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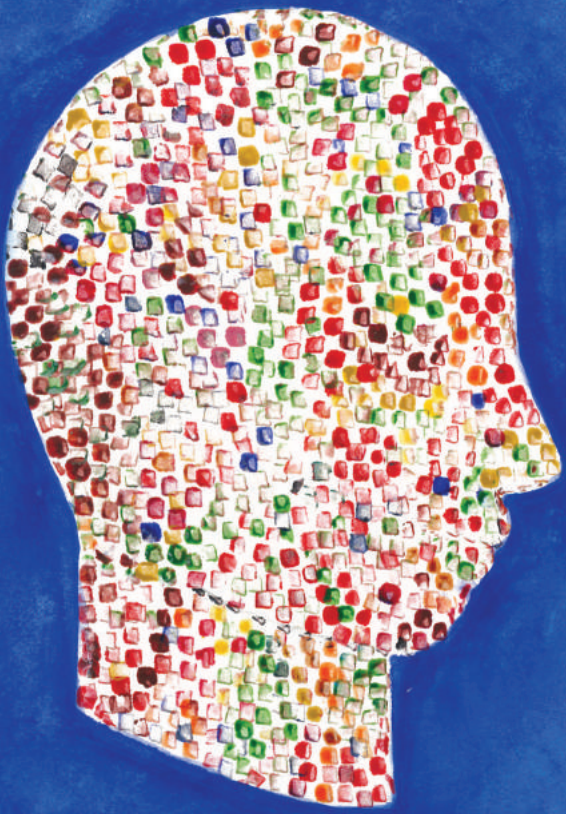
Information technology project managers' competencies

An analysis of performance and personal competencies



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Research Justification

The purpose of this book is to shed light on the performance and personal competencies of information technology (IT) project managers in South Africa. Predictive models are built to determine what project managers consider the crucial competencies they should possess to deliver an IT project successfully. This investigation takes place in the context of poor IT project success rates globally and, in particular, in South Africa. This novel research seeks to extend the debate on project success beyond what merely constitutes success or failure, but seeks to find clarity in what IT project managers believe are the essential competencies in practice.

This quantitative research gathered data by way of an online survey based on literature regarding the Project Management Competency Development Framework (PMCDF). The population consisted of IT project managers in South Africa. Four hundred and two respondents chose to share their insights. Through the use of descriptive and multivariate statistics, major competency factors were identified. These factors were used in structural equation modelling to build various validated predictive models.

This book contributes to the current body of knowledge by uncovering the competencies that IT project managers consider themselves competent in. The structural equation models indicated predictors of perceived competence by IT project managers and where these perceived competencies differ from literature. Twelve managerial implications are highlighted in the final chapter that seek to draw the myriad of threads together into a coherent summary. It is apparent that IT project managers do not consider the PMCDF important in its entirety, but instead choose to focus on certain competencies.

This book is intended for reading by fellow researchers as well as project and IT practitioners. These may include IT managers, IT executives, project managers, project team members, the project management office (PMO), general managers and executives that initiate and conduct project-related work.

This body of work is original and has not been plagiarised, although certain concepts have been tested in peer reviewed academic work by way of conference proceedings. Instances of this have been referenced and cited. This book is in its first edition and has not been based on thesis work published previously.

Prof. Dr Andries G van Aarde
AOSIS Chief Editor: Scholarly Books

Contents

List of abbreviations appearing in the Text and Notes

ACP	Agile Certified Practitioner
APMBOK	Association for Project Management Body of Knowledge
APMC	Advanced Project Management Certification
BABOK® Guide	A Guide to the Business Analysis Body of Knowledge
CAPM	Certified Associate in Project Management
CFI	Comparative Fit Index
CMIN/DF	Chi-squared/Degrees of freedom
COBIT	Control Objectives for Information and Related Technology
EFA	Exploratory Factor Analysis
FICA	Financial Intelligence Centre Act
GAPPS	Global Alliance for Project Management Performance Standards
ICB	IPMA Competence Baseline
ICT	Information and Communications Technology
IFRS	International Financial Reporting Standards
IIL	International Institute for Learning
IPMA	International Project Management Association
ISO	International Standards Organisation
IT	Information Technology

ITIL	Information Technology Infrastructure Library
ITSM	IT Service Management
KMO	Kaiser-Meyer-Olken
NFI	Normal Fit Index
OECD	Organisation for Economic Co-operation and Development
OGC	Office of Government Commerce
P2M	Programme and Project Management for Enterprise Innovation
PMBOK® Guide	A Guide to the Project Management Body of Knowledge
PMCDF	Project Management Competency Development Framework
PMI	Project Management Institute
PMP®	Project Management Professional
PMSA	Project Management South Africa
POPI	Protection of Personal Information Act
PRINCE2	Projects IN Controlled Environments
RICA	The Regulation of Interception of Communications and Provision of Communication-Related Information Act (South Africa)
RMP	Risk Management Professional
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SABS	South African Bureau of Standards
SEM	Structural Equation Modelling
SP	Project Scheduling Professional
SWEBOK	Software Engineering Body of Knowledge
TLI	Tucker-Lewis Index
WBS	Work Breakdown Structure

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Notes on Contributors

Carl Marnewick

Prof. Carl Marnewick's academic career started in 2007 when he joined the University of Johannesburg. He traded his professional career as a senior information technology (IT) project manager for that of an academic career. The career change provided him the opportunity to emerge himself in the question why IT/IS-related projects are not always successful and do not provide the intended benefits that were originally anticipated. This is currently a problem internationally as valuable resources are wasted on projects and programmes that do not add value to the strategic objectives of the organisation. It is an international problem where there is a gap between theory and practice and he is in the ideal position to address this problem.

The focus of his research is the overarching topic and special interest of the strategic alignment of projects to the vision of the organisations. This alignment is from the initiation of a project to the realisation of benefits. He developed a framework (Vision-to-Project i.e. V2P) that ensures that projects within an organisation are linked to the vision. Within this framework, a natural outflow of research is the realisation of benefits to the organisation through the implementation of IT/IS systems. Benefits realisation is part of a complex system and his research to date has identified the following impediments in the realisation of benefits: (1) IT project success rates as well as IT project management maturity levels did not improve over the last decade and these results are in line with similar international research, (2) IT project managers are not necessarily following best practices and industry standards, (3) governance and auditing structures are not in place and (4) IT project managers' training and required skills are not aligned. If these four aspects are addressed through research and practice, then benefits realisation can occur.

