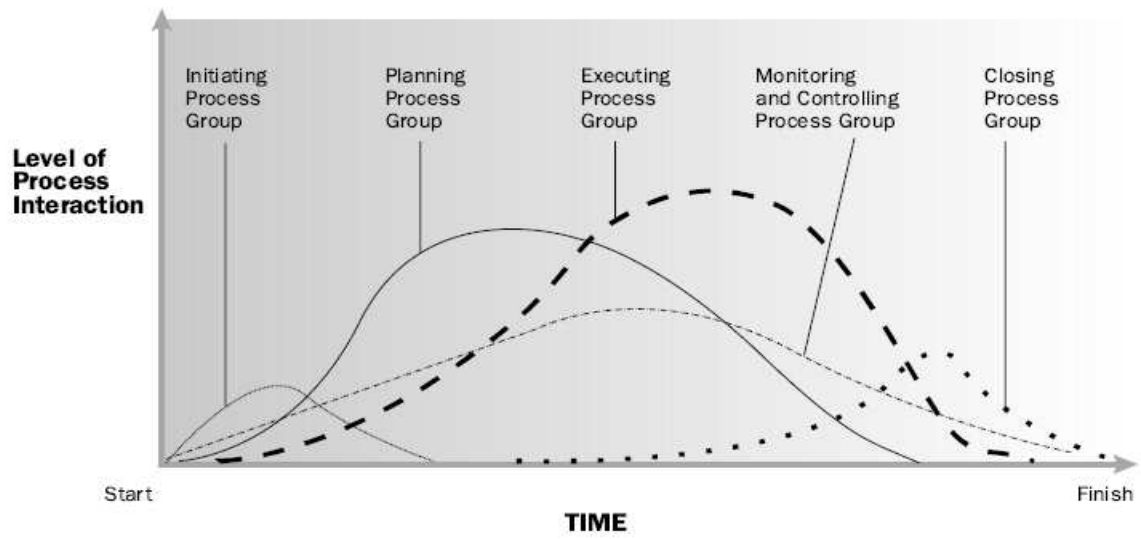


Figure 2: Process Group Interaction [1]

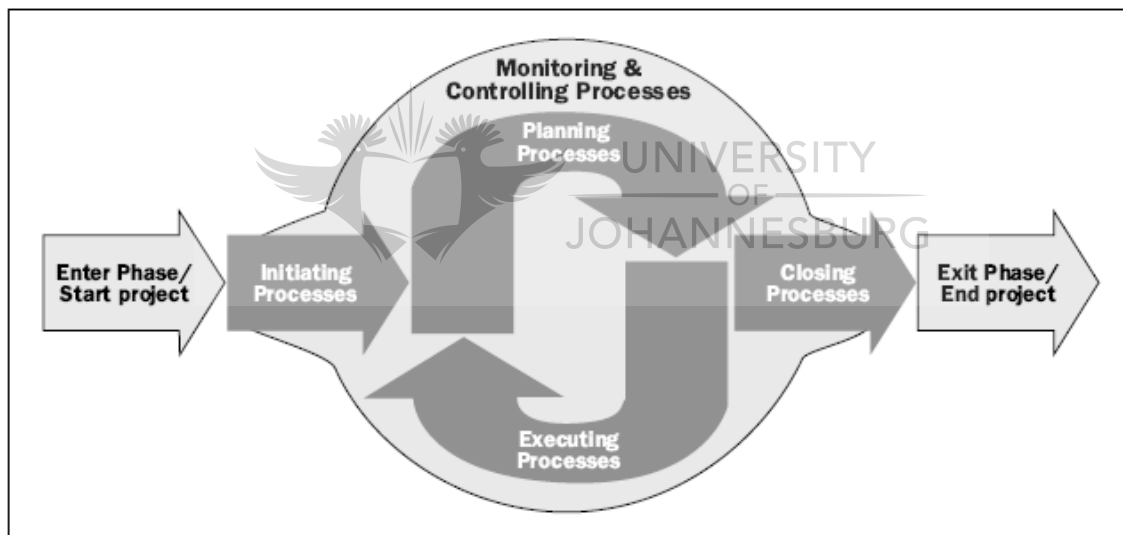


Figure 3: Process Group Interaction in a Project [1]

As previously noted, the guide advocates the use of processes as a means of applying knowledge. As such the guide uses the 42 processes defined as a means of applying the project management knowledge that has been divided into 9 Project Management Knowledge Areas. The nine knowledge areas of the PMBOK® Guide are:

- Project Integration Management;
- Project Scope Management ;
- Project Time Management;
- Project Cost Management;
- Project Quality Management;
- Project Human Resource Management;
- Project Communications Management;
- Project Risk Management; and
- Project Procurement Management.

These nine knowledge areas represent some of the fundamental concepts and principles that one needs to have a good understanding of the requirements of project management. Each knowledge area has one or more processes occurring across the five process groups at various stages of a project's lifecycle. The relationship between the processes, process groups and knowledge areas is illustrated in Table 1.

Table 1: Process Groups, Processes and Knowledge Areas Mapping [1]

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
Project Integration Management	-Develop charter	-Develop project management plan	-Direct and manage project execution	-Monitor and control project work -Perform integrated change control	-Close project or phase
Project Scope Management		-Collect Requirements -Define Scope -Create WBS		-Verify scope -Control scope	

Project Time Management		<ul style="list-style-type: none"> -Define activities -Sequence activities -Estimate activity resources -Estimate activity durations -Develop schedule 		<ul style="list-style-type: none"> -Control schedule 	
Project Cost Management		<ul style="list-style-type: none"> -Estimate costs -Determine budget 		<ul style="list-style-type: none"> -Control costs 	
Project Quality Management		<ul style="list-style-type: none"> -Plan quality 	<ul style="list-style-type: none"> -Perform quality assurance 	<ul style="list-style-type: none"> -Perform quality control 	
Project Human Resource Management		<ul style="list-style-type: none"> -Develop human resources plan 	<ul style="list-style-type: none"> -Acquire project team -Develop project team -Manage project team 		
Project Communications Management	<ul style="list-style-type: none"> -Identify stakeholders 	<ul style="list-style-type: none"> -Plan communications 	<ul style="list-style-type: none"> -Distribute information -Manage stakeholder expectations 	<ul style="list-style-type: none"> -Report performance 	
Project Risk Management		<ul style="list-style-type: none"> -Plan risk management -Perform qualitative risk analysis -Perform quantitative risk analysis -Plan risk responses 		<ul style="list-style-type: none"> -Monitor and control risks 	
Project Procurement Management		<ul style="list-style-type: none"> -Plan procurement 	<ul style="list-style-type: none"> -Conduct procurements 	<ul style="list-style-type: none"> -Administer procurements 	<ul style="list-style-type: none"> -Close procurements

2.2 Projects in Controlled Environments version 2 (PRINCE2™)

PRINCE2™ is a structured project management **methodology**, a step by step guide on how to implement project management theory such as that contained in the PMBOK®. PRINCE2™ is highly process oriented and can generally be applied to manage, control and organize any size project. Its generality and the fact that it represents a common sense approach to project management are some of its biggest strengths.

PRINCE2™ is driven by eight processes and contains eight components and three techniques. Using the processes, component and techniques, PRINCE2™ places focus on the business case and a product based approach to the project [5].

The eight PRINCE2™ processes are: Starting up a project, Planning, Initiating a project, directing a project, Controlling a stage, Managing project delivery, Managing stage boundaries and Closing a project. A description of each process is as follows [2] [3]:

Starting Up a Project - This represents the start of the project. It occurs in a controlled manner at the beginning of the project. The viability of the project is also evaluated during this process.

Planning - This process is a continual process throughout the project. The plans are produced by identifying processes, activities and resources that would be required to obtain and achieve the project's deliverables.

Directing a Project - Directing a project is also a continuous process throughout the project. PRINCE2™ defines the role of a project board that maintains accountability for the delivery/completion of the project. The project board also provides an approval system for advancement of the project from one stage to another.

Initiating a Project - This process details the management of the project in a document known as the Project Initiation Document. It is also vital for management to commit to the support of the project by providing all the necessary resources.

Controlling a Stage - This process allows the project manager to control and deal with issues arising on a daily basis during project execution.

Managing Product Delivery - This process allows technical teams to decide on and coordinate the work that needs to be done in order achieve product/ project delivery.

Managing Stage Boundaries - This process provides a mechanism for managing the advancement from one stage to another. It is essential for the project board to reassess the viability of the project and the business case at each stage transition. Should the business case no longer hold or the project no longer is viable, the project must be terminated.

Closing a Project - This process is concerned with the termination of the project and covers issues such as product/project handover, finalization of product/project documentation as well as operating and maintenance arrangements.

The interaction of PRINCE2™ processes is illustrated in Figure 4.

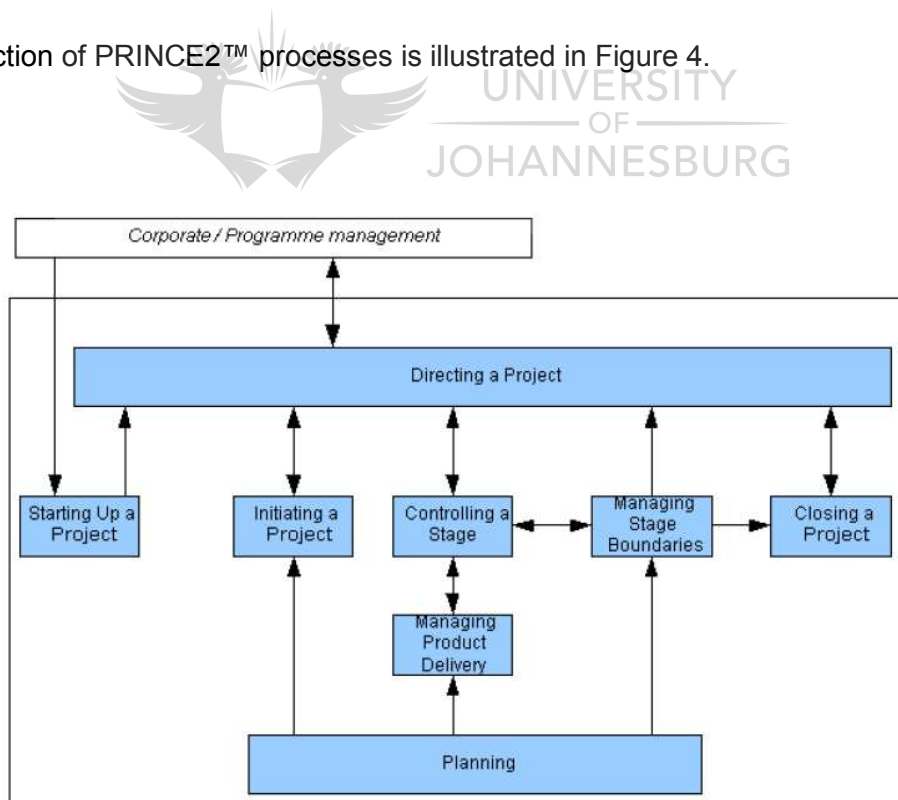
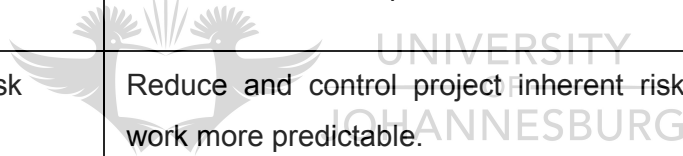


Figure 4: PRINCE2™ Processes [6]

Although not as in-depth as the PMBOK®'s nine knowledge areas, PRINCE2™'s eight components are quite similar to the knowledge areas. The components and their brief descriptions are as indicated in Table 2 [2] [3]:

Table 2: PRINCE2™ Components

PRINCE2™ Component	Description
Business Case	Viability must exist in order for the project to start or continue
Organization	Project board must be accountable for project and avail resources
Plans	Plans must be available and approved by the project board
Controls	Ensure project meets set criteria, is carried out to schedule within acceptable risk and remains viable.
Management of Risk	Reduce and control project inherent risks and make work more predictable.
Configuration Management	Ensures tracking and control of deliverables within a project
Quality in Project Environment	Ensures that quality, as is expected by the customer(s), is achieved
Change Control	Ensures that changes to scope are controlled and the importance thereof to the business case and costs are analysed.



The three PRINCE2™ techniques are exercised throughout the eight processes in order to ensure overall process effectiveness. The three techniques used in PRINCE2™ are:

- Product-based Planning;
- Change Control Review; and
- Quality Review.

2.3 Comparison of PMBoK® and PRINCE2™.

The PMBoK® guide highlights that it is only a guide and encourages the use of a structured project management methodology for the execution of projects.

"This standard is a guide rather than a methodology. One can use different methodologies and tools to implement the framework." [1]

This assertion by PMBoK® alludes to fact that PMBoK® in itself is a theoretical knowledge base of project management principles and these principles are most effectively applied to the management of a real project when a methodology, like PRINCE2™, is used. PRINCE2™ provides a practical method of applying the knowledge contained within PMBoK® to an actual project. Hence PMBoK® and PRINCE2™ are complimentary.

There are some differences between the PMBoK® and PRINCE2™. For instance, the PMBOK® approach places the accountability and responsibility squarely on a project manager's shoulders. PRINCE2™, on the other hand, places the accountability of the project with the Project Board and leaves the responsibility of running the project on a day to day basis with the project manager. Another difference is how the two approaches define a project stage/phase. PRINCE2™ differentiates between Technical stages and Management stages. Technical stages are generally those stages where technical specialist skills are required to deliver an outcome. Management stages are those where resources are committed [2] [3]. PMBoK® makes no distinction between technical and management phases and simply considers a phase as a collection of colligated activities that are used to deliver a major outcome.

Despite the differences, it is interesting to note that the PMBoK® knowledge areas correlate to the components (elements) of PRINCE2™ [3]. This is shown in Table 3.

Table 3: PMBOK® knowledge area vs. PRINCE2™ components (elements) [3]

PMBOK® Knowledge Area	PRINCE2® Element
Integration	Plans, Planning, Change Control
Scope	Business Case, Plans, Product Based Planning, Change Control
Time	Plans, Planning, Product Based Planning, Change Control
Cost	Plans, Planning, Change Control
Quality	Quality/Quality Review, Configuration Management
Risk	Management of Risk
Communications	Controls, Controlling a Stage, Closing a Project
Human Resources	Only Roles & Responsibilities Covered
Procurement	Not covered by PRINCE2®

Similarly, the five processes of the PMBoK® also correlate to the eight processes of PRINCE2™ as shown by Table 4.

Table 4: PMBOK® processes vs. PRINCE2™ processes [3]

PMBOK®	PRINCE2®
Initiating	Starting up a project Directing a project Managing Stage Boundaries
Planning	Initiating a Project Managing Stage Boundaries Managing Product Delivery Planning
Executing	Controlling a Stage Managing Product Delivery Directing a Project
Monitoring and Control	Controlling a Stage
Closing	Managing Stage Boundaries Closing a Project

2.4 Conclusion

PMBok® and PRINCE2™ are the de facto standards for project management. These standards provide a framework in which controls for a project can be implemented. These controls are aimed at ensuring the success of a project in terms of time, cost and quality. Whereas the PMBoK® provides a knowledge base of good project management theory and practice, the PRINCE2™ provides a step by step how-to guide for the implementation of project management principles. The two standards can therefore be described as independent but complimentary to one another.



CHAPTER 3: SOFTWARE IMPLEMENTATION SUCCESS AND FAILURE FACTORS

This chapter investigates the factors that research has identified as being critical to the success or failure of software implementation projects. These have been termed Critical Success Factors (CSFs) and Critical Failure Factors (CFFs) respectively. These factors are studied in the context of Enterprise Resource Planning (ERP) system implementation projects.

With the emergence of Information Technologies, software systems and applications have increasingly become a vital aspect of business and organizational activities. However, the adoption of a software system does represent a change in the organization. Regardless of the need for the change, the adoption process is not guaranteed to be successful. This uncertainty regarding the success of implementation has prompted researchers to investigate software implementations, its effects on organizations and the factors that contribute to failure as well as success.

The area of software system implementation that has arguably received the most attention is that of Enterprise Resource Planning (ERP) system implementation. ERP system implementation is generally considered to be the largest scale, most complex, demanding and expensive software undertaking by a firm [9][15][19]. As such, they represent a good measure of the challenges faced during software implementation and will be used as the basis for the literature review.

3.1 Enterprise Resource Planning (ERP) Implementation

ERP software has been described as follows:

ERP software automates core corporate activities, such as manufacturing, human resource, finance, and supply chain management, by incorporating best practices to facilitate rapid decision-making, cost reductions, and greater managerial control. [14]

Zhang *et al* refer to Kumar *et al*'s (2000) definition of ERP systems as “*configurable information systems packages that integrate information and information-based processes within and across functional areas in an organization*” [19].

The scale, complexity and difficulty of ERP implementation have led to disappointing implementation success rates. Zhang *et al* noted that 90% of ERP projects at the time were late or over budget and only 33% were successful [19]. Aiken and Keller indicate a figure of 30% success [21]. Dantes and Hasibuan investigated the effect of organizational maturity levels on ERP implementation success. The empirical study categorized organizational maturity into operational, managerial and strategic levels, as indicated in Figure 5, whereby the following information system capabilities applied to each category:

- Operational - cost reduction, cycle time reduction, productivity improvement, quality improvement and customer service improvement;
- Managerial - Operational level capabilities together with resource management, improve decision making and planning, and performance improvement; and
- Strategic - Managerial level capabilities together with business growth support, business alliance support, building of business innovation, building of cost leadership, generation of product differentiation, and building of external linkages.