His research has given him national and international presence. He is currently a regular reviewer for national and international journals. He was actively involved in the development of new international project management standards ISO21500 and ISO21503 (portfolio management). Project Management SA awarded him the Excellence in Research Award as recognition for his active contribution to the local and global body of knowledge by conducting and publishing scientific research in portfolio, programme and project management.

He is currently heading the Information Technology Project Management Knowledge and Wisdom Research Cluster. This research cluster focuses on research in IT project management and includes, amongst others, governance, auditing and assurance, complexity, IT project success, benefits management and sustainability. Email: cmarnewick@uj.ac.za

Wikus Erasmus

Wikus Erasmus has been researching and lecturing at the University of Johannesburg since 2010 in the Department of Applied Information Systems. He has attained a Master's degree in Business Management with undergraduate studies in Informatics. He is registered as a PhD candidate.

He did a tour of duty as a project manager in the construction and information technology industry where he primarily focused on IT infrastructure implementations. These were for major South African corporate clients, including financial institutions and retail holding groups.

His experience as a project manager in the IT industry has guided him to focus on various issues of importance to project management. These include the governance of projects, programmes and portfolio's, strategic alignment of projects and success of IT projects. He has published various papers that addressed poor communication and poor risk management practices in IT projects. He also experienced the importance of stakeholder relations in the successful completion of a project, even if it becomes challenged.

He is of the opinion that proper governance frameworks are to be implemented if greater project success rates are to be observed as this would improve strategic alignment of projects. This improved strategic alignment would ensure that projects that contribute to organisational goals will be attempted. The process needs to be overseen with concurrent project auditing and a final project audit to impart organisation to the organisation. This is yet another area that he has found lacking in the practice of project management. Email: werasmus@uj.ac.za

Nazeer Joseph

Nazeer Joseph (BCom, BCom Hons, Mcom) is a native of Johannesburg who, whilst working on his Master's, joined the University of Johannesburg (UJ) as a part-time lecturer for the Department of Applied Information Systems. The output of his Master's

was a predictive model for determining IT project success. His Master's, achieved cum laude, signifies his contribution to the IT project management body of knowledge. On completion of his MCom, he joined UJ on a full-time basis. He chose to pursue an academic career once he completed his MCom and realised that the field of IT project management requires extensive attention in order to improve IT project success. The poor performance of IT projects is a global phenomenon and must be addressed to ensure these projects deliver the expected benefits to realise organisational goals and objectives.

His research touches a number of areas in the IT project management domain: (1) IT project management processes, (2) Agile IT project management, (3) IT project performance, (4) IT project management competencies and (5) IT project management sustainability. He is currently working on his PhD in IT management with the primary focus on IT project management processes. A key aspect why IT projects fail is that current project management processes are inadequate for IT projects. The aim of his PhD is to investigate why current processes are inadequate and what can be done to improve these processes and subsequently IT project performance.

As a junior lecturer and researcher at UJ, he has established himself as performer and contributor to the IT project management body of knowledge. He publishes in international journals, participates in conferences and strives to continuously contribute as a journal reviewer. His Master's research was the only Master's presented at the 2014 Project Management Institute Research and Education Conference.

In an effort to improve the state of IT project performance, he works within a research cluster which has established close ties with South African organisations to assist them with addressing this problematic phenomenon. Email: njoseph@uj.ac.za.

Chapter 1

Introduction to project management competencies

Bredillet, Tywoniak and Dwivedula (2015) stated that '... delineating what is a good project manager and the level of performance at which s/he is expected to perform is still a burning issue'. Apart from the fact that we still do not know what a good project manager is, a conundrum currently exists in the project management discipline. Literature suggests that project success is dependent on the project manager's competencies (Bourne & Walker 2004; Mnkandla & Marnewick 2011) but, on the other hand, research suggests that the competency of the project manager is not a factor that contributes to project success (Marnewick & Labuschagne 2012).

Many companies recognise that project management is key to their business operations (Crawford 2005). This increase in the adoption of project management has stimulated the interest of both practitioners and researchers to investigate all aspects of project management, and considerable effort has been devoted to understand the role of

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the project manager itself as well as the skills and competencies that a project manager must portray.

With project managers in short supply and an increasing pressure to identify potential project managers, companies are looking more and more for reliable and predictable assessment processes and criteria. Programme and project management is ranked in fifth place according to the top 100 scarce skills within South Africa (Government Gazette 2014). Information and communications technology project management per se are ranked in position 66. A further complication to this problem is that companies are initiating too many complex projects and that these companies do not have enough competent project managers to manage them. Companies report difficulties in the recruitment of project managers with the appropriate knowledge, skills and experience necessary for their current projects.

Research on the characteristics of a project manager highlights that project managers must have a strong profile of managerial and people skills. There is a strong focus on the softer competencies rather than the technical competencies of the project manager (Yasin, Gomes & Miller 2009). It is commonly found that whilst relevant project management qualifications may indicate the presence of project management knowledge, they are often poor predictors of overall capability (Worsley 2009).

Various project management competency standards exist (Caupin *et al.* 2006; Project Management Institute 2007) but these standards have not been described, assessed and further developed for organisations, teams and individuals within the South African environment.

The aim of the research project is to determine the level of competence of South African IT project managers. This is irrespective of the industry or organisation where they are employed. The analysis of the competencies enables companies to establish a competency baseline. Such a baseline can be used to determine current project managers' competency levels as well the screening and interviewing of prospective project managers.

Project management competence is defined as the demonstrated ability to perform activities within the project environment (Project Management Institute 2007). These activities must lead to expected outcomes based on predefined and accepted standards. IPMA, on the other hand, defines competence as a collection of knowledge, personal attitudes, skills and relevant experience that is needed to successfully perform a certain function (Caupin *et al.* 2006).

Project management competence can therefore be linked to the performance of the project itself and ultimately to the performance of the organisation (Crawford 2005). Thus, there is a strong case for understanding and improving the competence levels of project managers as this should lead to successful projects and ultimately successful organisations (Skulmoski & Hartman 2010).

With respect to competencies, Crawford (2005) proposes three classifications:

- Input competencies that refer to the knowledge and skills that a project manager brings to a job.
- Personal competencies that are the core attributes underlying a project manager's capability to execute a job.
- Output competencies that relate to the 'demonstrable' performance that a project manager exhibits within the work environment.

IPMA classifies competence into three ranges, that is, people, practice and perspective (Caupin *et al.* 2006). This view of IPMA is very much aligned with various views that competence is not a single construct (Alam *et al.* 2010).

The Project Management Institute's (PMCD) framework defines three competence dimensions, namely, knowledge, performance and personal (Project Management Institute 2007). Project management competence is defined as the knowledge that project managers bring to a project or project-related activity and their understanding of the project management's discipline, experience in the application of this knowledge, and core attitude and personality traits that affect their behaviours.

Finding the right project manager depends on how an organisation defines the project management role and, more importantly, how it defines the project management processes itself. Organisations look most often for project experience when evaluating new project managers, followed by communication skills. Technical skills are assumed a given for project managers entering the job market. However, the key behavioural competencies involved in the performance domain are dynamic and difficult to identify (Chen, Partington & Wang 2008).

The generally described project manager competencies such as project-specific expertise, problem-solving, leadership and social competence have to be complemented with entrepreneurial and project management competence. Depending on the type and scope of the project, competencies will vary in their depth and breadth (Hölzle 2010).

The need for project management competence is well documented. Kaklauskas, Amaratunga and Lill (2010) contend that '... there is a growing awareness of the relationship between achieving project success and project managers' competences'. According to Patanakul and Milosevic (2009) the competence of the project manager is in itself a factor in the successful delivery of projects. This view is also shared by Stevenson and Starkweather (2010). Whilst employers need guidance in the selection of a competent project manager, they are responsible for identifying the specific competencies needed for a particular project. However, the latter remains difficult to quantify.

Project management as a professional discipline has given rise to a number of frameworks that define the scope of the discipline and describe its tools, techniques and concepts (Chen *et al.* 2008).

Competence frameworks and standards

Competency frameworks and standards are developed for one specific reason: to assess, develop and to reassess the competencies of project managers. This process should be a continuous process and project managers should embrace this process to improve their own competencies.

Three major project management competence standards are discussed as part of the introductory chapter. The rationale to focus on these three is as follows: GAPPS provides a global competency standard and, more importantly, a mapping between various countries' accreditation. The PMI's Project Management Competency Development Framework (PMCDF) is used extensively in South Africa. The reason is that project managers in South Africa are biased towards PMI and, therefore, the discussion of the PMCDF. IPMA provides its own '... global standard that defines the competences required by individuals working in the fields of project, programme and portfolio management' (International Project Management Association 2015:5). IPMA provides a different view with regard to competence than that provided by the American view of PMI.

Global alliance for project management performance standards

GAPPS is a unique alliance of government, private industry, professional associations and training and/or academic institutes working together to develop globally applicable project management competency-based standards, frameworks and mappings. The GAPPS project manager standard is written in the format of a performance-based dimension (Bredillet *et al.* 2015). This is a particular form of standard that aims to address two key questions, namely, what is usually carried out in this occupation, profession, or role by competent performers, and what standard of performance is usually considered acceptable to infer competence?

The standard identified six units of competency are indicated in Table 1.

TABLE 1: Global alliance for project management performance standards (GAPPS) unit of competency.

Unit #	Unit title
PM01	Manage stakeholder relationships
PM02	Manage development of the plan for the project
PM03	Manage project progress
PM04	Manage product acceptance
PM05	Manage project transitions
PM06	Evaluate and improve project performance

The first unit of competency focuses on managing the relationships with various project stakeholders. The focus is on what is required to manage stakeholder relationships during a project (Global Alliance for Project Performance Standards 2007). The focus of this unit is to demonstrate competence in ensuring that all the relevant individuals and organisations are identified in a timely and appropriate manner throughout the project lifespan.

The second unit focuses the competencies that are required by project managers to develop the project plan. Aspects that are included in this unit are determining the scope of the project, identification of risks and the confirmation of the project success criteria. In the third unit, the project manager must illustrate competence in managing the progress of the project. Elements of competence include the monitoring, evaluation and controlling of the project's performance. The project manager should also exhibit competence with regard to the monitoring of risks.

The fourth unit focuses on the end product or service of the project and ensures that it is accepted by all the relevant stakeholders as identified by PM01. The main objective is to secure acceptance of the final product or service by the stakeholders. The fifth unit focuses on the various phases and cycles of the project. The emphasis is on the transition from one stage to another and how the project is closed at the end.

The sixth and final unit focuses on the evaluation and possible improvement of the project's performance. Competencies focus on the development of an evaluation plan, the evaluation of the project against this plan and the documentation of lessons learned.

The GAPPS can be downloaded from http://globalpmstandards.org/

PMI's project manager competency development framework (PMCDF)

The PMCDF provides an overall view of the skills and behaviours one would need to develop competence as a project manager (Project Management Institute 2007). It provides a framework for the definition, assessment, and development of project management competence. The framework also defines the key dimensions of competence and identifies those competencies that are most likely to impact project management performance. The framework outlines the key dimensions of competency and identifies those competencies that are most likely to impact performance (Pellegrinelli & Garagna 2009).

Shao (2006) offers the following brief description of PMCD framework:

- Three project management competency dimensions are defined as knowledge, performance and personal. These dimensions are further divided into four levels, that is, unit of competence, competency cluster, element which is specific to each competency cluster and performance criterion which is specific to each element.

- The knowledge and performance competence dimensions draw upon the nine knowledge areas as well as the five project management process groups as outlined in the PMBOK® Guide (Project Management Institute 2008).
- The competency scorecard is used for self-assessment and identification of training needs.
- This framework is not used to select project managers because of the limitation of understanding of the relative weighting that must be applied to each of the elements.