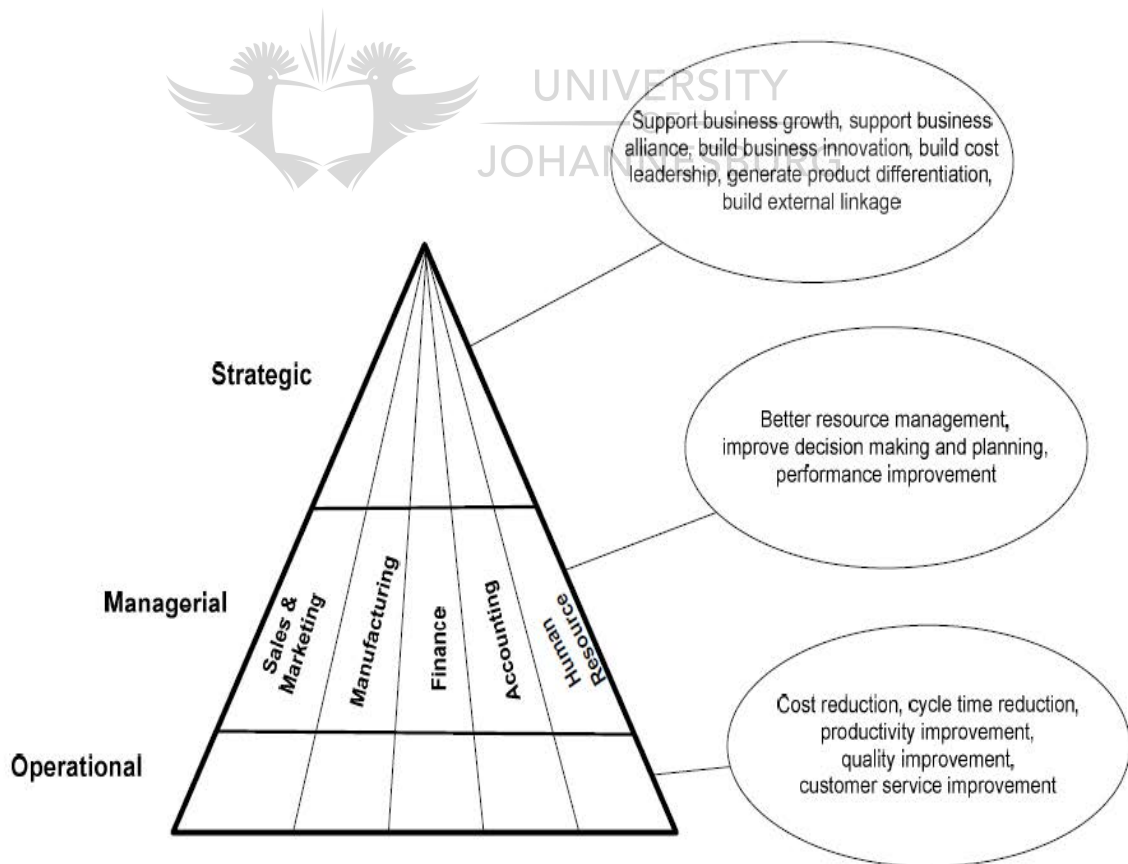


Figure 5: Organizational Maturity Levels [37]

Although the study indicated that the probability of ERP implementation success is higher in more mature organizations, Dantes and Hasibuan concluded that there is no correlation between organizational maturity and ERP implementation success [37].

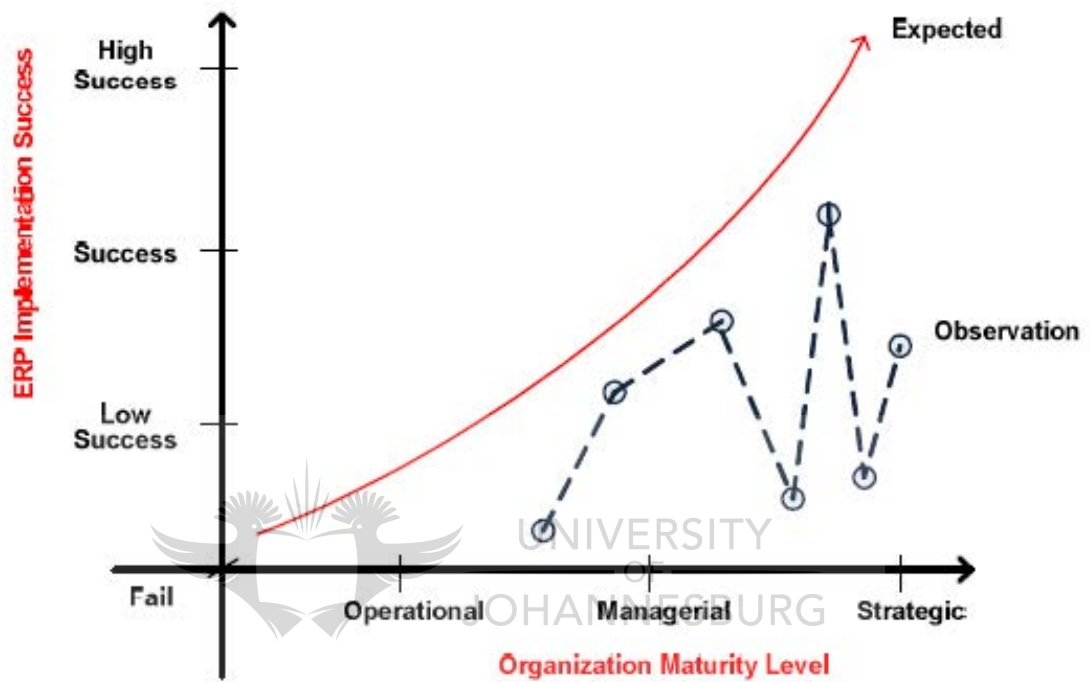


Figure 6: Organizational Maturity vs. ERP Implementation Success [37]

Notably, the Dantes and Hasibuan's study also stressed that organizational maturity alone is not a determinant of ERP implementation success [37].

Understandably, a lot of research effort has been put into trying to better the poor implementation success rate statistics and understand the organizational impact of ERP implementation. Consequently, ERP research has developed into the hierarchical structure [9] illustrated in Figure 7.

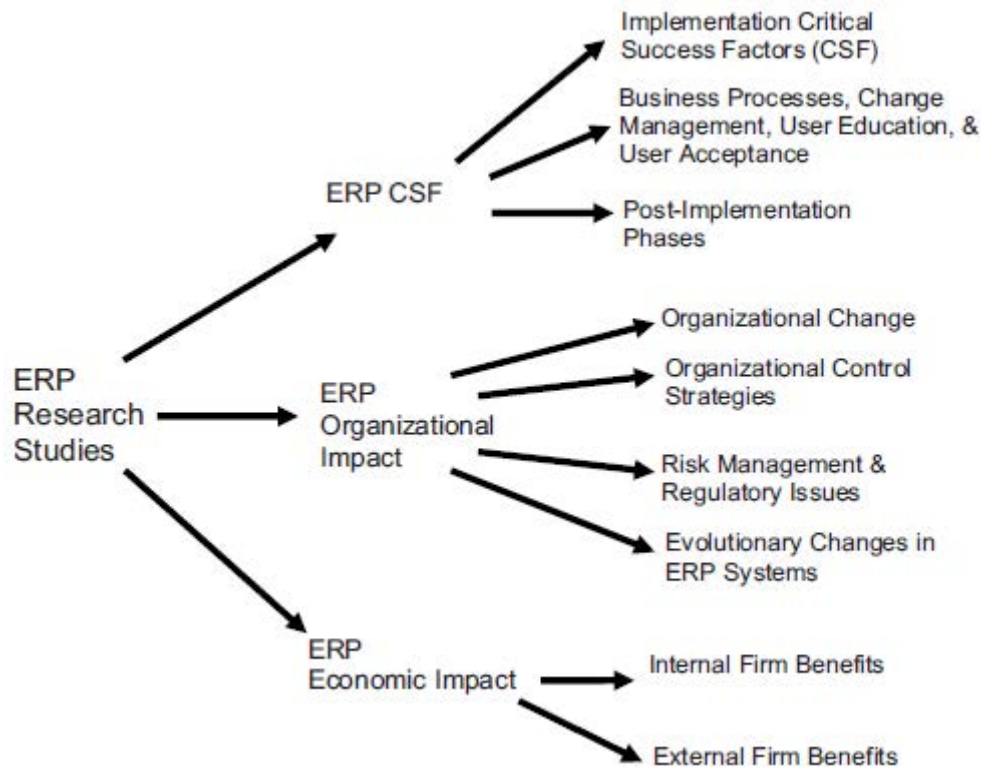


Figure 7: ERP Research [9]

Of particular interest to this review are the following:

- Implementation Critical Success Factors; and
- Change Management.

Critical success factors will be discussed in the next sub-section and change management will be discussed in the next chapter.

3.2 Critical Success Factors

ERP implementation researchers have, through case studies and surveys, tried to identify sets of factors that must be managed in order to ensure implementation success. These factors have been termed Critical Success Factors (CSFs). Researchers have proposed various critical success factors over the years with most of them showing concurrency.

The following have been proposed as critical success factors for ERP implementation [10] [14] [15] [17] [19]:

- Top Management Support ;
- User Involvement ;
- Education and Training;
- Communication
- Organizational and Cultural Context;
- Change Management
- Project Management
- Influence of Legacy Systems ;
- Broad-based Commitment ;
- ERP Implementation Team Composition
- Data Accuracy; and
- System Vendor Support.

Interestingly, Aladwani acknowledges the importance of Critical Success Factor research but states that it alone is inadequate when it comes to fully describing the dynamics of implementation [17]. Aladwani advocates the use of critical success factors with a process oriented approach as illustrated in the model in Figure 8. Aladwani's model incorporates some change management characteristics.

Various researchers have identified different CSFs depending on the case studies applicable. A lot of the CSFs identified are very similar concepts. Consequently, some researchers have done work on the categorisation of CSFs. One such categorisation is provided in Appendix B.

Inverse to CSFs, researchers have also identified the concept of critical failure factors. These are described as the factors that will predetermine failure of a change initiative. In the context of ERP implementation, critical failure factors (CFFs) have been defined as *"the key aspects (areas) where things must go wrong' in order for an enterprise resource planning implementation process (ERP) to achieve a high level of failure"* [35]. The factors that research has identified as CFFs are given in Appendix C.

Change Management will be discussed in the next chapter.

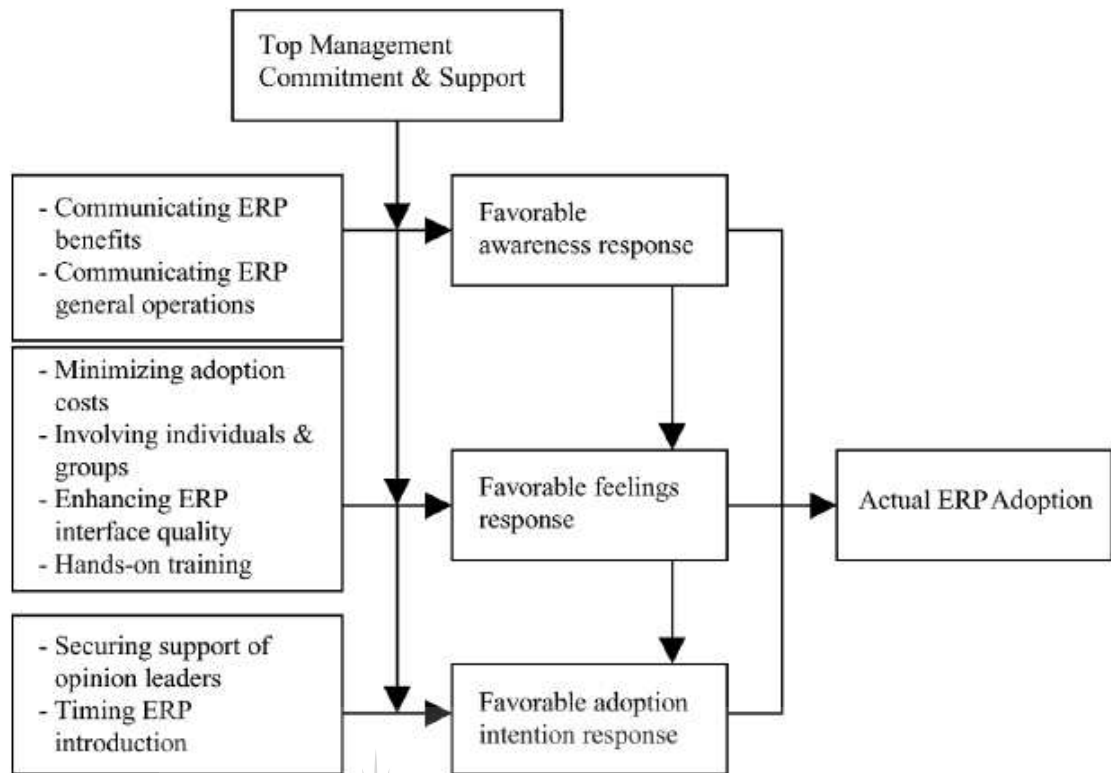


Figure 8: Aladwani ERP Adoption Model [17]

3.3 Conclusion

ERP implementation projects are complex projects that provide good case studies of the challenges that can be encountered during software implementation projects. In a fairly mature area of software implementation research, researchers have identified various critical success factors for the successful implementation of software. The factors identified by different researchers have generally been consistent with other researcher's findings. Top management support, project management and change management have been, along with others, some of the critical success factors that have consistently been identified by researchers. The factors that have been identified as critical failure factors are often the inverse or lack of management of critical success factors.

CHAPTER 4: CHANGE MANAGEMENT

This chapter investigates change management aspects at an individual level and at an organizational level. Individual's affective, cognitive and behavioural reactions to change and the underlying theory are analysed. The ensuing manifestation of resistance to change at an organizational level is also analysed.

Change is a natural part of life that effects psychological reactions in people. When change is applied in a business environment, these reactions can pose a threat to the successful implementation of the change initiative. Research has shown that the most common reactions to organizational change are negative [22]. These negative feelings towards change could be detrimental in business environments where an organization's competitive advantage also depends on its ability to adapt quickly and effectively to the change being implemented [22]. Research has shown that 40-70% of change initiatives fail despite the fact that people are aware of the need for the change [22]. In an organizational setting, change is implemented by or on the employees and the success thereof is determined by how the employees behave towards the change [12] [13] [22]. This fact has led to the realisation of the critical importance of employee support for change initiatives. In a business culture that promotes ownership, responsibility, accountability and empowerment, there is a need to understand and manage the psychological reactions caused by organizational changes in order to improve the probability of success. It is this need that has led to the development of the field of Change Management [22]. One change management learning centre defines change management as follows[42]:

“Change management is the process, tools and techniques to manage the people-side of business change to achieve the required business outcome and to realize that business change effectively within the social infrastructure of the workplace.”

In order to further understand the need for change management, the current research will explore the psychology of change in individuals as well as the reactions to organizational changes.

4.1 Individual Change Management Psychology

The field of psychology is concerned with how the human minds work and how individuals react to and behave in certain environments. As individuals are often subjected to different forms of change, a significant amount of work in the field of psychology has gone into understanding how individuals and groups react to change [12] [22]. Individual change management literature highlights the need to understand external world changes and the simultaneous internal psychological transitions by drawing on four approaches to change [24]. These four approaches are defined as;

- The behavioural approach;
- The cognitive approach;
- The psychodynamic approach; and
- The humanist approach.

4.1.1 The Behavioural Approach

The behavioural approach is based on the concept that preferred behaviour can be elicited, encouraged or discouraged, by linking it to reward or punishment [24][29]. This approach focuses on changing behaviour without putting much focus on how individuals experience the change [24]. This approach is described by the four scenarios illustrated in Table 5 below.

Table 5: Behavioral Approach Scenarios [24]

Actions	Positive	Negative
Addition	Positive reinforcement Pleasurable and increases probability of repeat behavior	Punishment Unpleasant (for example, an electric shock) leading to decrease in repeat behavior
Subtraction	Extinction Avoidance of an unpleasant stimulus increases the likelihood of repeat behavior	Negative reinforcement Removal of a pleasant stimulus decreases the likelihood of repeat behavior

According to Cameron and Greene, in order to change behaviour, five steps are required [24]. These steps are:

- Step 1: The identification of the behaviours;
- Step 2: The measurement of those behaviours;
- Step 3: A functional analysis of the behaviours;
- Step 4: The generation of a strategy of intervention; and
- Step 5: An evaluation of the effectiveness of the intervention strategy.

The fourth step, “The generation of a strategy of intervention”, requires the linking of behaviours to rewards or punishments. This can be achieved through financial reinforcement, non-financial reinforcement and social reinforcement. Financial reinforcement is the most explicit mechanism and involves incentives such as bonuses and prizes. A key component of this type of reinforcement is that there must be a clear, close and visible link between reward and the required behaviour. Non-financial reinforcement involves the provision of positive or negative feedback in various forms e.g. coaching. This form of reinforcement has greater impact when the feedback is more specific. Social reinforcement is implemented through interpersonal actions such as group approvals or disapprovals. This could take the form of recognitions, praise and compliments [24].

4.1.2 The Cognitive Approach

The psychology of the cognitive approach developed as an expansion of behaviourism. This approach is more focused on the internal processes and processes inside the brain. The base theory for the cognitive approach is the premise that emotions and problems result from thinking patterns. The ground breaking work in the field of cognitive research was done by Albert Ellis who highlighted the importance of the following four concepts [24]:

1. People’s conditioning themselves to feel disturbed (rather than being conditioned by parental and other external sources);
2. Their biological as well as cultural tendencies to think ‘crookedly’ and to needlessly upset themselves;

3. Their uniquely human tendencies to invent and create disturbing beliefs, as well as their tendencies to upset themselves about their disturbances; and
4. Their unusual capacity to change their cognitive, emotive and behavioural processes so that they can:
 - a. Choose to react differently from the way they usually do;
 - b. Refuse to upset themselves about almost anything that may occur; and
 - c. Train them so that they can semi-automatically remain minimally disturbed for the rest of their lives.

Cognitive theory was developed by Aaron Beck on the theoretical basis that an individual's behaviour is determined by the individual's outlook of the world. This theory allowed for the development of the cognitive approach to change which suggests that individuals must assess how they limit themselves by adhering to old ways and must embrace new ways [24]. The approach is more concerned with what and how individuals plan to achieve goals. The cognitive approach advocates the setting of clear goals and highlights the following questions that need to be asked in order to achieve results:

- Self-concept and values: what are my core values? ;
- Beliefs and attitudes: what are my limiting beliefs and attitudes and with what do I replace them? ;
- Feelings: what is my most effective state of being to accomplish my goals and how do I access it? ;
- Behaviour: what specifically do I need to be doing to achieve my goals and what is my first step? ; and
- Results: what specific outcomes do me want and what might get in the way? [24]

Furthermore, the approach suggests that individuals need to be careful of the manner in which they talk to themselves as these internal conversations can limit the individuals.

Various techniques for changing individuals' beliefs have been developed in the cognitive approach. These include [24] [25] [27] [29]:

- Positive Affirmations- personal, positive, present tense and potent statement describing a desired state of being;
- Visualization- positive and present mental imagery;
- Reframing- reduction of negatively impacting thoughts and feelings;
- Pattern Breaking – symbolically shifting focus from negative to positive states;
- Detachment – detaching oneself from negative states; and
- Rational Analysis – disproving irrational beliefs by rationalizing.

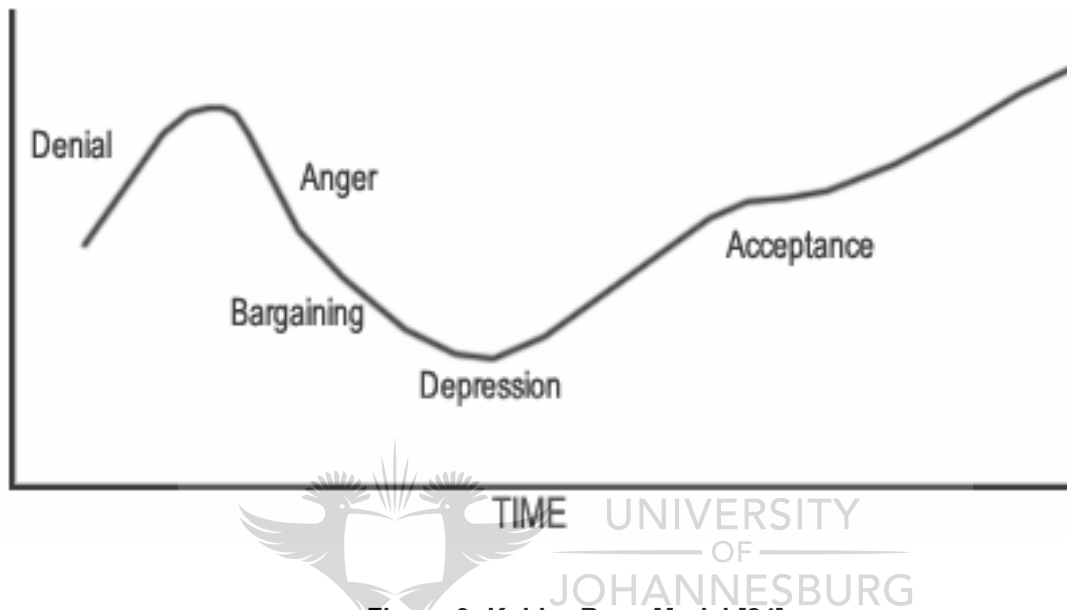
The cognitive approach has a drawback in that it doesn't not account for the inner emotional state of individuals and the effects that this can have on managing change [24].

4.1.3 The Psychodynamic Approach

The psychodynamic approach is based on the premise that when an individual experiences change in the external world, the individual can undergo various psychological internal states. This is illustrated by models such as the Kubler-Ross model. Based on research on terminally ill patients, Elizabeth Kubler-Ross developed the model that highlights five mental states that individuals experience when confronted with change. The five states in the Kubler-Ross model are [24] [30] [31]:

- **Denial.** In this state, individuals do not accept the change. They can deny the change, be emotionally numb to it or be in a state of disbelief.
- **Anger.** This state occurs when individual acknowledges that the change is happening and reacts to it with external or internal anger and frustration. Individuals in this state are not yet willing to accept the change.
- **Bargaining.** In this state the individual tries to remedy the situation as best they can and try to gain some control over the change. The individual still does not accept the change or the gravity of it and can even exhibit signs of panicking.
- **Depression.** When individuals realize that their bargaining is fruitless, they enter into a state of grief, mourning or sadness. Intense emotions, disassociation, sadness and apathy can also be experienced in this state.
- **Acceptance.** In this final state, individuals accept the imminent even though they might not be happy with it. They are however in a state where they are conscious of their positive and negative feelings toward the change and are prepared to accept it.

The Kubler-Ross model also highlights the different levels of self-esteem that individuals experiencing change can go through. As illustrated in Figure 9, self-esteem is highest during the Denial stage and bottoms out during the Depression stage. When an individual reaches the Acceptance stage, their self-esteem is regained to levels similar to their initial state before the change [24].



Subsequent work in the field by Adams, Hayes and Hopsons expanded on the Kubler-Ross model by adding two stages pre the Denial stage and another two stages post the Acceptance stage. The two pre Denial stages are [24]:

- **Relief.** A sense of relief that the change is known ; and
- **Shock and/or Surprise.** A state characterized by disbelief about the change.

The Acceptance stage is followed by the following two stages:

- **Experimentation.** A stage in which the individual starts to entertain thought of the change and possible opportunities ; and
- **Discovery.** A state in which individuals discover that there are positive aspects of the change.

Figure 10 illustrates the expanded model by Adams, Hayes and Hopsons.

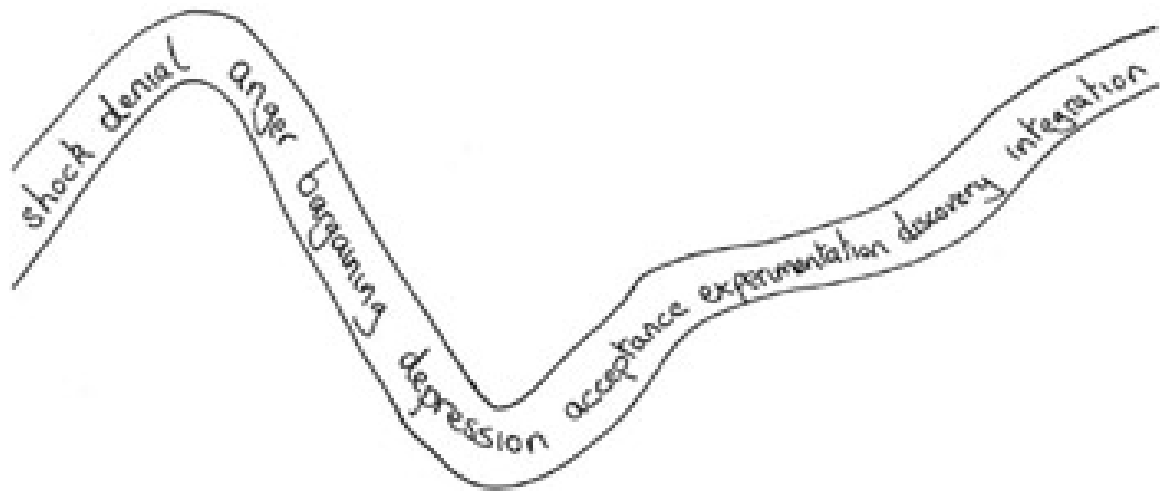


Figure 10: Adams, Hayes and Hopsons Model [24]

Virginia Satir developed a model that introduced the concepts of the “Foreign Element” and the “Transforming Idea”. In the Satir model, as illustrated in Figure 11, consists of three stages, namely [24] [31]:

- Old Status Quo;
- Chaos; and
- New Status Quo.

The Foreign Element and the Transforming Idea represent key events that trigger the transition from one stage to the next i.e. from Old Status Quo to Chaos and from Chaos to New Status Quo. The Old Status Quo represents an initial state in which a certain status quo is maintained. A foreign element, representative of the change in the environment, is then introduced into the system and causes the system to go into a state of chaos. In the chaos state, individuals can internally experience anger, disbelief and disorganization. Subsequently, a transforming idea emerges from the chaos. The transforming idea is the idea that causes the individuals to see the change in a more positive light and triggers the transition from chaos to a new status quo[24][31].

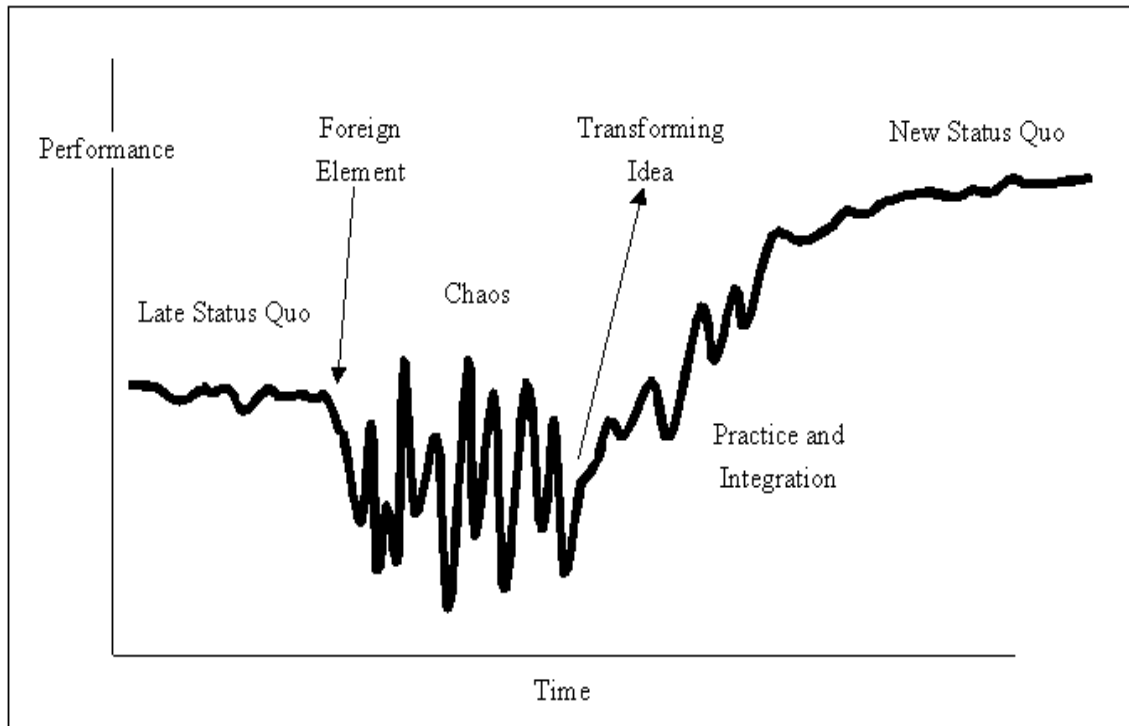


Figure 11: Satir Model [24]

4.1.4 The Humanistic Approach

The humanistic approach is concerned with the more abstract and intangible concepts that are not emphasised in other approaches [24] [29]. These include:

- Love;
- Creativity;
- Self-Growth;
- Self-actualization;
- Values;
- Responsibility;
- Meaning;
- Courage ; and
- Similar concepts.

The humanistic approach has a few key focus areas that highlight the importance and significance of the following [24]:

- The subjective awareness that individuals experience;
- Individuals taking responsibility for their situation; and
- The significance of a holistic approach to individuals.

Although the humanistic approach does integrate some of the concepts that are covered under the psychodynamic, cognitive and behavioural approaches, there are significant differences as indicated in Table 6 [24] [29].

Table 6: Comparison of Humanistic Approach with Other Approaches [24]

Theme	Psychoanalytic	Behaviourism	Cognitive	Humanistic
Psychodynamic approach – looking for what is behind surface behaviour	Yes	No	Yes	Yes
Action approach – looking at actual conduct of person, trying new things	No	Yes	Yes	Yes
Acknowledgement of importance of sense-making, resistance, etc.	Yes	No	No	Yes
Use of imagery, creativity	No	Yes	Yes	Yes
Use in groups as well as individual	Yes	No	No	Yes
Emphasis on whole person	No	No	No	Yes
Emphasis on gratification, joy, individuation	No	No	No	Yes
Adoption of medical model of mental illness	Yes	Yes	Yes	No
Felt experience of the practitioner important as a tool for change	Yes	No	No	Yes
Mechanistic approach to client	No	Yes	Yes	No
Open to new paradigm research methods	No	No	Yes	Yes

The humanistic approach is demonstrated by Abraham Maslow's Hierarchy of Needs. Maslow researched what motivated people to be able to live their lives to the fullest and believed in an inbuilt desire in individuals to develop and reach an ultimate state he termed "Self-Actualization". What constitutes the state of self-actualization is dependent on the individual's goals in life. Maslow hypothesized that in order to reach self-actualization; there is a hierarchy of several other needs that need to be satisfied and one cannot move from one level in the hierarchy to the next until the needs in the subsequent levels had been satisfied [24]. Maslow's Hierarchy of Needs is illustrated in Figure 12.

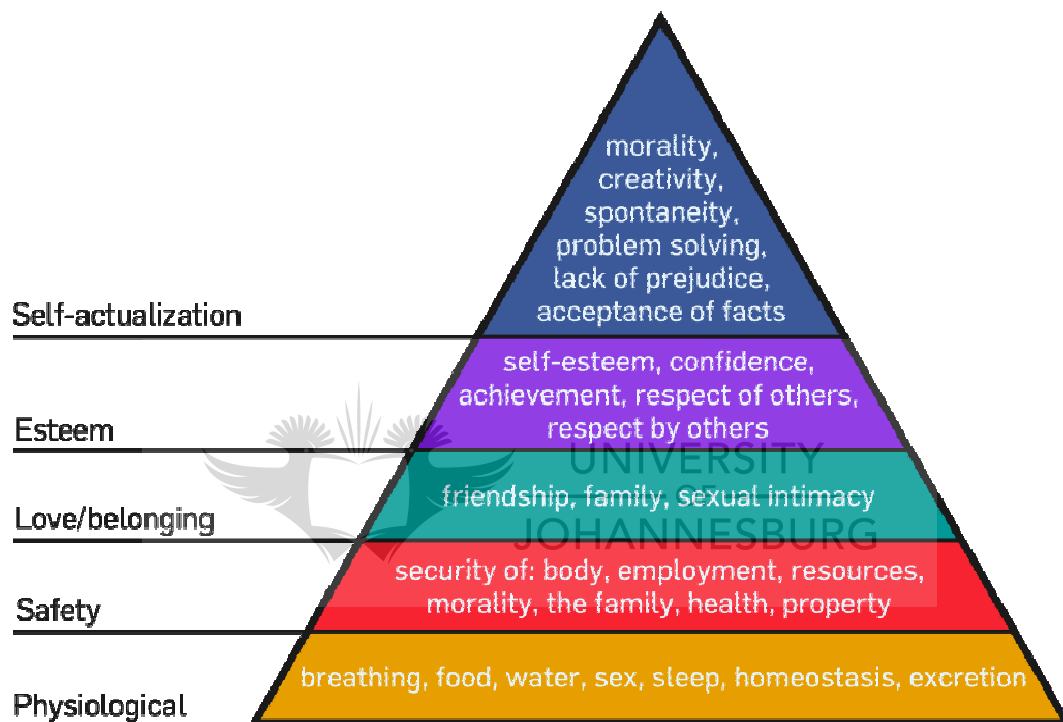


Figure 12: Maslow Hierarchy of Needs

The types of needs identified in the hierarchy are as follows:

- Physiological – basic requirements such as food and water ;
- Safety – the desire for a sense of security, physically and psychologically ;
- Love and belonging – reciprocated affection and intimate affiliations ;
- Self-esteem – needs that can be fulfilled through recognition of achievement, competence and mastery ; and

- Self-actualization – described by Maslow as ‘the desire to become more and more what one is, to become everything that one is capable of becoming’.

Maslow classified the first four needs as needs of the hierarchy as ‘deficiency needs’ i.e. needs that if not fulfilled motivated individuals to achieve something. He noted the desire of individuals to seek to develop and grow further when their deficiency needs had been satisfied.

In his research, Carl Rogers, another prominent figure and one of the founders of the humanistic movement, highlighted three conditions that are necessary for change to bring about growth and development. These three conditions are:

- Genuineness and congruence: to have awareness of ones feelings and be true to them ;
- Unconditional positive regard: genuine willingness to allow individuals to work through the emotions experienced during change ; and
- Empathic understanding: Carl Rogers explained this as follows: ‘It is only as I understand the feelings and thoughts which seem so horrible to you, or so weak, or so sentimental, or so bizarre – it is only as I see them as you see them, and accept them and you, that you feel really free to explore all the hidden roots and frightening crannies of your inner and often buried experience. [22]

Rogers also developed a 7 stage model to describe the emotions that individuals experience through the process of change. These 7 stages and the emotions thereof are illustrated in Table 7.

Table 7: Seven Stage Change Process [24]

Stage	Emotions/Feelings/Reactions
One	an unwillingness to communicate about self, only externals; no desire for change; feelings neither recognized nor owned; problems neither recognized nor perceived.