Figure 1 is a graphical depiction of the PMCD framework. The green indicates a competent project manager, implying that project managers must be fully competent in all three dimensions. The red indicates the current competency of a project manager. The distance between the red and green indicate competency gaps that need to be addressed.

The performance competencies focus exclusively on the project life cycle. The first unit of competence focuses on the initiation of a project. Project managers should be competent in authorising and defining the project scope. The second unit of competence focuses on how the project is planned. Competence is measured based on the project manager's ability to mature the project scope, develop the project management plan and to identify and schedule the project activities based on the project scope.

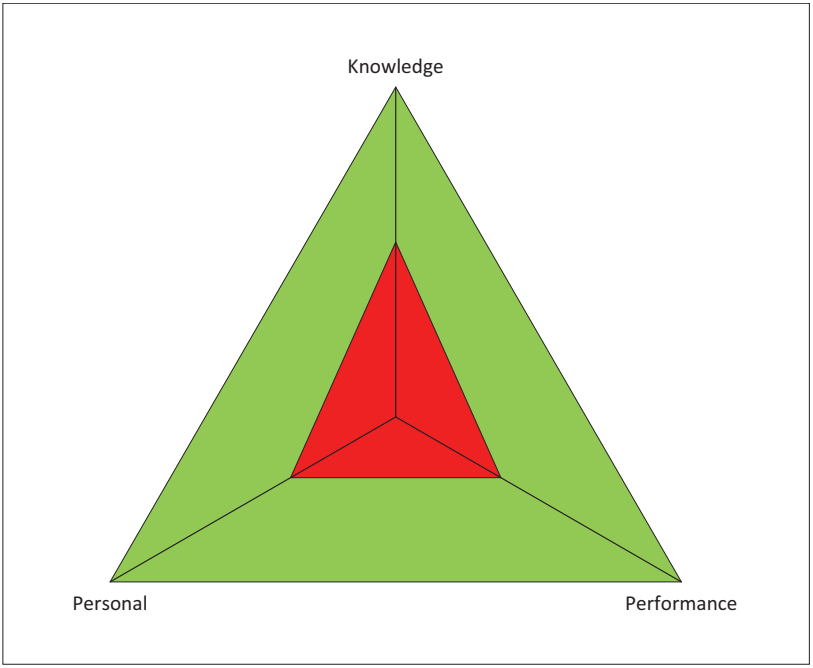

FIGURE 1: Project Management Competency Development Framework (PMCD) framework.

Thirdly, the project manager must exhibit competence during the execution of the project. Competence is measured according to how well the project objectives are achieved, based on the project scope. During the monitoring and controlling of a project, the project manager is measured against his ability to compare actual performance versus planned performance and the measures that are taken to address misalignment between the actual and planned performance.

The last competence unit focuses on the closing of a project. The project manager must exhibit competence in formally terminating a project and the transfer of the completed product to operations or to close a cancelled project.

Personal competencies as per the Project Management Institute (2007) are those '... behaviors, attitudes, and core personality characteristics that contribute to a person's ability to manage projects'. Six units of competence are identified (Project Management Institute 2007):

- Communication which focuses on exchanging accurate, appropriate, and relevant information with stakeholders using suitable methods.
- Leading which guides, inspires and motivates team members as well as the project stakeholders to achieve the project objectives.
- The effective deployment and use of human, financial, material, intellectual and intangible resources forms part of the managing personal competence.
- Applying the appropriate depth of perception, discernment, and judgment to effectively direct a project in a changing and evolving environment is the focus of the cognitive ability competence unit.
- Effectiveness is the fifth competence unit, and the emphasis is on producing the desired results through the application of skills, knowledge and tools on all the project management activities.
- Professionalism focuses on the level of conformance to responsibility, respect, fairness and honesty.

According to PMI, the current edition of the PMCDF is under review as substantial changes were made to the project management body of knowledge.[1]

IPMA'S international competence baseline (ICB)

IPMA's ICB shows the knowledge, experience and personal attitudes expected of project managers (Caupin *et al.* 2006; Ghosh *et al.* 2012). Furthermore, the ICB deals with a mix of knowledge about project management concepts, demonstrable performance against each knowledge topic and specific behaviours that are deemed to be associated with good

1. http://www.pmi.org/PMBOK-Guide-and-Standards/Standards-Current-PMI-Standards-Projects.aspx

project management (Aitken & Crawford 2008). However, some aspects of competence, like self-concept and value, are not included in the ICB (Song & Gale 2008).

ICB organises the competence elements required by the modern project manager into 29 elements that are organised in the following three competence areas (International Project Management Association 2015):

- People define the personal and interpersonal competences required to succeed in projects.
- Practice defines the technical aspects of managing projects.
- Perspective defines the contextual competences that must be navigated within and across the broader project environment.

The ICB describes a competent project manager within the three different ranges, represented figuratively in the eye of competence as per Figure 2.

The people competence area consists of 10 competencies, that is:

- **Self-reflection** and self-management focuses on the project manager's ability to acknowledge, reflect on and understand his own emotions, behaviour and values and the

FIGURE 2: The international competence baseline (ICB) eye of competence (International Project Management Association 2015:25).

impact thereof on project performance. Self-management on the other hand, is the project manager's ability to set personal goals and to validate progress against these goals.