Two	<p>expressions begin to flow;</p> <p>feelings may be shown but not owned;</p> <p>problems perceived but seen as external;</p> <p>no sense of personal responsibility;</p> <p>experience more in terms of the past not the present.</p>
Three	<p>a little talk about the self, but only as an object;</p> <p>expression of feelings, but in the past;</p> <p>non-acceptance of feelings; seen as bad, shameful, abnormal;</p> <p>recognition of contradictions;</p> <p>personal choice seen as ineffective.</p>
Four	<p>more intense past feelings;</p> <p>occasional expression of current feelings;</p> <p>distrust and fear of direct expression of feelings;</p> <p>a little acceptance of feelings;</p> <p>possible current experiencing;</p> <p>some discovery of personal constructs;</p> <p>some feelings of self-responsibility in problems;</p> <p>close relationships seen as dangerous;</p> <p>some small risk-taking.</p>
Five	<p>feelings freely expressed in the present;</p> <p>surprise and fright at emerging feelings;</p> <p>increasing ownership of feelings;</p> <p>increasing self-responsibility;</p> <p>clear facing up to contradictions and incongruence.</p>

Six	<p>previously stuck feelings experienced in the here and now;</p> <p>the self is seen as less of an object, more of a feeling;</p> <p>some physiological loosening;</p> <p>some psychological loosening – that is, new ways of seeing the world and the self;</p> <p>Incongruence between experience and awareness reduced.</p>
Seven	<p>new feelings experienced and accepted in the present;</p> <p>basic trust in the process;</p> <p>self becomes confidently felt in the process;</p> <p>personal constructs reformulated but much less rigid;</p> <p>strong feelings of choice and self-responsibility.</p>

4.2 Organizational Resistance Outcomes



Research has shown that employees' reactions to organizational changes are commonly negative. These negative reactions can be detrimental to the change initiative as they result in resistance. Resistance is described as a three-pronged negative reaction toward the change. The three, often interdependent, aspects of this reaction are [12]:

- Affective – describing the feelings towards the change;
- Cognitive – describing the perspective of benefits of the change; and
- Behavioural – describing the intent to actively resist the change.

Change management literature describes the following reasons for employee's resistance to organizational changes.

4.2.1 Sources of Resistance

Organizational change management literature indicates that organizational resistance can be linked to the context of the change and the personalities of the individuals in the organization. Individuals have different propensities for change based on their personalities [12]. These differences in disposition to change can dictate whether individuals are more inclined to adopt or resist change [12]. Stable personalities, with a high disposition to change resistance, are less likely to incorporate voluntary changes in their lives and more likely to resist imposed changes. These types of personalities are also more likely to experience strong negative feelings like anxiety and fear when change is imposed upon them.

A significant amount of change management research has centred on the context in which change occurs and how this leads to resistance. Research has provided various contextual variables that are antecedents to resistance. Generally, these antecedents are either concerned with the outcomes of the change or the procedural manner or process in which the change is implemented [10] [12] [22]. Reactions to the change process or procedure tend to be behavioural whereas reactions to the expected outcomes tend to be affective and cognitive [12]



4.2.2 Outcomes based antecedents to resistance

One of the preeminent factors determining if employees will accept change is the degree to which the change is perceived to be beneficial or detrimental to them. This evaluation of the effect the change will have appeals to the cognitive reasoning of employees and provides a rational reason to accept or resist the change [12]. Research highlights the following change outcomes based antecedents:

- Intrinsic rewards;
- Job security;
- Loss of power and prestige; and
- Fear of failure.

Intrinsic rewards describe the internal satisfaction that employees obtain from aspects of their jobs. These could be in the form of the challenging nature of the job or the level of autonomy experienced. Changes that affect the perceived level of intrinsic rewards can solicit affective and cognitive reactions. The reactions can be positive or negative depending on whether the intrinsic rewards are affected negatively or positively [12]. Some

organizational changes can decrease the intrinsic job satisfaction of employee's by creating or shifting employees to less challenging environments [12]. Intensification of work, arising from organizational changes, also affects the intrinsic rewards associated with employees' jobs [10].

Job security, or the fear of job loss, has been highlighted as an obvious determinant of resistance to change. The possibility of job losses as a result of organizational changes elicits strong emotional reactions in employees that result in affective resistance. [10][12][22]

Organizational changes sometimes result in changes in positions or job roles and responsibilities. For some employees these changes can result in reduced responsibility, reduced status, a reduction in political clout in the organization or the possible redistribution of power, status and prestige. This loss of power and prestige creates strong affective and cognitive reactions. Research studies have found that threats to power and the reluctance to relinquish power are some of the primary causes of resistance to organizational change [10] [12] [22].

Fear of failure can arise when employees perceive that they will be unable to cope with the changes, such as new technologies, in the organization. This fearful reaction to the change has been highlighted as a dangerous reaction as it impedes rational analysis of the change and opportunities thereof and can lead to stress [22] [27].

4.2.3 Process based antecedents to resistance

Research has highlighted that the process employed in implementing organizational change also affects employees' attitudes towards the change. The following process based antecedents to resistance have been identified:

- Trust in Management;
- Disruptions in sense making;
- Information; and
- Social Influence.

Defined as *“the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party”* [10], trust has been established as a critical aspect of change management. Research has shown a strong correlation between trust in management and the intentions to resist change [12] [19].

Furthermore, trust in management has been shown to affect cognitive, affective as well as behavioural reactions. Employees that have trust in management have more willingness to be vulnerable to management actions and are more likely to accept the reasons or rationale provided by management for the change [10]. Conversely, where there is a lack of trust in management, employees are more likely to be critical of information regarding the change and the justification for the change. Research has also shown that frequently carrying out failed change initiatives can also create distrust in management [22].

Sense-making is described as *“an active process that involves the interaction of information seeking, meaning ascription, and associated responses”* [11]. Disruptions in sense-making refer to the phenomenon whereby employees, based on the information available to them, do not understand the change and rationale behind it. Research has shown that it is important for employees to understand the rationale behind the change in order to commit to it [22] [20]. The definition of sense-making alludes to the importance of information during organizational change.

Information, or lack of information, has been shown to influence employees' attitudes and reactions towards change [10]. Research has shown that in the face of uncertainty, employees will exhibit information seeking behaviours [22]. If quality information is not forthcoming from the organization, there is the possibility that employees will seek information from different sources, a practice that might be counterproductive to the change initiative [22]. Information has been shown to be strongly negatively correlated to uncertainty, i.e. more information equals less uncertainty. However, it has also been noted that more information does not automatically translate to improved attitudes and reactions toward the change. The perceived quality of the information received is also important in changing attitudes and reactions [22]. Research has also shown that the dissemination of timely and useful information creates a willingness to cooperate with organizational changes [12].

Another that affects resistance to change is that of social influence. Social influence can either affect resistance positively or negatively. Social network theory suggests that because individuals are embedded within social systems, those social systems form the basis for the formulation of attitudes. In the context of organizational change, this theory implies that employees are more likely to resist changes if the social environment in the organization resists the change [10].

Change management literature also highlights the importance of uncertainty during organizational changes. Overarching the above mentioned antecedents to change and described as “*an individual’s perceived inability to predict something accurately*” [10], a wide range of uncertainties have been identified. These uncertainties revolve around the following [10] [12] [22]:

- Expected outcomes of the change;
- Job or position security or loss of power and prestige; and
- The change process.

However, it has been noted that uncertainty can also provide a sense of hope or optimism regarding expected outcomes of change.

4.3 Organizational Resistance Outcomes



Research has shown that organizational change triggers cognitive, affective and ultimately behavioural reactions in individuals [25]. The interaction between the cognitive, affective and behavioural responses to organisational is illustrated by Smollan’s model for organisational change response in Figure 13. Although these responses, with exception of behavioural responses, predominantly manifest internally; the model highlights external forces that could affect the responses. These include the leadership ability of the change manager, their emotional intelligence as well as the organizational culture and context in which the change occurs. Furthermore, the model suggests that individuals will have certain predispositions based on their character, previous experience and even stress from sources external to the organization. Hence there are several variables that can act as mediating or moderating factors to an individual’s cognitive, affective and behavioural responses. These mediating and moderating factors are discussed further in Appendix A.

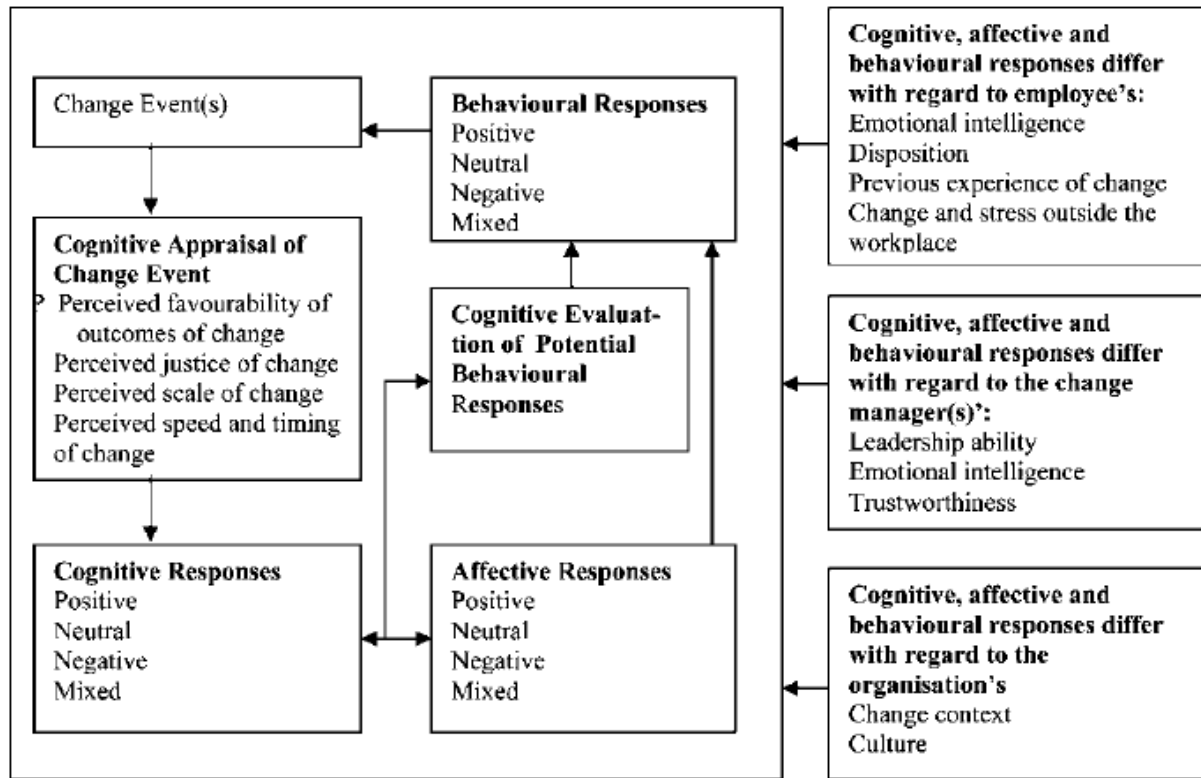


Figure 13: Smollan's Organizational Change Response Model [25]

Oreg developed a model, illustrated in Figure 14, in which he sub-categorized resistance into affective, cognitive and behavioural resistance and, based on structural equation modelling, correlated these to three expected work outcomes. The model highlighted the following relating to employee withdrawal during organizational change [12]:

- Affective resistance has the strongest correlation with employee job satisfaction;
- Behavioural resistance has the strongest correlation with intentions to quit; and
- Cognitive resistance has the strongest correlation with employees' commitment to the change and continuity with the organization.

Research has also indicated that employees who experience strong negative cognitive reaction coupled with affective resistance emanating from emotions such as fear, anxiety and anger will most likely reject the change [25].

This rejection of the change can be manifested in the following ways [10] [12] [25]:

- Disloyalty;
- Neglect;
- Exit from the organization;
- Lower trust;
- Active campaigning against the change;
- Deception;
- Sabotage;
- Violence; and
- Aggression.

Generally, it has been found that resistance can have serious negative effects on the change initiative and corrode the competitive advantage of the organization due to employee withdrawal [22].



4.4 Conclusion

Individuals experience a range of psychological reactions when confronted with change. These reactions are experienced in a change process such as the change processes indicated by the Kubler-Ross and Satir models. Consequently, individuals exhibit cognitive, affective and behavioural responses to the change. These responses could lead to resistance against the change. Resistance, which can be due to several factors relating to the change implementation, must be managed in order to ensure project success.

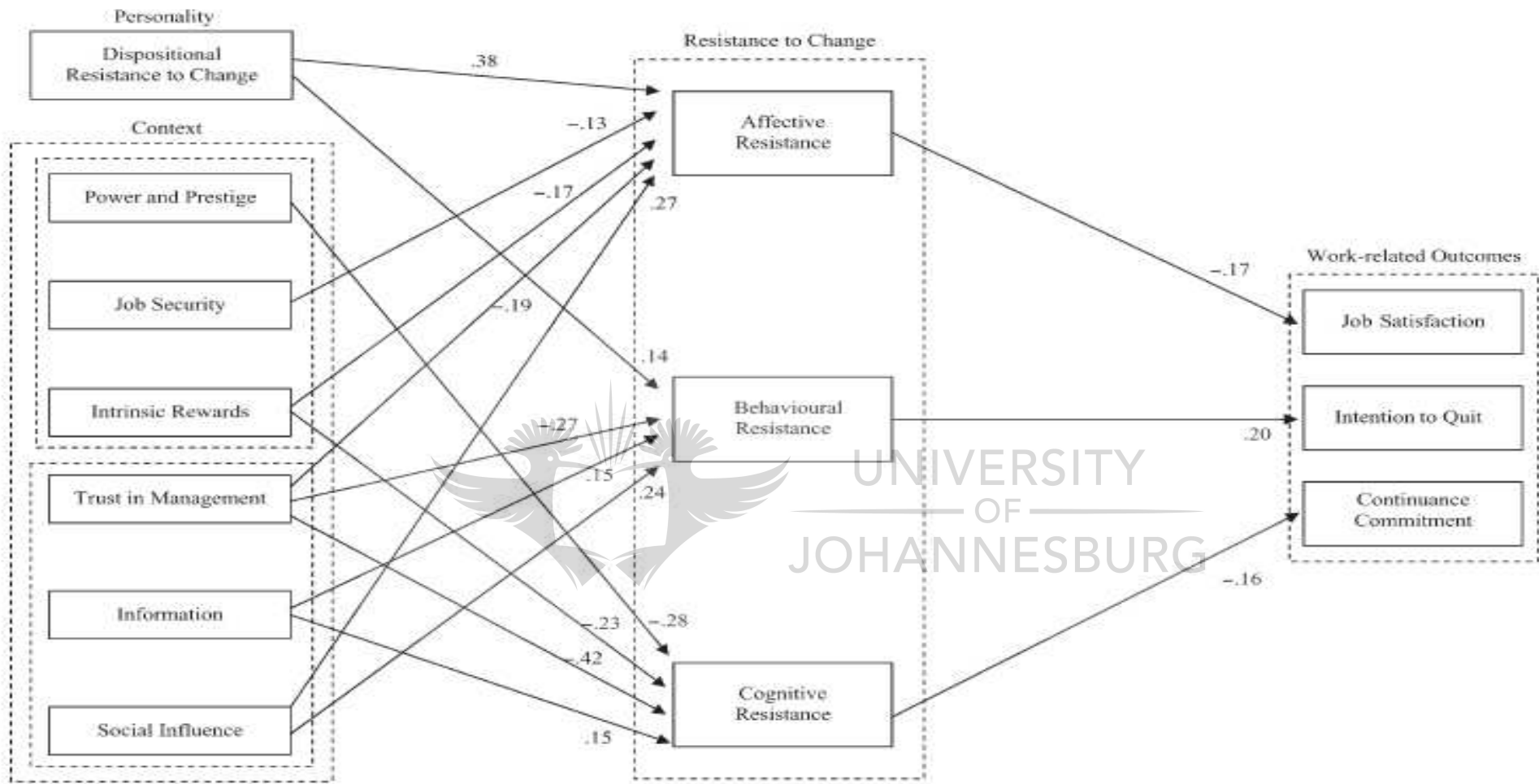


Figure 14: Oreg Resistance Correlation Model [12]

CHAPTER 5: CHANGE MANAGEMENT STRATEGIES IN SOFTWARE IMPLEMENTATION PROJECTS

This chapter will investigate the strategies that research has identified in order to manage and mitigate resistance to organizational changes in software.

Researchers have noted that many ERP software implementations fail because organizations underestimate the importance of change management and the effort required thereof [34]. Change management has also been identified as a core competency for the successful implementation of software project [17]. These research findings allude to the importance of change management strategies in the implementation of software implementation projects. As such, researchers have developed and proposed change management strategies for software implementation projects. One such change management strategy is a three phase model proposed by A. Aladwani [17].

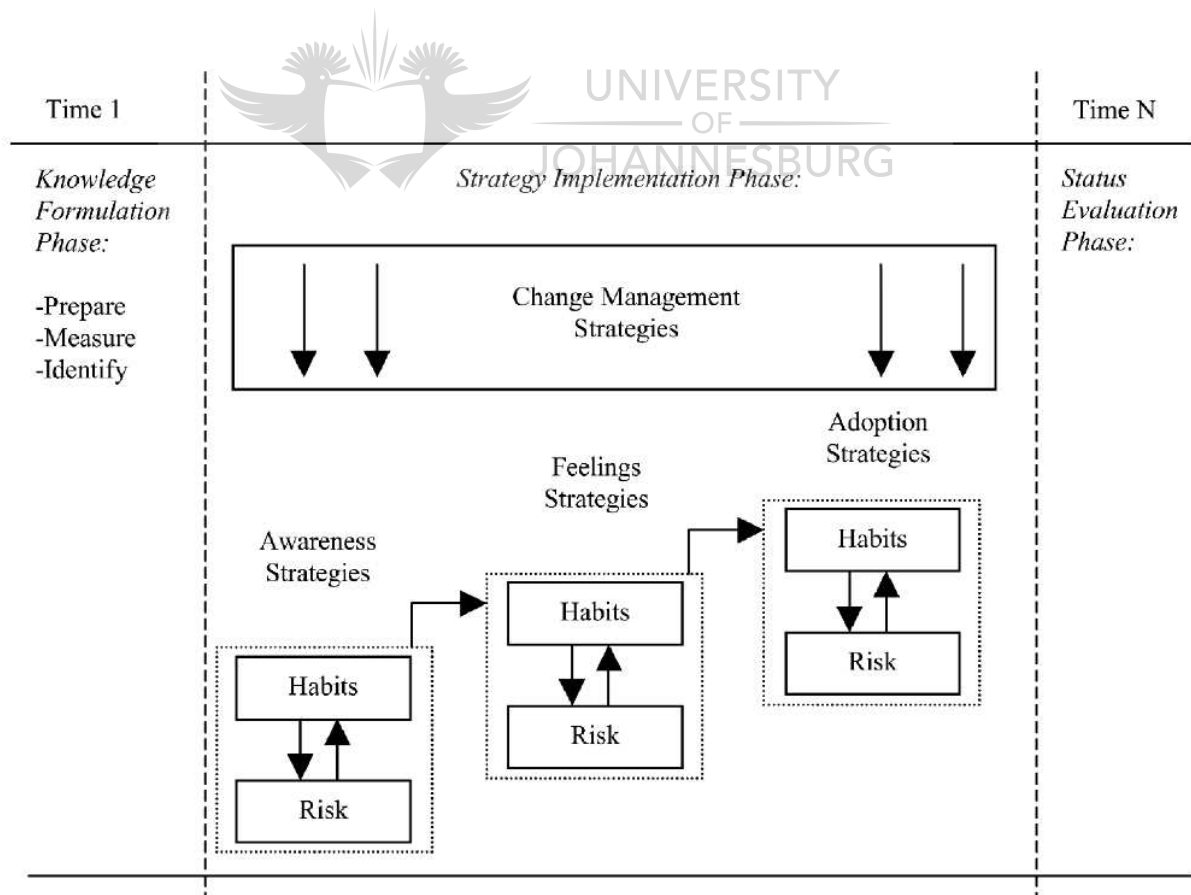


Figure 15: Aladwani Change Management Strategy [17]

5.1 Aladwani Change Management Strategy

Aladwani's strategy consists of a knowledge formulation phase, strategy implementation phase and status evaluation phase. The goal of the first phase, Knowledge Formulation, is the identification and evaluation of affective and cognitive attitudes of individuals and influential groupings towards the change.

The following questions must be addressed during this phase [17]:

- Who are the resisting individuals and/or groups? ;
- What are their needs? ;
- What beliefs and values do they have? ; and
- What are their interests?

This information can then be used to identify possible sources of resistance to the change as well as the habits and risks prevalent in the implementation environment [17].

In the Strategy Implementation phase, information obtained in the first phase is used to formulate strategies that are aimed at changing end-user's attitudes. Researchers have noted that the first approach to changing employees' attitudes is to try and affect the cognitive component of the attitude [17]. Communication has been identified as a key factor in affecting cognitive attitudes [12] [17] [34]. Top management is encouraged to market and create anticipation around the new software system by communicating the benefits of the new system while simultaneously managing expectations. Further marketing of the system can be directed around how the system will work [17]. The second approach in changing employees' attitudes targets the affective components of employees' attitudes. In order to appeal to the affective component of employees' attitudes, management must try to minimize adoption cost to individual employees' as well as influential groupings. This minimization of the adoption cost must be demonstrated to the organization. Aladwani also advocates the use of quality differentiation, to improve user perception, and hands on training. Hands on training allows employees to become familiar with the system and gain an appreciation for the system's features and benefits thereby creating positive feelings towards the system[17].

Another strategy that is employed in the Strategy Implementation phase is the buy-in of influential groups or individuals. This can be done by allowing these groups or individuals into the decision-making process in order to gain their commitment and benefit from their influential standing in the organization [17]. Aladwani's model also stresses the importance of the timing of the actual implementation of the software as well as the importance of senior management support. Management must be committed to the implementation project and the actual implementation must be carried out when positive feelings about the software prevail [17].

The third and final phase of the model, Status Evaluation, is concerned with the measurement and evaluation of the effectiveness of the change management strategies employed in the second phase. Management must evaluate the success of the change management initiatives implemented and react to the failure or success if any such initiatives [17].

Another change management strategy is that applied M. Kemp and G. Low. Kemp and Low's strategy involved the following four steps [34]:

- Implementation climate assessment – an assessment of the impact of the system change on the organization and the organization's change readiness ;
- Scoping and planning – the drafting of a transition plan as well as communication plan to move the organization from the current state to adoption ;
- Change management delivery – implementing change management initiatives such as communication, change champions, training, user involvement and project phasing to reduce resistance ; and
- Benefits analysis – analysing benefits if the change management delivery and reacting accordingly.

Kemp and Low related several change management initiatives to cognitive, affective and behavioural components of the implementation environment and implementation effectiveness as illustrated in Figure 16. This implementation effectiveness model, like Aladwani's research, also highlights the importance of communication and user involvement in a change management strategy for software implementation.

5.2 Aspects of Change Management Strategies

Various researchers have highlighted that communication plays a pivotal role throughout the change implementation process [15] [17] [20] [33] [34]. Frahm and Brown differentiate between three different forms of communication; namely:

- Monologic – an instrumental unilateral form of communication;
- Dialogic – a constructivist relational dialogue; and
- Background Talk – informal conversations that occur between peers [20].

Monologic communication is normally used to convey strategic information and can be useful in conveying the benefits or vision behind the change [22]. Researchers have stressed the importance of communicating the change vision so that the employees can make sense of the change [15] [22] [33] [34].

Dialogic communication represents a bi-lateral form of communication i.e. between supervisor and staff, where questions can be asked and misunderstandings cleared up. This is a very important form of communication as it is through this that job specific concerns can be addressed and uncertainties cleared [22].

Background talk refers to the informal conversations between peers. It is also the context in which negative and resistive talk flourishes [20]. It is worth noting that in the absence of clear concise monologic and dialogic communication, background talk becomes the prominent form of communication regarding the change. Research has shown that an employee is more likely to resist change if social environment is also resisting the change [12].

Involving users in the change has been shown to be a predictor in employee's openness to change, their trust in management and acceptance of the system [22] [39] [40]. More information on the role of user acceptance in software implementation success is provided in Appendix E. User's that are actively participating in the change initiative can also serve as role models and spread positive sentiment in the context of background communication. Researchers have also advocated involving users from an early stage in order foster a sense of ownership, identification and improved commitment to change. In the context of creating a solution, user participation can lead to a more workable and improved solution design [22] [13].

Yet another common finding in the change management of software implementation projects is the importance of end-user training [15] [17] [28] [34]. Researchers have

found that end-user training allows the users to get to grips with the system as well as start appreciating the attribute and potential benefits that the system offers. In the change management implementation effectiveness model, the quality of training is associated with favourable feeling responses [34].

Furthermore, research highlights the importance of the timing as well as phasing of the software implementation. The timing and phasing of the initiative can affect the attitudes of affected parties. These attitudes, as indicated in Chapter 4, can lead to employee resistance. A phased approach is indicated as a tactic that can be used to manage and reduce employee resistance as employees are more opposed to larger scale change than smaller scale changes [25][34]. The amount of time that is allocated to carry out the change initiative is also very important as tight timelines intensify the change and resistance thereof [25].

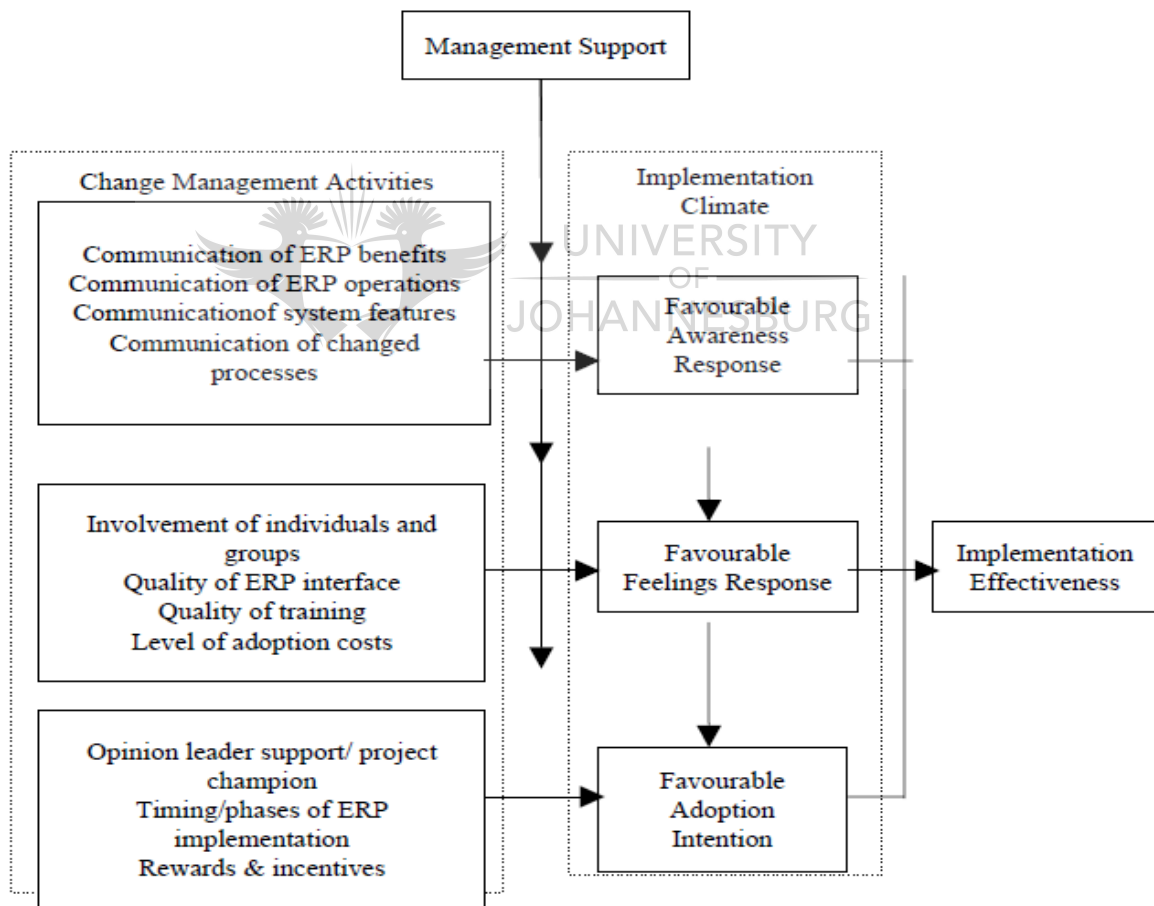


Figure 16: Implementation Effectiveness Model [25]

The implementation effectiveness model also highlights the need to minimise adoption costs for the end-users or affected parties as well as the introduction of rewards and incentives as precursors to favourable adoption intentions. Lastly, researchers have highlighted the importance of the role of change agents or project champions within software implementation projects [25] [34]. These are identified as influential individuals in the organization that will champion and drive the cause [25] [29] [34]. Finally, as highlighted in the critical success factors for the implementation of software implementation projects, management support is highlighted as being crucial in the change management structure [29] [34] [25].

5.3 Transfer of Ownership Change Management Strategy

Stapleton and Rezak, in their case study on ERP implementation at an oil company, identified the Transfer of Ownership change management strategy. The concept behind this strategy is to have ownership of the new system and processes transferred from the design and implementation team to the end-users. The strategy breaks down ownership into three drivers; namely:

- Knowledge transfer;
- Responsibility transfer; and
- Vision transfer.

The strategy places a keener focus on responsibility transfer as this facilitates the transfer of knowledge and vision [37]. The basic idea is that if everyone is involved in some way then communication and training initiatives will have a greater impact. The core aspects of the responsibility transfer drive revolve around the readiness to implement the ERP. To this end tasks are defined and given to the end-users to execute. The end-users become responsible for planning and executing the task and the progress thereof is actively tracked. The progress of the tasks feed into readiness assessment reports for executive management.

Knowledge transfer is a continuous process throughout the implementation. It is facilitated through training initiatives and the project's communication initiatives.

Stapleton and Rezak noted two important challenges that pertain to knowledge transfer:

1. Processes and systems are sometimes still under development during ERP implementation. Hence, at any given time there is a limitation on the amount of knowledge available for transferring; and
2. Subject matter experts are the ideal candidates for transferring the knowledge. However, experts are in limited supply and are often occupied by the project itself.

These challenges must be and can be overcome by training and communication initiatives [38].

The concept behind vision transfer is to get the end-users to see possibilities of the ERP implementation in the same way as the project champions see them. This allows end-users to envision the changes that will be introduced to their work once the implementation is completed. The transfer of vision requires the use of two-way dialogic communication that can be facilitated through interactive initiatives such as workshops, sandbox environments and validation sessions.

The transfer of ownership strategy places an emphasis on the importance of different forms of communication throughout the implementation project. The change management communications model illustrated in Figure 17 is employed in the strategy.

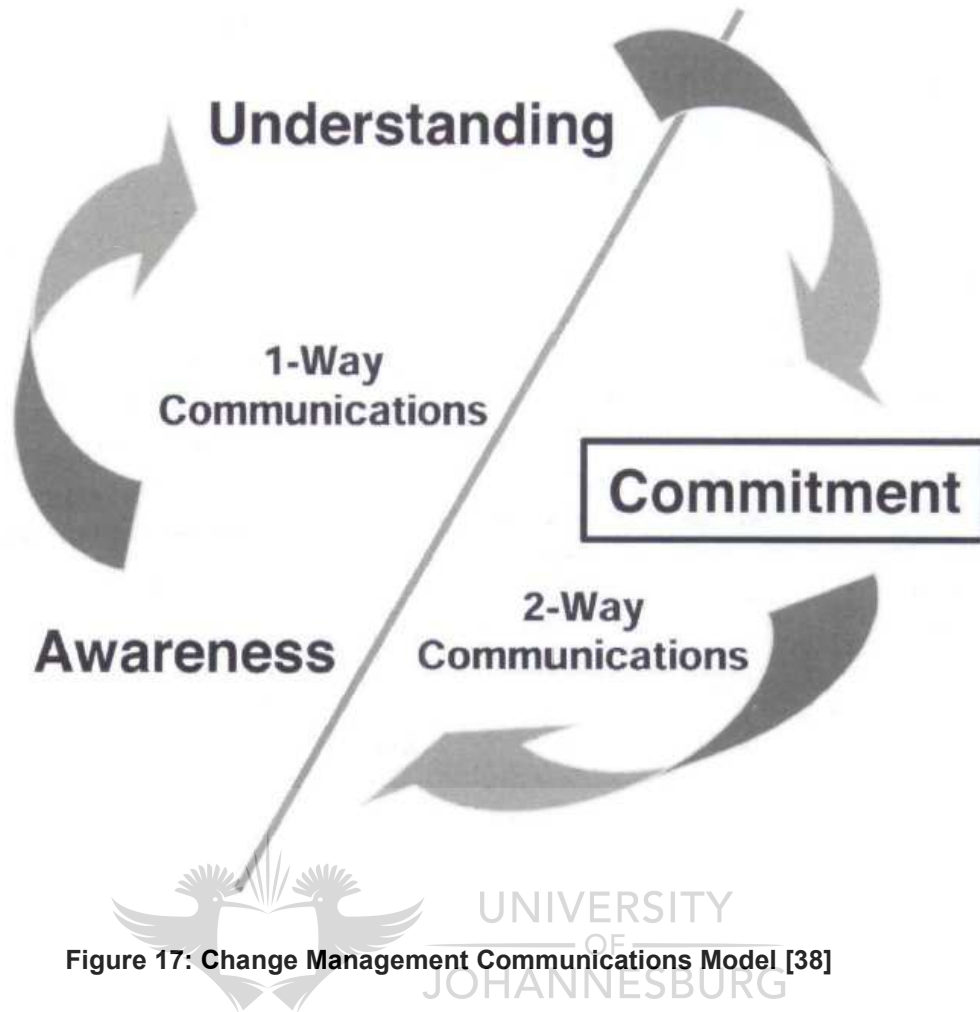


Figure 17: Change Management Communications Model [38]

The model highlights a few fundamental concepts. Firstly, the ultimate goal of communication is to get end-user commitment. However, end-user commitment can only be achieved when the end-users have transitioned through a communication cycle.

This communication cycle involves the following sequential steps:

- Communication to provide awareness;
- Communication to provide understanding; and
- Communication to gain commitment.

Secondly, the model highlights that one-way or monologic communication is adequate to provide awareness and to provide understanding. However, in order to gain commitment, two-way or dialogic communication must exist. Examples of one-way communications initiatives include the following:

- Newsletters;
- Websites;
- Road shows; and
- Personal appearances by key personnel.

Two-way communications are facilitated through the following:

- Interactive workshops;
- Issue tracking;
- Meetings;
- Hands on interventions;
- Conference calls; and
- Collaboration websites.

Lastly, the communication process must be recurrent throughout the project so as to address any challenges encountered [38].

The change management strategies discussed in this chapter are specific to software implementation. Research does however provide generic methods that can be used to implement any organizational change. Some of these methods are provided in Appendix D.

CHAPTER 6: DISCUSSION OF RESEARCH RESULTS

This chapter provides a discussion on the information obtained from a review of the literature on project management, software implementation critical success factors and change management.

Change is perpetual in today's business environment. As one of the many consequences of this constant change, organizations periodically have to change their software systems in order to strategically position themselves better. This results in the organization having to implement a new software or system, the size and complexity of which varies depending on the business needs. Although the antecedent of the software implementation initiative, change, is perpetual in nature; the software implementation initiative is not. Software implementation initiatives are conducted within a finite time using finite resources with the intention to achieve set goals. In essence software implementation initiatives are projects in nature and accordingly they are carried out as projects.