- Project managers must demonstrate personal **integrity** and reliability, because a lack of these qualities may lead to a failure of the intended project results.
- Personal **communication** focuses on the exchange of information as well as the accurate and consistent delivery of project information to all relevant stakeholders.
- The **relations and engagement** competency element focuses on the forging of personal relations that form the foundation of productive collaboration, personal engagement and commitment, This competency element is enforced by empathy, trust, confidence and communication skills.
- **Leadership** provides direction and guidance to individuals and groups. The competence focuses on the ability to choose and apply appropriate styles of management in different situations.
- **Teamwork** focuses on building a productive team by forming, supporting and leading the team. Team communication and team relations are amongst the most important competencies of successful teamwork.
- **Conflict** and crisis includes the moderation and solving of conflicts through the observation of the environment.
- The competence element of **resourcefulness** is the ability to apply various techniques and ways of thinking to defining, analysing, prioritising, finding alternatives for, and dealing with, or solving, challenges and problems.
- Project managers must be competent in **negotiation**. The focus is to balance different interests, needs and expectations in order to reach a common agreement and commitment whilst maintaining a positive working relationship.
- **Results orientation** is the critical focus maintained by the project manager on the outcomes of the project. The individual prioritises the means and resources to overcome problems, challenges and obstacles in order to obtain the optimum outcome for all the parties involved. The results are continuously placed at the forefront of the discussion and the team drives toward these outcomes.

The practice competence area consists of the following 13 competencies:

- **Project design** addresses how competent the project manager is in interpreting the demands, wishes and influences of the organisation and translating these into a high-level project design.
- The competence element of **requirements and objectives** describes the rationale of the project's existence. The focus is on the goals that need to be achieved, the benefits that need to be realised and which stakeholders' requirements are to be fulfilled.
- **Scope** defines the specific focus of the project. The project manager should be competent in describing the outputs, outcomes and benefits and the work required to produce the project's product or service.

- **Time** includes the identification and structuring of all components of a project in time in order to optimise the execution.
- The **organisation and information** competence element includes the identification of the various roles and responsibilities as well as the effective information exchange within the project.
- The **quality** competence element focuses on the quality of how the project is managed, as well as the quality of any product that is a deliverable of the project itself.
- Project managers must indicate competence in the **financial** side of the project. The financial competence element includes activities such as the estimation, planning, pending and controlling of financial resources.
- The **resources** competence element includes defining, acquiring, controlling and developing the resources that are necessary to realise the project's outcome.
- **Procurement** is the process of acquiring goods and/or services from external parties to the project itself. Project managers should be competent in purchase planning as well as contract administration.
- The competence element of **plan and control** determines the project manager's ability to create a balanced plan and to execute this plan in a controlled way and manner
- **Risk and opportunity** includes the competencies of identifying, assessing, planning and the implementing controls for risks and opportunities. Risk and opportunity management helps decision makers to make informed choices, prioritise actions and distinguish amongst alternative courses of action. Risk and opportunity management is an ongoing process taking place throughout the life cycle of the project.
- The **stakeholders** competence element focuses on the management and engagement of all the relevant stakeholders. Project managers should, on a constant basis, revise, monitor and act upon their interests and influence on the project.
- **Change and transformation** is the thirteenth competence area that enables project managers to change or transform their organisation, thereby achieving projected benefits and goals.

The perspective competence area consists of five competencies, that is:

- The **strategy** competence describes how strategies are understood and transformed by the project manager into manageable elements through the use of projects.
- The **governance, structures and processes** competence element defines the understanding of, and the alignment with, the established structures, systems and processes of the organisation that provide support for projects and influence the way they are organised, implemented and managed.
- The **compliance, standards and regulations** competence element describes how the project manager complies with external and internal standards and regulations within a given country, organisation or industry.
- The **power and interest** competence element describes how the project manager recognises and understands informal personal and group interests and the resulting politics and use of power.

- The **culture and values** competence element describes the project manager's approach to the influence of the organisation's culture and values on the project.

PMI's PMBOK® and IPMA's ICB have been mainly developed along the attribute-based dimension, whilst GAPPS' standards have been mainly developed along the performance-based dimension (Bredillet *et al.* 2015). The focus of assessment is the 'role' of individuals, their knowledge, tasks, and skills required, and what they do on their jobs.

Comparison between ICB, PMCDF and GAPPS

Each of the three major competence standard and frameworks has its own following. This following might be because of the certification that the project manager holds or it might even be based on the physical location of the organisation. Table 2 is a high-level comparison of the competencies that are reflected in ICB, PMCDF and GAPPS. The purpose of the comparison is to determine the level of similarity between these three frameworks and standards.

The results in Table 2 highlight that for the bigger part, most of the competencies are addressed by all three of the major standards. Each standard might have its own naming convention, but the intention of the specific competence is the same. The comparison highlights that GAPPS is the standard with the least competencies that can be mapped to the other standards.

TABLE 2: Comparison between ICB, PMCDF and GAPPS.

ICB (International Project Management Association 2015)	PMCDF (Project Management Institute 2007)	GAPPS (Global Alliance for Project Performance Standards 2007)
Strategy	• Project aligned with organisational objectives and customer needs • Takes a holistic view of project	
Governance, structures and processes		
Compliance, standards and regulations		• Ensure the plan for the project reflects relevant legal requirements.
Power and interest		
Culture and values		

Table 2 continues on the next page →

TABLE 2 (Continues ...): Comparison between ICB, PMCDF and GAPPS.

ICB (International Project Management Association 2015)	PMCDF (Project Management Institute 2007)	GAPPS (Global Alliance for Project Performance Standards 2007)
Self-reflection and self-management	• Handles personal and team adversity in a suitable manner	• Reflect on practice
Personal integrity and reliability	• Takes accountability for delivering the project • Demonstrates commitment to the project • Operates with integrity	
Personal communication	• Communication activities agreed • Project tracked and status communicated to stakeholders • Actively listens, understands, and responds to stakeholders • Maintains lines of communication • Tailors communication to audience	
Relations and engagement	Motivates and mentors project team members	
Leadership	• Builds and maintains effective relationships • Uses assertiveness when necessary	
Teamwork	• Project team identified with roles and responsibilities agreed • Project team managed • Creates a team environment that promotes high performance • Builds and maintains the project team • Manages a diverse workforce	• Promote effective individual and team performance

Table 2 continues on the next page →

TABLE 2 (Continues ...): Comparison between ICB, PMCDF and GAPPS.

ICB (International Project Management Association 2015)	PMCDF (Project Management Institute 2007)	GAPPS (Global Alliance for Project Performance Standards 2007)
Conflict and crisis	• Plans and manages for project success in an organised manner • Resolves project problems • Resolves individual and organisational issues with objectivity	
Resourcefulness	• Uses influencing skills when required • Effectively resolves issues and solves problems • Uses appropriate project management tools and techniques	
Negotiation		
Result orientation	• Plans and manages for project success in an organised manner • Seeks opportunities to improve project outcome	• Confirm project success criteria.
Design		• Develop and integrate project baselines
Requirements, objectives and benefits		• Ensure that the product of the project is defined
Scope	• Preliminary scope statement reflects stakeholder needs and expectations • Project scope agreed • Project scope achieved • Project change is managed	• Define the work of the project
Time		
Organisation and information	• Ensures quality of information	• Capture and apply learning

Table 2 continues on the next page →

TABLE 2 (Continues ...): Comparison between ICB, PMCDF and GAPPS.

ICB (International Project Management Association 2015)	PMCDF (Project Management Institute 2007)	GAPPS (Global Alliance for Project Performance Standards 2007)
Quality	• Quality management process established • Quality managed against plan • Quality is monitored and controlled	
Finance	Cost budget approved	
Resources	• Human resources managed • Project resources released	
Procurement and partnership	• Procurement plan approved • Material resources managed • Contracts administered	
Plan and control	• Project schedule approved • Integrated change control processes defined • Project plan approved	• Monitor, evaluate, and control project performance • Ensure that changes to the product of the project are monitored and controlled • Develop a plan for project evaluation • Evaluate the project in accordance with plan.
Risk and opportunities	• High-level risks, assumptions and constraints are understood • Risk response plan approved • Risk is monitored and controlled	• Document risks and risk responses for the project • Monitor risks to the project

Table 2 continues on the next page →

TABLE 2 (Continues ...): Comparison between ICB, PMCDF and GAPPS.

ICB (International Project Management Association 2015)	PMCDF (Project Management Institute 2007)	GAPPS (Global Alliance for Project Performance Standards 2007)
Stakeholders	• Stakeholders identified and their needs are understood • Project stakeholders' expectations managed • Stakeholder perceptions measured and analysed • Maintains project stakeholder involvement, motivation and support	• Ensure that stakeholder interests are identified and addressed • Manage stakeholder communications • Facilitate external stakeholder participation
Change and transformation	• Project outcomes accepted • Changes at the required pace to meet project needs	• Secure acceptance of the product of the project • Manage project start-up • Manage transition between project phases
Select and balance		
	• Project charter approved	
	• Project formally closed	• Manage project closure

Research methodology

A quantitative approach was used in this research as the primary aim was to explore IT project managers' perception of their competence with regard to the elements that contribute to competence. A structured questionnaire was used, which facilitated the quantitative analysis of the gathered data (Denscombe 2010; Thomas 2003). The key reason for adopting a structured questionnaire was that it ensured that each respondent was presented with the exact same questions in the same sequence. Moreover, this allowed the researchers to reliably aggregate and compare the responses between different sample subgroups. A dualistic approach was taken to gather responses, namely a web-based survey as well as a manually distributed survey. Both these approaches used the structured questionnaire as a basis. The web-based survey was designed and hosted on SurveyMonkey (www.surveymonkey.com) and was open to the public whilst the targeted survey focused on specific individuals. The second approach made use of hard copies of the structured questionnaire, and the specific targeted individuals

were asked to complete the questionnaires manually. The unit of analysis for this research was IT project managers who were involved in the managing of IT projects on a daily basis.

The questionnaire is divided into three sections. The first section collected demographic data regarding the geographic location of project managers, what types of projects they are involved in as well as the sector in which they perform their project management duties.

Sections two and three formed the main body of the questionnaire and required the respondents to rate their competence in two subsections, namely, performance competencies and personal competencies. The PMI's PMCDF was used as the basis for questions that form part of these sections.

Performance competencies addressed activities that project managers should be able to perform during the project's life cycle. These were derived from the Project Management Body of Knowledge (PMBoK® Guide). These process groups are:

- **Initiating a project:** Performing the work to authorise a new project and define its scope.
- **Planning a project:** Performing the work to define and mature the project scope, develop the project management plan and identify and schedule the project activities.
- **Executing a project:** Performing the work in the project management plan to accomplish the project objectives under the project scope statement.
- **Monitoring and controlling a project:** Performing work to compare actual performance with planned performance, to analyse variances, to assess the trends to effect the process improvements, to evaluate possible alternatives and to implement appropriate corrective actions as needed.
- **Closing a project:** Performing the work to formally terminate a project and transfer the complete product to operations or to close a cancelled project.

Each process group is taken as a unit of competence.

The personal competencies section included subsections that relate to behaviours, characteristics and core personality traits that contribute to project success. Once again, the respondents were requested to rate their own competence related to the following areas:

- **Communication:** Effectively exchanging accurate, appropriate and relevant information with stakeholders using suitable methods.
- **Leadership:** Guiding, inspiring and motivating team members and other project stakeholders to manage and overcome issues to effectively achieve project objectives.

- **Managing:** Effectively administering the project through appropriate deployment and use of human, financial, material, intellectual and intangible resources.
- **Cognitive ability:** Applying an appropriate depth of perception, discernment and judgement to effectively direct a project in a dynamic environment.
- **Effectiveness:** Producing desired results by using appropriate tools, resources and techniques in project management activities.
- **Professionalism:** Conforming to an ethical behaviour governed by responsibility, respect, fairness and honesty in the practice of project management.

Each of these six areas was also taken as a unit of competence.

Probability sampling was used as this research focused on providing a representative view of the unit of analysis for the purpose of generalisability (Sekaran 2003). Simple random sampling was selected because it not only provides results which are highly generalisable, but also adequately represents the target population. Furthermore, because this form of sampling exhibits low bias, the results obtained would provide an objective view of the research problem.