Research has shown that software implementation projects have fairly poor success rates. It has been noted that most software implementation projects are over budget, late, do not meet the goals set out or are implemented with reduced functionality. In general peer reviewed research has indicated a 30-40% success rate for these types of projects. Interestingly, an internet search of software implementation service providers indicates that the service providers generally report success rates that are twice as high. It should be noted that the definition of success in a software implementation project is debatable. Whereas one could argue that successful implementation is the rollout of the system or software, another could argue that success is only achieved when the end-users use the system as specified. Even when the end-users are using the system, one could question the extent to which the system is used in relation to the extent to which it was intended to be used. To a large extent, success in a software implementation project is subjective. This could explain the difference between the success rates reported by service providers and those reported in peer reviewed research.

6.1 Project Management

As projects, software implementation initiatives are carried out in project management environments and frameworks. Project management theory and best practices are well developed and documented. The PMBOK® Guide provides a framework of activities to be managed in order to successfully implement a project. The PRINCE2™ project management methodology outlines the approach to implement a project. The contents of these two *de facto* standards in project management are similar in nature and the two standards are complimentary. These standards are generic and as such can be applied to any type of project. Although outside of the scope of the current research, one can raise the question of the level of suitability of these generic standards to software implementation projects.

Nonetheless, it is in project management environments and frameworks that the challenge of change management must be addressed. This fact is supported by the considerable attention paid to change management and control in the project management standards.

Armed with project management knowledge, the pioneers of ERP implementation gradually discovered that project management does not guarantee success. Some research tried to ascertain relationships between ERP implementation success and the organizational maturity. The results thereof did not adhere to the expected philosophy that more mature organizations would be able to implement ERP more successfully. Hence, good project management and organizational maturity were not, and are still not, predictors of ERP implementation success.

6.2 Critical Success Factors

The drive to identify other aspects that were pivotal to successful implementation culminated in the emergence of critical success factor research. Various researchers have identified different aspects that have been defined as critical success factors. . Given the size and complexity of the ERP implementation projects, the management of time, cost, quality as well as other project management related issues was always going to be important. Inevitably, project management was identified as a critical success factor. Although there are some slight differences in the other factors that were identified, the research indicates that there is a general consensus as to which factors constitute critical success factors for ERP implementation

The most eminent of these undisputed factors is the role that top management support plays in achieving successful implementation. Research indicates that management must actively support, sponsor and champion the ERP implementation project in order to place the organization's focus on it. The support of management must also be driven at the most senior level of the organization so as to align the middle and lower levels of management and lead the organization in one direction. The importance of management support is a factor that is not only highlighted for ERP implementation, but also for generic organizational change initiatives. Top management support requires that management must create an enabling environment for success. To this end management must support the project in terms of approvals, sponsors, championship and resource allocation. Research shows that management must also become actively involved in communication and change management initiatives. Essentially management must be prepared to serve the project wherever the project sees fit to employ the services of management.

Several researchers have indicated the importance of selecting the correct software or ERP package as a critical success factor. These researchers elaborated on the importance of the consideration of issues such as ERP architecture, system vendor support, customizability of the software package, business process re-engineering, integration and the effect of legacy systems. Further critical success factors identified included data accuracy, composition of the implementation teams, business plans and visions. Converse to critical success factors, research has also defined critical failure factors. The current research notes that these generally absence or poor application of the factors that have been defined as critical success factors. While an argument can be made for the importance the many critical success and failure factors, some of them are not of particular interest to the current research.

The critical success factor that is particular interest to the current research, directly, is change management. Other critical success factors that are also of particular interest, indirectly, are those of communication, user education and training and project management. The current research does note that researchers have differed in the manner that they categorised some critical success factors. Whereas some w indicated communication as a standalone critical success factor, others categorised ii as a part of change management. In the authors view, user education and training as well as communication are all aspect of change management and should thus be categorized under change management.

Jerri Dunn, Nestlé's Chief Information officer in 2002, expertly emphasized the importance of change management to large software implementation projects in the statement below [38]:

"No major software implementation is really about the software. It's about change management. When you move to SAP, you are changing the way people work. You are challenging their principles, their beliefs, and the way they have done things for many, many years."

6.3 Individual and Organizational Change Management

In order to understand the need for change management in software implementation projects, one must first gain an understanding of the psychological reactions that individuals experience when faced with change as well as the psychodynamic processes go through. In the context of software implementation projects, the new software represents a change in the organization. The employees' individual psychological reactions to this new software are based on the change psychology concepts discussed in Chapter 4.

The first interesting concept obtained from the literature on human change psychology is derived from Albert Ellis' work. Ellis noted that humans have biological and cultural tendencies to create disturbing beliefs and sometimes needlessly upset themselves. Essentially this can be viewed as a weakness of humans. Ellis, perhaps more importantly, also highlighted a redeeming strength in humans; their ability to change their cognitive, affective and behavioural process to counter the disturbances and disturbing beliefs. This observation was compounded by other psychological scholars that also noted the ability of humans to change their beliefs using various techniques.

The second interesting concept is the set of models that describe the psychodynamic experiences that individuals traverse through when confronted with change. These include the Kubler-Ross model, Satir model as well as the Rogers seven stage change process.

Thirdly, not least or last, the humanistic approach to change psychology highlights the importance of some abstract concepts such as love, values and responsibility. Of particular interest is Maslow's Hierarchy of Needs, re-illustrated below.

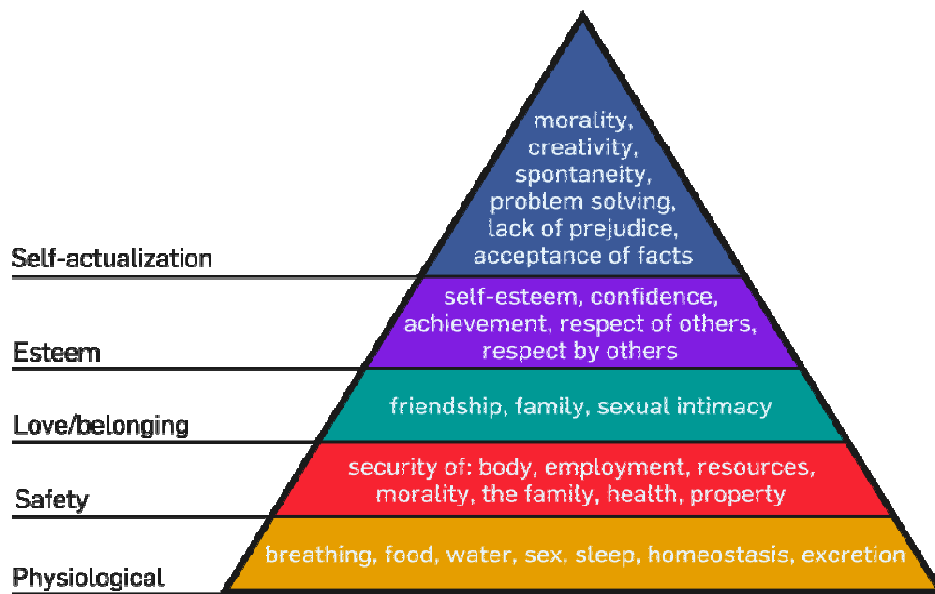


Figure 18: Maslow Hierarchy of Needs

When organizational change occurs, software implementations included, all the above-mentioned concepts can come into play. Firstly, a disturbance in the hierarchy of needs can be realised. The need for Esteem will be disturbed, when individuals feel the software will perform tasks for which they received appreciation, praise and respect. This could also be described as the fear of loss of power or prestige. In extreme cases, the software could render certain jobs and positions redundant thereby making certain employees fearful of retrenchment and hence disturbing their need for Safety.

As described by Ellis, individuals' tendencies to create disturbing beliefs and upset themselves can also come into play. This could be particularly true in the absence quality information from management, whereby employees will fill the void with rumours that can be counter-productive and upsetting.

The introduction of the new software will most likely set into motion the process of employees going through various mental states as described by models such as the Kubler-Ross model or the Satir model. If the Satir model is taken as an example, the new software represents the Foreign Element that plunges employees into the state of Chaos.

It is in this state that employee's experience psychological reactions that can result in employee resistance towards the software.

As described in Chapter 4, this resistance can be affective, cognitive and/or behavioural. The antecedents to the resistance can be outcomes based or process based. These include factors such as loss of power and prestige, job security, lack of trust in management, lack of information etc. Furthermore, research indicates that there are factors that can moderate and mediate the cognitive, affective and behavioural processes that lead to resistance. These factors are discussed in Appendix A. The current research has noted that there are always underlying reasons why employees will resist change in general or the implementation of new software.

Regardless of the reason, end user resistance poses a great threat to the implementation and user acceptance of software systems. Ultimately, this resistance could lead to the failure of the software implementation project. Herein lies the role of change management in software implementation projects. Change management must be employed to manage the complex psychological and psychodynamic processes as well as the cognitive, affective and behavioural responses that could result in end-user resistance and rejection of the software or system.

In essence change management in software implementation should be used to manage the transition from the Status Quo to the New Status Quo stage. The Satir model highlights the concept of a Transforming Idea that causes employees to start shifting out of the Chaos stage. The question that arises in a software implementation project is whether change management must produce the Transforming Idea. By definition, the Transforming Idea is the idea that causes individuals to see the change, in this case the new software, in a more positive light or to see the benefits thereof. This suggests that the benefit is already inherent in the new software and the role of change management is therefore to manage the resistance and illuminate the transforming ideas.

A further question that arises is what if the benefits of the new software are only there for management but the software provides no benefit to the end users/employees? In this context, is the role of change management to create a transforming idea for the employees? One could argue good application of change management principles would have included User Involvement in the process of selecting and implementing

the new software and hence an organisation should ideally not end up in a situation where the new software is only beneficial to management.

In the transition from the Chaos stage to the New Status Quo, end users are required to practice and integrate the new software. Change management highlights the importance of end user training as one of the requirements for employees to accept a new software system. As discussed in Chapter 5, the quality and timing of this training is also quite important and is best done when there are generally positive feelings about the software, i.e. transforming ideas have set in, and the software is about to be rolled out.

6.4 Change Management Strategies

To carry out change management in software implementation projects, various researchers have proposed change management strategies. These strategies create a framework in which to implement tactics that identify and combat resistance as described in Chapter 5. The two of the primary goals of the change management strategy should be to:

1. Minimise the adoption cost so that outcomes based resistance is minimised, managed or alleviated; and
2. Manage the implementation process in such a manner as to reduce process based resistance.

Within the different change management strategies for the implementation of software, there are a few recurring themes. These themes are as follows:

- Communication;
- User-involvement; and
- User education and training.

Quality communication is vital throughout the software implementation process and must be used to raise awareness, understanding as well as commitment. In essence the communication provided must be adequate and provided in a timely manner in order to provide quality information on the processes, progress and outcomes. The provision of quality information through communication addresses the problem of the psychological human weakness that Elis highlighted by employing the redeeming

strength that humans have. Research indicates that different types of communication are required at different stages of the software implementation. Crucially, the research also indicates that communication must be on-going throughout the implementation process.

The second recurring theme is that of user involvement in the implementation process. User involvement allows for the transfer ownership of the project and software to the end-users. It also improves the openness to change as well as employee's trust in management.

Thirdly, end user training is important as it allows users to get to grips with the system as well as to start appreciating the benefits of it first-hand. As per the research, this generates favourable feelings towards the software and improves intentions to adopt.

It must be noted that software implementation change management strategies are not "one size fits all" solutions for every organization implementing new software. The nature of the problem that must be addressed by change management is such that the employees' cognitive, affective and behavioural responses as well as the organizational context and culture are unique in every organization.

The current research has highlighted that the sources of resistance in software implementation projects are well researched and documented. Likewise, the tactics for combating resistance and strategies for change management in software implementation projects are also well researched and documented. However, as alluded to, software implementation projects are carried out as projects under a project manager.

The question that arises is the level of change management and change psychology proficiency that is required for a project manager. This question is outside the scope of the current research but it must be acknowledged that the level of change management and change psychology proficiency could play a role in the success or failure of a software implementation project. Likewise, the same could be said of management.

Lastly, there is a vast amount of research that has been aimed at critical success factors in software implementation projects. This research has identified the following factors, in addition to change management, as critical success factors:

- Top Management Support ;
- User Involvement ;
- Education and Training;
- Organizational and Cultural Context;
- Project Management
- Influence of Legacy Systems ;
- Broad-based Commitment ;
- Data Accuracy; and
- System Vendor Support.

It is interesting to note that, with the exception of Project Management, these critical success factors can be viewed as aspects that could constitute or be addressed by a change management strategy. This underlines the importance of change management in software implementation projects.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

The current research concludes that change management is a critical success factor in software implementation projects. The introduction of a new software system represents a change that effects various complex psychological reactions in employees. These reactions can ultimately lead to various forms of resistance that could jeopardise the success of the software implementation and usage of the software once it has been implemented.

Although the definition of success in software implementation projects is somewhat subjective, the measure of that success must include system end user usage. To successfully implement a software system that is generally not used by the end users is a waste of resources. To this end it is important to ensure that employee reactions and attitudes towards the software or system are managed. Change management is necessary to manage this resistance in order to ensure that the software is implemented and used successfully. Change management must therefore minimise adoption costs and manage the implementation process in a way that minimises end user resistance thereby improving the chances of success. A change management strategy has to be identified proactively before the project begins and the strategy must be monitored and adjusted accordingly throughout the project to improve the probability of success.

As change management is carried out within a project management framework, it is important that the project manager should have a good understanding of change management and the psychology of change. The level of change psychology proficiency that is required of the project manager is open to further research. Management support has been highlighted as a critical success factor in software implementation projects. It is also important that management must have a good understanding of the benefits of change psychology and change management so as to provide support to the change management initiative.

The current research has identified that a vast amount of research has already been done on change management in software information projects and the related information is readily available. Yet in spite of the amount of information that is available, success rates in software implementation projects are still fairly low. This is predominantly because organizations have underestimated the scale of change management required in software implementation projects. Ultimately, to ignore or underestimate change management in a software implementation project is akin to setting up for failure.

It is interesting to note that most of the critical success factors identified for the successful implementation of software systems can be incorporated by change management. This highlights the importance of change management in software implementation projects. Change management is, together with project management, one of the most pivotal success factors in software implementation projects. To echo the words of Mr Dunn, ERP implementation projects are not about the software, they are about change management.



9.1 Future research

The current research set out to answer some questions on the role of change management in software implementation projects. During the course of this research further questions and potential avenues for future research have arisen. These are as follows:

1. Given the relatively poor success rate, what are the prevailing change management awareness levels amongst project managers and senior managers in industry;
2. How suitable are current project management standards for software implementation projects;
3. How does the level of change management proficiency of project managers influence the success rate in software implementation projects; and
4. Are there any differences in change management of large scale software implementations when compared to smaller scale software implementations?

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APPENDIX A: VARIABLES MEDIATING AND MODERATING COGNITIVE, AFFECTIVE AND BEHAVIOURAL RESPONSES

In his model of cognitive, affective and behavioural responses to change, Smollan highlighted that there are several factors that affect individuals' responses. These factors can either be mediating or moderating factors. [25]

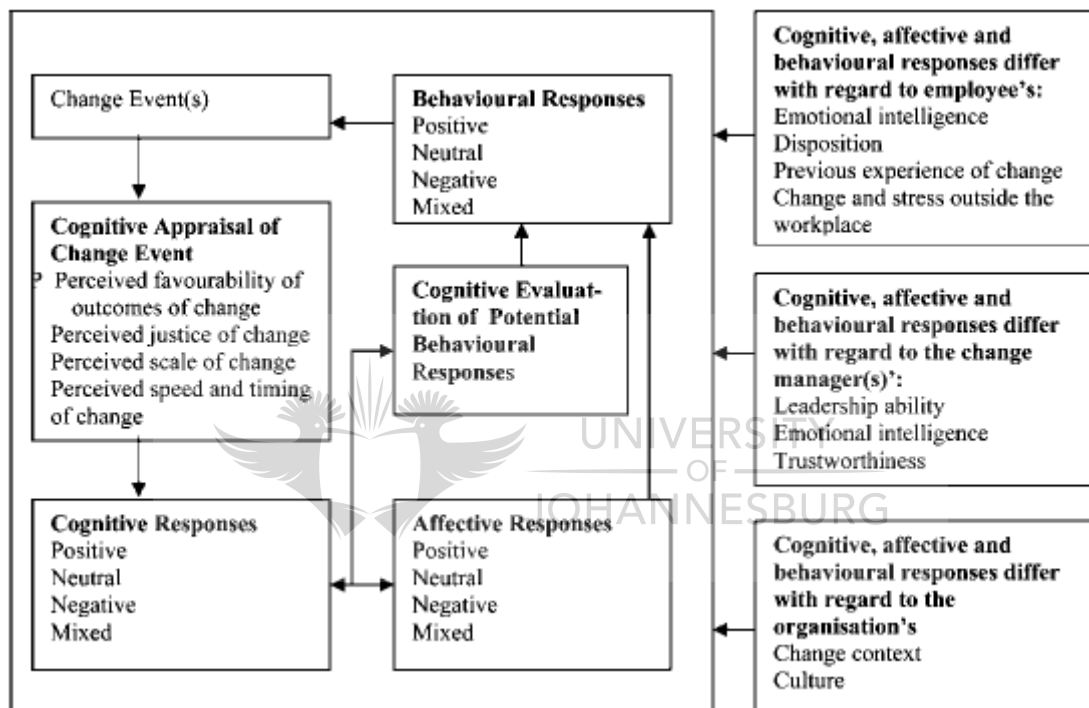


Figure 19: Smollan Model of Responses to Change [25]

Variables Mediating Responses

When confronted with a change, individuals employ various angles of perception when evaluating and judging the effects of the change. The following four aspects are considered in the evaluation of the change:

- Perceived favourability of the change outcome;
- Perceived justice of the change;
- Scale of the change; and
- Perceived speed and timing of the change.