The purpose of any questionnaire is that it measures what it intended to measure (Cameron & Price 2009; Kumar 2011). If a questionnaire does not measure what it is supposed to measure, then the conclusions and statistical analysis might also be invalid. Validity checks are used to verify that the questionnaire is suitable (Kitchenham & Pfleeger 2002). There are many types of validity checks, including content, criterion and construct validity (Litwin 1995). Construct and content validity was used in this research. The questionnaire was constructed using the PMCDF as a baseline for the questions. Each competence unit and element was included in the questionnaire ensuring that the respondents are measured on each of these items. Content validity is the extent to which the items on a test are fairly representative of the entire domain which the test seeks to measure (Sekaran 2003). The questionnaire was evaluated by subject matter experts. These experts were IT project management experts, who evaluated the questionnaire on the following criteria, namely, the layout was logical, and the questions collected relevant data to answer the various research hypotheses.

Data analysis was performed using the following statistics:

- Descriptive statistics were used to describe and summarise the various characteristics of the data quantitatively (Mendenhall, Beaver & Beaver 2013; Sekaran 2003).
- Correlation analysis was used to determine whether there is a relationship between two or more variables. The correlation statistics reveal whether there is a strong or weak relationship amongst variables, as well as whether the relationship is positive or negative (Downing & Clark 2010; Sekaran 2003). The data were analysed to assess whether there was a significant relationship between certification presence and IT project performance.

- The data were also analysed for significant factors that may influence performance and personal units of competence. Exploratory factor analysis attempts to further describe and understand the underlying structure of variables (Zikmund *et al.* 2013). Great amounts of variables can then be condensed into a manageable number of factors that can be interpreted. The importance of each variable determines to which factor it correlates. Each unit of competence is measured in this way.

Chapter 2

Industry overview of project manager competencies

The purpose of this chapter is to determine the overall project manager competencies across three major industries. This is accomplished through the following objectives: analyse the general project manager competencies across all three industries, analyse the project manager competencies specifically for each of the industries, and do a cross-industry comparison with regard to the project manager competencies.

The chapter is structured in six sections. Section 1 focuses on the demographics of the respondents, and section 2 on the overall PM competencies. Sections 3 to 5 focus on the industry specific competencies of the project managers and section 6 compares the competencies across the industries.

Biographical information

A total of 403 responses were received which included responses from various industries. The three major industries represented are the financial services, building and construction and ICT. This percentage breakdown is presented in Figure 3.

How to cite: Marnewick, C., Erasmus, W. & Joseph, N., 2016, 'Industry overview of project manager competencies', in *Information technology project managers' competencies: An analysis of performance and personal competencies,* pp. 19-40, AOSIS, Cape Town. http://www.dx.doi.org/10.4102/aosis.2016.itpmc07.02

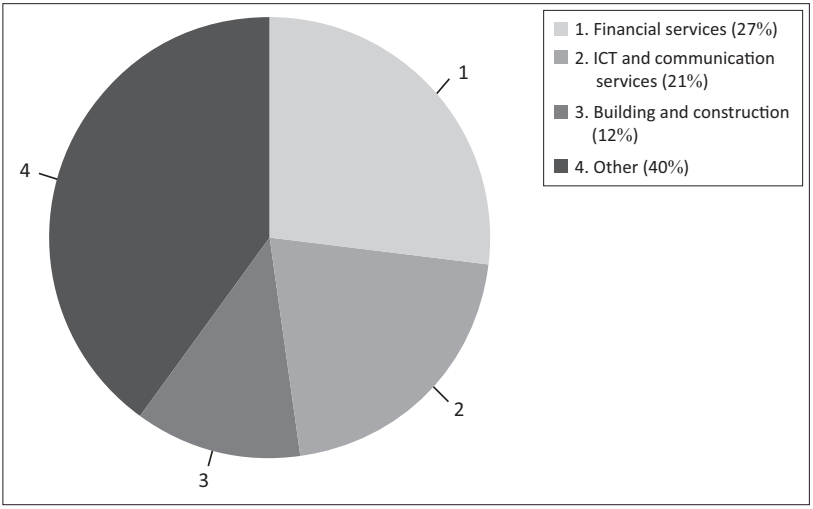

FIGURE 3: Industry representation.

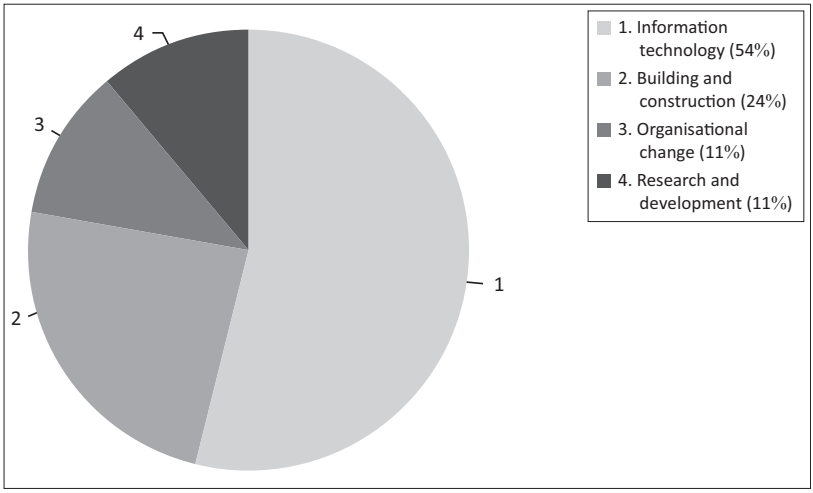

FIGURE 4: Types of projects.

The respondents also had to indicate the types of projects that they are involved in. The results are displayed in Figure 4. It is evident that the majority of the projects are IT-related projects, followed by 24% of the projects that focus on construction and engineering.