These aspects highlight the importance of the individual's perception of events. It should be noted that it is the individual's perception of the facts and not the facts themselves that actually matters in the cognitive evaluation and decision-making process.

Perceived Favourability

Organizational changes tend to have different outcomes for different individuals or groups of individuals within the organization. The individual's perceived favourability of the outcome of the change can pose as a mediating factor in the cognitive evaluation of the change. Where uncertainty regarding the perceived favourability of the change exists, individuals can adopt a neutral or ambivalent cognitive stance on the change. Due to the subjectivity of the internal change evaluation process, individuals' dispositions often play a significant role in how they perceive they perceive the favourability of the change i.e. pessimists vs. optimists.

Perceived Justice

The perceived justice of the change also has a mediating effect on cognitive responses. Furthermore, research has shown that it also plays a mediating role for affective responses. Organizational research has identified various forms of justice, namely:

- Distributive justice;
- Procedural justice; and
- Systemic justice.

Distributive justice describes the fairness of the change outcome. Procedural justice, on the other hand, describes the fairness of the change procedure itself i.e. fairness of the manner in which decisions are made. Procedural justice includes interactional justice, which can be sub-divided into inter-personal justice and informational justice. These forms of justice are associated with the manner in which change information is communicated to individuals.

The concept of systemic justice refers to individual's perceived fairness of various organizational practices over a period of time. Systemic justice is based on the

individual's experience of the organization and could include experiences from past change initiatives. Research also describes the notion of the psychological contract. The psychological contract refers to an employee's perception of the organization's obligations towards the employee and vice-versa.

Perceptions of injustice in the different forms of justice solicit different reactions. Research does however indicate that individuals holistically consider all the justice forms when deciding on fairness. Perceptions of injustice essentially lead to negative affective and cognitive responses whilst perceptions of justice are greeted with more favourable responses. A breach of the psychological contract tends to elicit strong affective responses that can lead to negative behavioural responses such as intentions to quit.

Scale of the Change

The scale of the proposed changes affects the cognitive response to the change. Research indicates that revolutionary change is more likely to be resisted by those that have strong senses of ownership over certain aspects of their work. Furthermore, it has been argued that wholesale system changes have more impact than smaller scale changes to aspects of the system. The scale of the change could effectively create negative cognitive reactions even if other aspects of the change create positive reactions.

Perceived Timing and Speed of the Change

The perception of timing and speed of the change affects the cognitive response to the change. Speed of the change pre-dominantly refers to the timespan over which the change initiative is carried out. Larger scale change initiatives should be implemented over a longer time period. If a large scale change is pushed through in a relatively short period of time, individuals will tend to have negative cognitive responses to it. The timing of the change is also very important. Smollan provides the following two scenarios as examples of poor timing:

1. Introducing a big change at the busiest time of the month; and
2. Announcing a new management bonus scheme just after retrenchments.

Improperly timed changes create negative perceptions amongst employees and negatively affect the cognitive responses to the change.

Variables moderating Responses

There are various factors that can moderate cognitive, affective and behavioural responses in individuals. These factors are either internal or external to the individual. The following factors are internal to the individual:

- Emotional Intelligence
- Disposition of employees; and
- Previous experience of change.

Emotional Intelligence

Emotional intelligence is seen as the ability to accurately perceive the emotions of one self and others, to regulate one's emotions and respond appropriately to the emotions of others. Research indicates that employees with high emotional intelligence levels can discern and control their emotions as well as gauge the impact their actions would have. A high level of emotional intelligence results in a cohesion of cognitive processes in the affective processes thereby promoting non-erratic and constant behaviour. Consequently, high emotional intelligence individuals are able to cope better when faced with job insecurities.

Disposition of Employees

Individual disposition has a moderating effect on cognitive, affective and behavioural responses to change. As change is sometimes fraught with uncertainty, research indicates that individuals that can tolerate ambiguity have the ability to merge affective and cognitive processes thereby allowing them to adapt their behaviour accordingly. Seven personality factors have been identified by researchers as predictors of reactions to change.

The seven factors can be subdivided into two categories, namely; positive self-concept and risk tolerance. Positive self-concept consists of the following:

- Locus of control;
- Self-efficacy;
- Self-esteem; and
- Positive affectivity.

Risk tolerance refers to the following three concepts:

- Tolerance of ambiguity;
- Openness to experience; and
- Risk aversion.

Various empirical studies have indicated that individual's dispositions can predict reactions to change in any context. An individual's disposition is also important when there are other changes or stress inducing events, external to the organization, which the individual is coping with. Individuals that are more resilient are able to cope better whereas those that are less resilient may have negative cognitive, affective and behavioural responses.

Experience of Previous Change

Another moderating factor to cognitive, affective and behavioural responses to change is the past experience that individuals have of change initiatives. Past experience can potentially be negative or positive. Individuals that have positively experienced past changes or successfully dealt with negative changes are more likely to have a positive outlook on change. Conversely, an individual's negative experience of change will facilitate a negative outlook. Researchers also noted that past organizational changes create a cynic environment within the organization that potentially creates self-fulfilling prophecies. The frequency of changes, regardless of the success thereof, has also been noted as a source of negative reactions.

Variables external to the change recipients

The abilities and attributes of the change managers can also play a role in determining the cognitive, affective and behavioural responses of the change recipients.

The following attributes and capabilities of the change manager, or lack thereof, have been highlighted as affecting responses:

- Leadership ability;
- Emotional intelligence; and
- Perceived trustworthiness.

Furthermore, research indicates that there are two further organizational factors that also affect responses. These are the organizational culture and the organizational change context. The organizational change context is very important as it forms the basis on which cognitive, affective and behavioural responses are made.



APPENDIX B: CATEGORISATION OF CRITICAL SUCCESS FACTORS FOR ERP IMPLEMENTATION

There are various factors that have been identified as critical success factors (CSFs) for ERP implementation. These factors can be grouped into the categories indicated in Table 8 below [41].

Table 8: Categorization of ERP CSFs [41]

<p>1 Business Plan and Vision</p> <p>1.1 Business plan/Vision</p> <p>1.2 project mission</p> <p>1.3 Justification for investment</p>
<p>2 Change Management</p> <p>2.1 Recognizing the need for change</p> <p>2.2 Enterprise wide culture and structure management</p> <p>2.3 Commitment to change-perseverance and determination</p> <p>2.4 Business process re-engineering</p> <p>2.5 Analysis of user feedback</p> <p>2.6 User education and training</p> <p>2.7 User support organization and involvement</p> <p>2.8 IT workforce re-skilling</p>
<p>3 Communication</p> <p>3.1 Targeted and effective communication</p> <p>3.2 Communication among stakeholders</p> <p>3.3 Expectations communicated at all levels</p> <p>3.4 Project progress communication</p>
<p>4 ERP team composition, skill and compensation</p> <p>4.1 Best people on team</p> <p>4.2 Balanced or cross-functional team</p> <p>4.3 Full-time team members</p> <p>4.4 Partnerships, trust, risk-sharing and incentives</p> <p>4.5 Empowered decision-makers</p> <p>4.6 Performance tied to compensation</p> <p>4.7 Business and technical knowledge of team members and consultants</p>

5 Project Management

- 5.1 Assign responsibility
- 5.2 Clearly establish project scope
- 5.3 Control project scope
- 5.4 Evaluate any proposed changes
- 5.5 Control and asses scope expansion requests
- 5.6 Define project milestones
- 5.7 Set realistic milestones and end dates
- 5.8 Enforce project timelines
- 5.9 Coordinate project activities across all affected parties
- 5.10 Track milestones and targets

6 Top Management Support and Championship

- 6.1 Approval and support from top management
- 6.2 Top management publicly and explicitly identified as top priority
- 6.3 Allocate resources
- 6.4 Existence of project champion
- 6.5 High level executive sponsor as champion
- 6.6 project sponsor commitment

7 Systems Analysis, Selection and Technical Implementation

- 7.1 Legacy System
- 7.2 Minimum Customization
- 7.3 Configuration of overall ERP architecture
- 7.4 Vigorous and sophisticated testing
- 7.5 Integration
- 7.6 Use of vendor's development tools and implementation methodologies
- 7.7 ERP package selection
- 7.8 Selection of ERP Architecture
- 7.9 Selection of data to be converted
- 7.10 Data conversion
- 7.11 Appropriate modelling methods/techniques
- 7.12 Troubleshooting

APPENDIX C: CRITICAL FAILURE FACTORS

Converse to critical success factors, the concept of critical failure factors relates to factors that will predetermine failure of a change initiative. In the context of ERP implementation, critical failure factors (CFFs) have been defined as “*the key aspects (areas) where things must go wrong’ in order for an enterprise resource planning implementation process (ERP) to achieve a high level of failure*” [35]. Research has identified various CFFs as indicated in the figure below.

<i>PROCESS CFFs</i>		<i>ORGANIZATIONAL CFFs</i>	
Goals, Metrics and Rewards		Culture	
Poor Communication Culture		High Need for Control	Sun & Alas, 2007
Poor Communication and connection	Boehm, 2002	High Need for Predictability	Decker & McCormack, 2008
Unrealistic Expectations of Employees	Somers & Nelson, 2001	Little Personal Flexibility	Pelletier, 2006
Conversation/Participation Not Allowed	Decker & McCormack, 2008		
Employees Cannot Express Doubt	Decker & McCormack, 2008		
High Sense of Vulnerability	Decker & McCormack, 2008		
No Clear & Consistent Expression of Vision & Objectives	Toolpack, 2011		
Transparency & Trust			
Prior Negative Experiences	Silwka, 2007		
No Transparency	Decker & McCormack, 2008		
Recent Change of Leadership/Management	Pinto & Slevin, 1989		
Lack of Trust	Waldrersee & Griffiths, 2003		
<i>PROCESS CFFs</i>		<i>ORGANIZATIONAL CFFs</i>	
Goals, Metrics and Rewards		Culture	
No Clear State of Requirements/Goals/Objectives	Decker & McCormack, 2008	Unsupportive Culture - grp & balanced	Brian et al, 2009
No Clear Vision & Objectives	Lalley, 2004	Not flexible/inability to adjust to changes	Decker & McCormack, 2008
Little Role definition & Presence of conflict	Boehm, 2002	Initiative Overload	
No Metrics/Monitoring/Feedback or not aligned	Heneman et al, 2008	History of failed initiatives	Bordia et al, 2007
Rewards not aligned to change	Heneman et al, 2008	Too many competing initiatives	Toolpack, 2011
Decision Making & Planning		Alignment	
Poor decision making	Nutt, 1998	No Alignment - Orgl./Vertical & Horizontal	Bryan et al, 2009

<i>PROCESS CFFs</i>		<i>ORGANIZATIONAL CFFs</i>	
Goals, Metrics and Rewards		Culture	
Continual changing customer requirements	Kannan et al, 2008	No Alignment of supply chain	Bryan et al, 2009
Poor Project Management competence/ plan, schedule	Somers & Nelson, 2001	Infrastructure/Structure	
Little user involvement in DM or planning	Iver & Olson, 1984	Inadequate Infrastructure	Lalley, 2004
Overreliance on customization	Wong et al, 2005	Inadequate Resources and Funding	Laaley, 2004
Improper Planning i.e. cost and time estimate	Lalley, 2004	Inadequate CM	Kemp & Low, 2008
Poor Strategy/Project Fit	Floyd & Lane, 2000	Leadership	
Bureaucracy and Politics		Poor leadership (General)	Pinto & Slevin, 1989
Little Interdepartmental cooperation/bureaucracy	Chaos Report, 1994	Leadership Pays Too Much Attention to Financial Issues	Szamosi & Duxbury, 2002
Too much Bureaucracy and Politics	Lalley, 2004	Lack of Support from Leadership	Pelletier, 2006
Knowledge Transfer		Unrealistic Expectations of Leadership	Wong et al. 2005
Lack of Training/poor knowledge transfer	Somers & Nelson, 2001	Lack of Emotional Intelligence	Hill, 2009
Inappropriate CM processes/strategy	Somers & Nelson, 2001	Lack of Change Champions	Chrusiel, 2008
Staffing			
Lack of Competent Staff	Lalley, 2004		
Inadequate Staffing	Keil et al. 1998	PEOPLE CFFs	
Poor IT/ERP system misfit	Wong et al, 2005	Low Care Horizon	
Poor consultant performance	Wong et al, 2005	Turnover of Team/ Leaders	Pelletier, 2006
Not Commercially profitable for the contractor	Lalley, 1984	Don't See the Change as Real/ Not Needed	Toolpack, 2011
Process Issues		Unrealistic Expectations from Management Perceived by Employees	Pelletier, 2006
Processes not in place	Decker & McCormack, 2008	Poor Alignment of People's and Org.'s Values	Pelletier, 2006
Mechanistic processes	Decker & McCormack, 2008	Little Mgt. Support Perceived	Lalley, 1984
Poor Business Process Reengineering	Wong et al, 2005	Little Individual Readiness for Change	Holt et al, 2007
		Low Motivation to Change	
		Interpersonal Resistance	Toolpack, 2011
COMMUNICATION CULTURE CFFs		Too much change coming	Black et al, 2004
Poor Community for Change		Little Motivation to Change	Toolpack, 2011
Little Interdepartmental Cooperation	Somers & Nelson, 2001	Little Buy-in/Passion	Pelletier, 2006
Little Executive Management Support	Boehm, 2002	Large Status Change Expected from Change	Decker & McCormack, 2008
Few Project Champions Perceived	Somers & Nelson, 2001	No Fun/Hard Work Expected	Decker & McCormack, 2008
Lots of Bureaucracy and Politics	Pinto & Slevin, 1989	User Resistance	Wong et al. 2005
Poor Implementation Manager's Reputation	Decker & McCormack, 2008	Low Ability to Change	
Low Commitment/involvement	Wong et al, 2005	Avoidance of Accountability	Decker & McCormack, 2008

Figure 20: Critical Failure Factors [35]

APPENDIX D: ORGANIZATIONAL CHANGE MANAGEMENT METHODS

Change management requires the management of various factors. However, the deeper underlying factors that must be addressed are the perceptions, beliefs and politics in the organization. This concept is demonstrated by the Change Management Iceberg model developed by Wilfred Kruger [36].

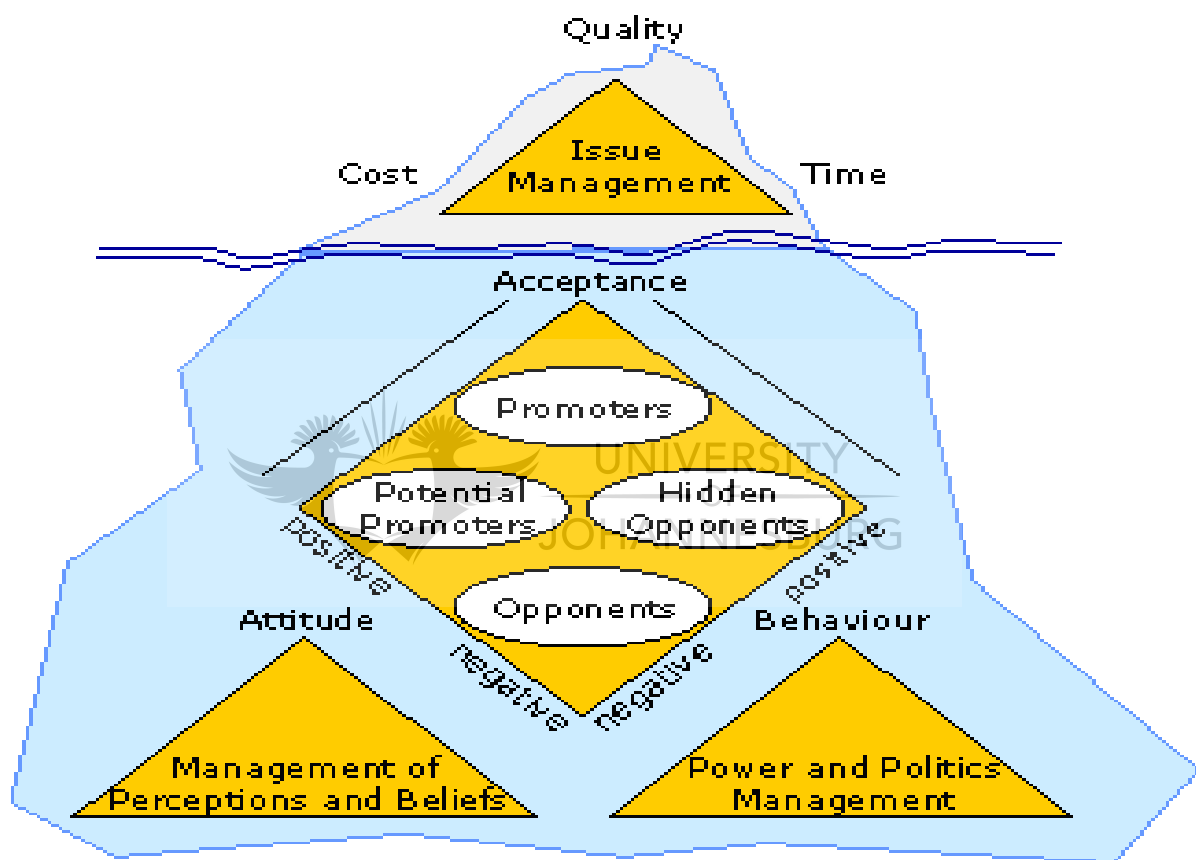


Figure 21: Change Management Iceberg Model [36]

Various researchers have proposed change management methods to allow organizations to address all the aspects of the change. Some of these methods will now be discussed.

Lewin Three Step Model

Kurt Lewin developed an organizational change model that incorporated the idea of force field analysis. The core principle of force field analysis is that for any change event, there are driving forces and resisting forces. In order for the change to be successful, the driving forces must overcome the resisting forces. Hence, the driving forces must be increased or the resisting force must be reduced. The concept of force field analysis is illustrated in the Figure 22 below. In the example, in order to speed up the executive reporting process, the driving forces on the left must overcome the resisting forces on the right and both sets of forces must be managed such that this can be achieved [24].

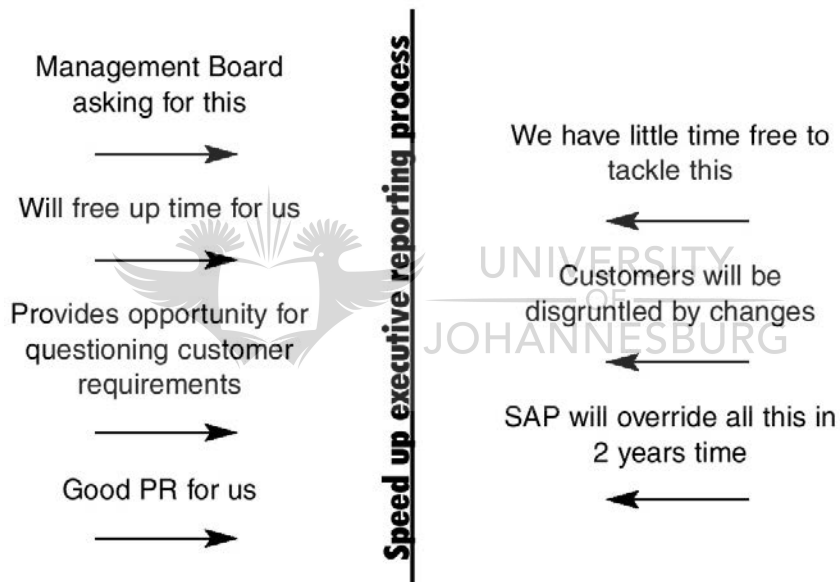


Figure 22: Force Field Analysis Principle [24]

Lewin developed a three step model for the implementation of organizational changes as illustrated in Figure 23. The model consists of the following three steps:

- Unfreeze – defining the current state, defining a desired end state and identifying the driving and resisting forces
- Move – Involvement and participation of stakeholders to implement
- Refreeze - establish the new status quo, new standards and reward success

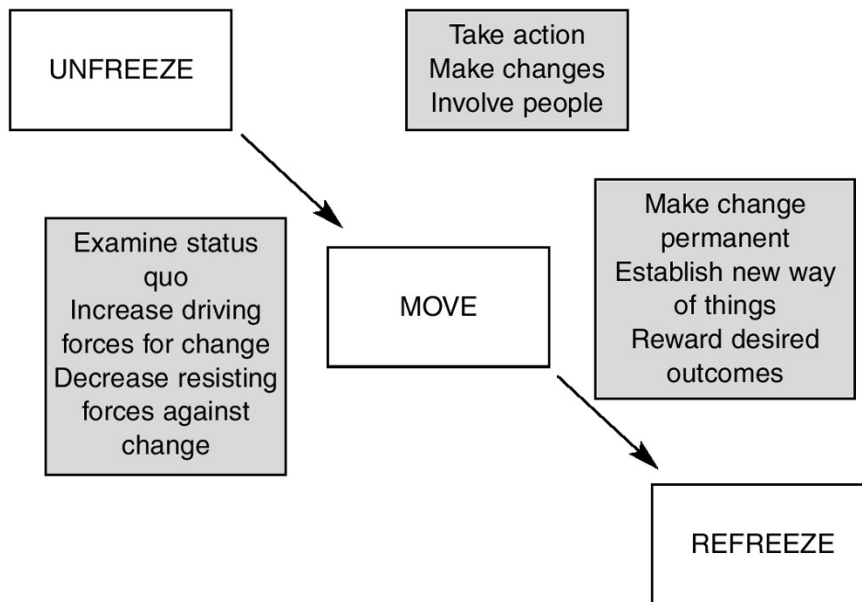


Figure 23: Lewin Three Step Model [24]

Kotter Eight Step Model



One of the more employed organizational change approaches is the Kotter Eight Step Model. Based on a 100 case studies of organizations going through change initiatives, Kotter developed an eight step model out of the findings from the case studies. The 8 steps in the model are as follows [24]:

1. **Establish a sense of urgency.** Discussing today's competitive realities, looking at potential future scenarios. Increasing the 'felt-need' for change.
2. **Form a powerful guiding coalition.** Assembling a powerful group of people who can work well together.
3. **Create a vision.** Building a vision to guide the change effort together with strategies for achieving this.
4. **Communicate the vision.** Kotter emphasizes the need to communicate at least 10 times the amount you expect to have to communicate. The vision and accompanying strategies and new behaviours need to be communicated in a variety of different ways. The guiding coalition should be the first to role model new behaviours.

5. **Empower others to act on the vision.** This step includes getting rid of obstacles to change such as unhelpful structures or systems. Allow people to experiment.
6. **Plan for and create short-term wins.** Look for and advertise short-term visible improvements. Plan these in and reward people publicly for improvements.
7. **Consolidate improvements and produce still more change.** Promote and reward those able to promote and work towards the vision. Energize the process of change with new projects, resources, change agents.
8. **Institutionalize new approaches.** Ensure that everyone understands that the new behaviours lead to corporate success.

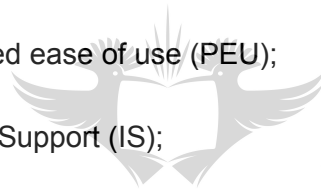


APPENDIX E: HUMAN FACTORS AFFECTING ERP USER SATISFACTION

The successful implementation of an ERP requires, among other things, that the end-users must ultimately use the system. In order for the end-users to use the system, they must be satisfied with it. Research indicates that productivity of employees is affected by their satisfaction with the implemented ERP [40]. To this end various researchers have conducted studies into the relationship between user satisfaction and the ERP implementation success [39] [40]. Some of this research has been focused on the factors that are antecedents to user satisfaction.

One such research study is an empirical study by Anjum *et al.* The study interviewed 228 respondents on the importance of aspects of user satisfaction in the successful implementation of ERP. These aspects included the following:

- Perceived usefulness (PU);
- Perceived ease of use (PEU);
- Internal Support (IS);
- Results demonstrability (RD);
- Compatibility (CP); and
- User Satisfaction (US).



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Using a Likert-scale, 1 – Strong Disagree to 5- Strongly Agree, Anjum *et al.*'s study highlighted that end users rated all of the above-mentioned factors as important for the successful implementation on ERP. Table 9 indicates the descriptive statistics results from the study.

Table 9: Descriptive Statistics of Anjum *et al.* Study [38]

Variables	Mean	SD
Perceives usefulness	3.9123	.67767
Perceived ease of use	4.0526	.70670
Internal Support	3.7807	.46477
Results Demonstrability	4.0263	.55468
Compatibility	3.9956	.59733
User Satisfaction	4.1667	.68870

The study went on to determine the relationships between user satisfaction and the other five aspects using the model illustrated in Figure 24 below.

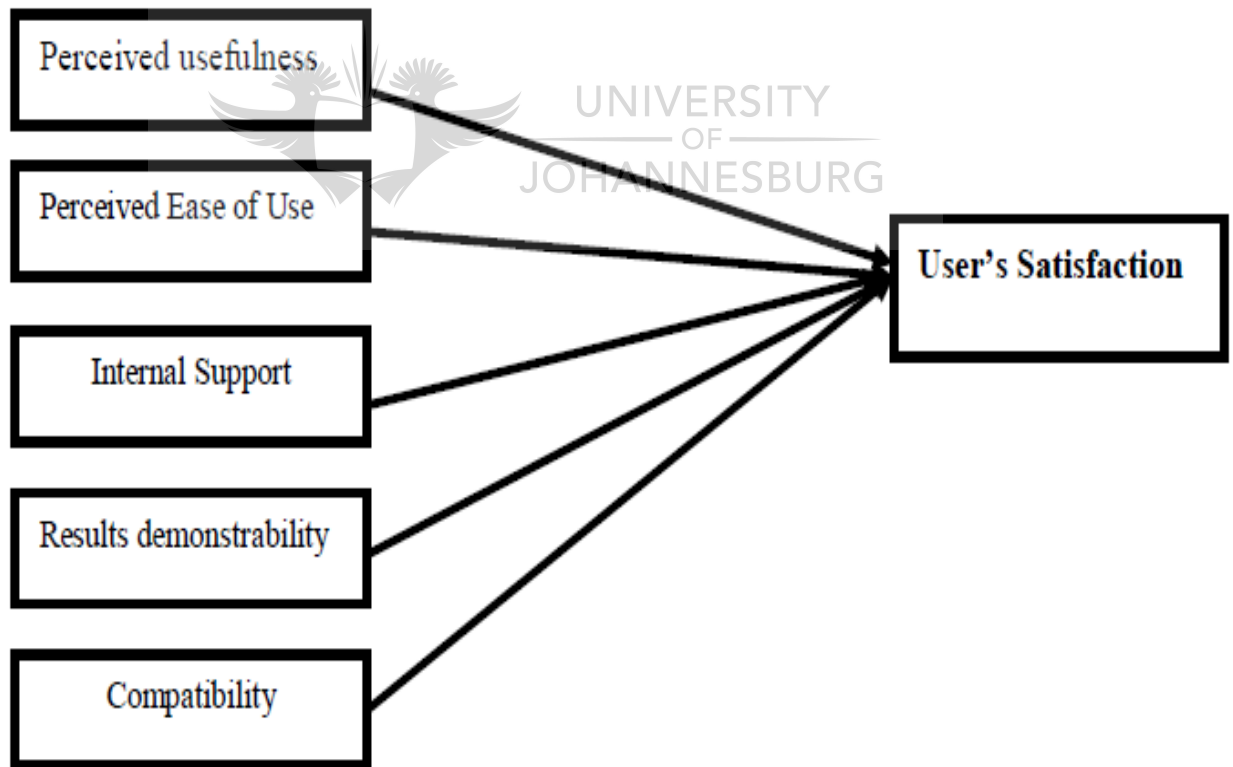


Figure 24: Anjum *et al* User Satisfaction Model [38]

The model was developed based on the following five hypotheses [38]:

1. H1: There is a positive relationship between perceived usefulness of ERP and user satisfaction;
2. H2: There is Positive relationship between perceived ease of use of ERP and user satisfaction;
3. H3: There is positive relationship between Internal Support and user satisfaction;
4. H4: There is positive relationship between Results Demonstrability of ERP and user satisfaction; and
5. H: 5: There is positive relationship between compatibility of ERP system and user satisfaction;

The results vindicated the hypotheses with the correlation coefficients as shown in Table 10.

Table 10: Correlation Analysis of ERP Success Factors with User Satisfaction [38]

	PU	PEU	RD	IS	CP	US
PU	1					
PEU	.525** .000	1				
RD	.093 .164	.049 .464	1			
IS	.369** .000	.356** .000	-.029 .666	1		
CP	.706** .000	.668** .000	.060 .367	.333** .000	1	
US	.617** .000	.561** .000	.060 .370	.369** .000	.687** .000	1

***. Correlation is significant at the 0.01 level (2-tailed)*

A more expansive study on human factors affecting user satisfaction in ERP implementation was performed by Mitakos *et al.* The study developed the model illustrated in Figure 25 and proposed fourteen hypotheses that related various social-demographic aspects to user-satisfaction.

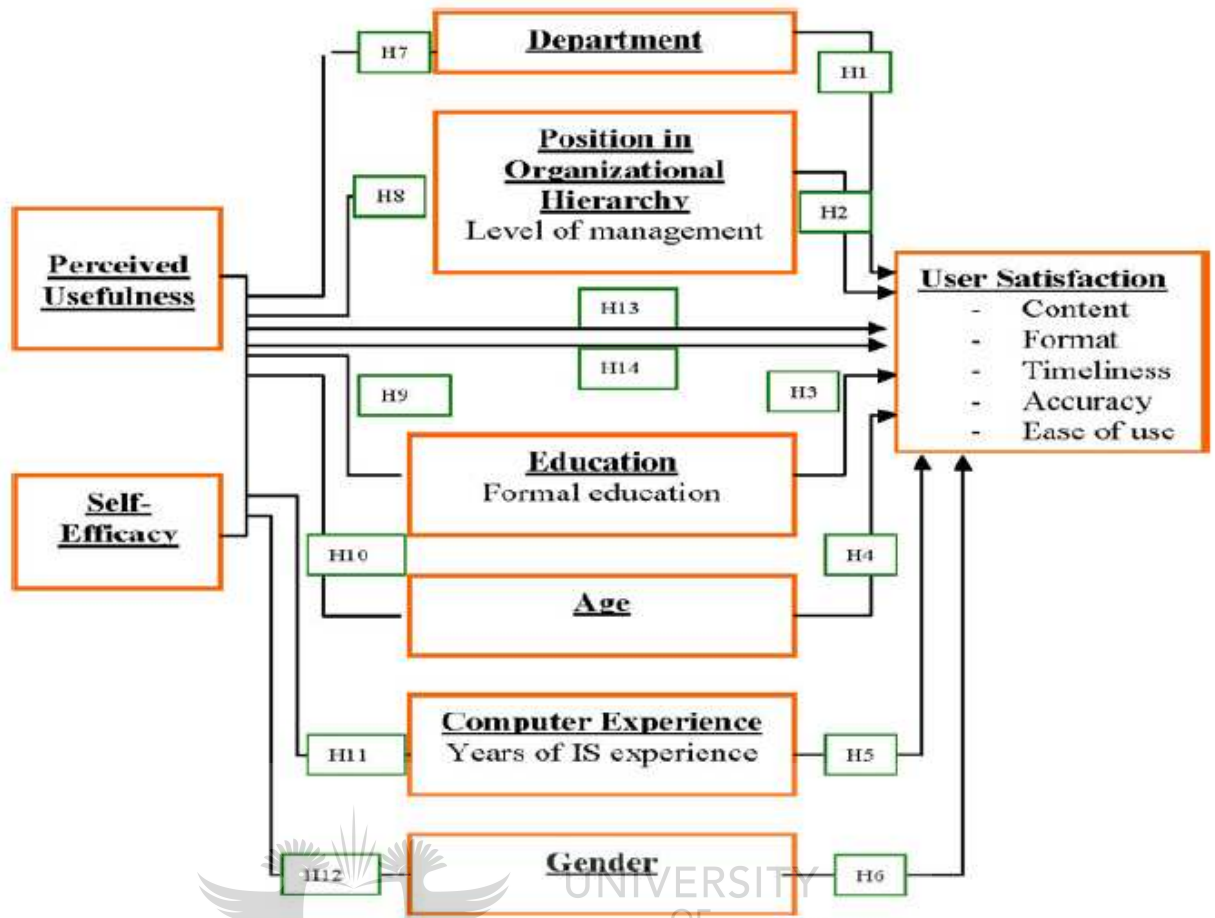


Figure 25: Mitakos et al User Satisfaction Model [38]

The first six of the fourteen hypotheses are as follows [38]:

- H1: there is a relationship between ERP user satisfaction and ERP users that belong to different functional departments;
- H2: there is a relationship between ERP user satisfaction and the position in the organizational hierarchy (the responsibilities in his/her position);
- H3: there is a relationship between ERP user satisfaction and his/her educational level;
- H4: there is a relationship between ERP user satisfaction and the ERP user's age; and
- H5: there is a relationship between ERP users' satisfaction and their computer experience

- H6: there is a relationship between ERP users' satisfaction and their gender

The next six hypotheses relate the department, position, education, age, computer experience and gender to the perceived usefulness and self-efficacy of users. These hypotheses are as follows:

- H7: there is a relationship between department and perceived usefulness as well as self-efficacy;
- H8: there is a relationship between position in the organizational hierarchy and perceived usefulness as well as self-efficacy;
- H9: there is a relationship between education and perceived usefulness as well as self-efficacy;
- H10: there is a relationship between age and perceived usefulness as well as self-efficacy;
- H11: there is a relationship between computer experience and department and perceived usefulness as well as self-efficacy; and
- H12: there is a relationship between gender and perceived usefulness as well as self-efficacy.

The last two hypotheses directly relate self-efficacy and perceived usefulness to user satisfaction and are as follows:

- H13: there exists a relationship between the perceived usefulness of an ERP system and user satisfaction; and
- H14: there exists a relationship between the user's self-efficacy and user satisfaction.

In their analysis of the hypothesis, only two of the fourteen hypotheses were vindicated as shown in Table 11. This was shown to be in line with other research findings [40].

Table 11: Validity of Proposed Hypotheses [40]

Hypotheses	Description	Validity
H1	Relationship between department and user satisfaction	Not Valid
H2	Relationship between position and user satisfaction	Not Valid
H3	Relationship between education and user satisfaction	Not Valid
H4	Relationship between age and user satisfaction	Not Valid
H5	Relationship between computer experience and user satisfaction	Not Valid
H6	Relationship between gender and user satisfaction	Not Valid
H7	Relationship between department, self-efficacy and perceived usefulness	Not Valid
H8	Relationship between position , self-efficacy and perceived usefulness	Not Valid
H9	Relationship between education , self-efficacy and perceived usefulness	Not Valid
H10	Relationship between age , self-efficacy and perceived usefulness	Not Valid
H11	Relationship between computer experience , self-efficacy and perceived usefulness	Not Valid
H12	Relationship between gender , self-efficacy and perceived usefulness	Not Valid
H13	Relationship between perceived usefulness and user satisfaction	Valid
H14	Relationship between self-efficacy and user satisfaction	Valid



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