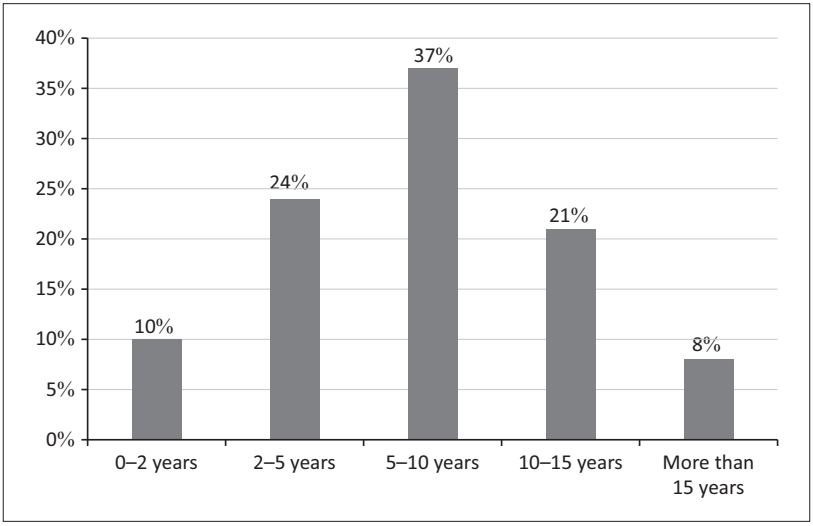

FIGURE 5: Project management experience.

The results in Figure 5 highlight the experience of the project managers in years. The greatest percentage of the respondents has between 5 and 10 years experience. Close to a third of the respondents (29%) have project management experience beyond 10 years, indicating that there is a large contingent of project managers with sufficient experience.

The biographical information highlights that project management is performed in various industries and applies to various types of projects. The results also highlight that project managers, in general, have and are gaining project experience.

The next section focuses on the performance competencies of the project managers. The performance competencies focus on 'what the project manager knows about the application of processes, tools, and techniques for project activities' (Project Management Institute 2007).

Performance competence

The performance competencies are divided into the project management processes. Within each project management process, competencies that are relevant for a project manager to execute a project successfully, are evaluated.

Initiating a project

The results depicted in Figure 6 highlight that project managers are competent with regard to all the activities that are needed to initiate a project.

The first activity focuses on the alignment between the organisation's strategic objectives and the project itself. An overwhelming 91.3% of the project managers are feeling either competent or highly competent that their projects are aligned with the strategic objectives of the organisations and with the needs of the users. This is very much in line with current theory and research stating that projects need to be strategically aligned to provide value and benefits to the organisation.

Secondly, the project managers are extremely competent (90.4%) that the scope statement reflects the needs of the stakeholders. This bodes well as the scope statement is used to determine, amongst others, the costing and duration of a project. If a scope statement is well documented, then it has a positive impact on the entire duration of the project as it provides a solid foundation to make decisions upon.

The one aspect that the project managers are not that competent in is the way that high-level risks are understood. Only 80.5% of the project managers are confident that

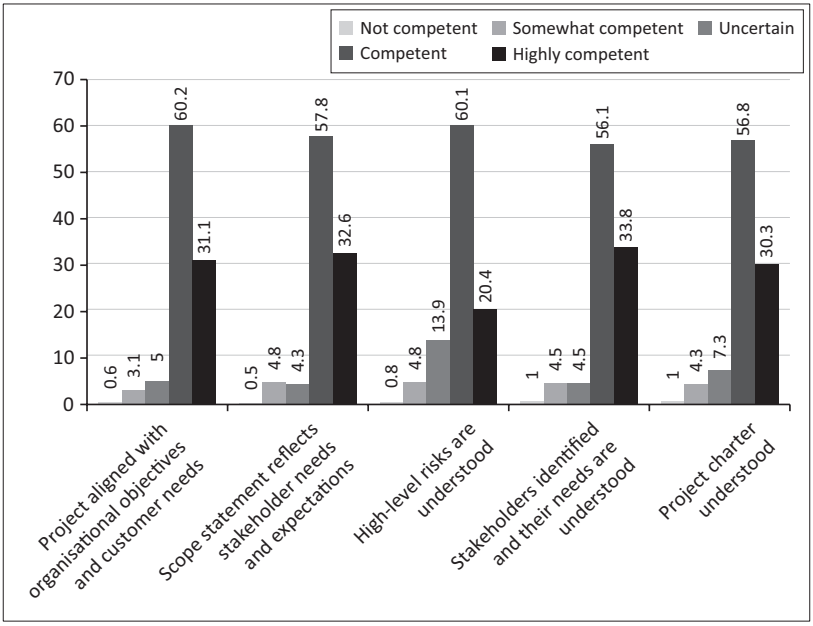

FIGURE 6: Unit of competence – Initiating a project.

they understand the high-level risks. The remaining 19.5% are less confident that they understand the high-level risks associated with their projects. Risk management is an issue of content, and research has indicated that project managers are not necessarily confident in this knowledge area.

The project managers are competent (89.9%) enough in identifying the stakeholders and that their respective needs are understood. This high-competence level is reflected in the high-competence level of the scope statement that reflects the needs of the stakeholders. There is a positive relation between the identification of stakeholders and the subsequent identification of their needs, and to capture these needs in a scope statement.

The final activity within this competence area is whether project managers understand the project charter of the projects that they manage. As with the other activities, the project managers are feeling more than competent (87.1%) that they understand the project charter and the subsequent implications of signing off on the project charter.

The results highlight that the project managers are competent to highly competent in the initiation of a project. This bodes well for any project as a project that is initiated well, does have a better chance of success than projects that are initiated in a less successful way.

Planning a project

Planning focuses on the processes that are needed to establish the entire scope of the project, define the objectives and develop the course of action that needs to be taken to attain these objectives (Project Management Institute 2013b). The respondents once again indicated that they are fairly competent in performing the activities that are related to the planning of a project.

Almost ninety per cent (87.7%) of the respondents are feeling either competent or highly competent that they are capable enough to have the project scope agreed upon. This is a fairly important statement as the costing and duration of the project is highly dependent on the scope of the project. Given this fact, the respondents are confident that they can get the project schedule (88.7%) as well as the budget approved (77.3%).

The results in Figure 7 highlight that the respondents are fairly positive about their competencies to get the correct team assembled (85.6%) and that an appropriate communication plan can be constructed for the team (88.7%). The respondents are also feeling confident about their competence in planning for risks (82.9%). This is, however, in contradiction with an independent study by Marnewick and Erasmus (2014) where only 50% of the project managers were formally doing risk management.

Three activities that the respondents are not that competent in are the establishment of quality processes (75.7%), the way that integrated change control is managed (77.7%) and

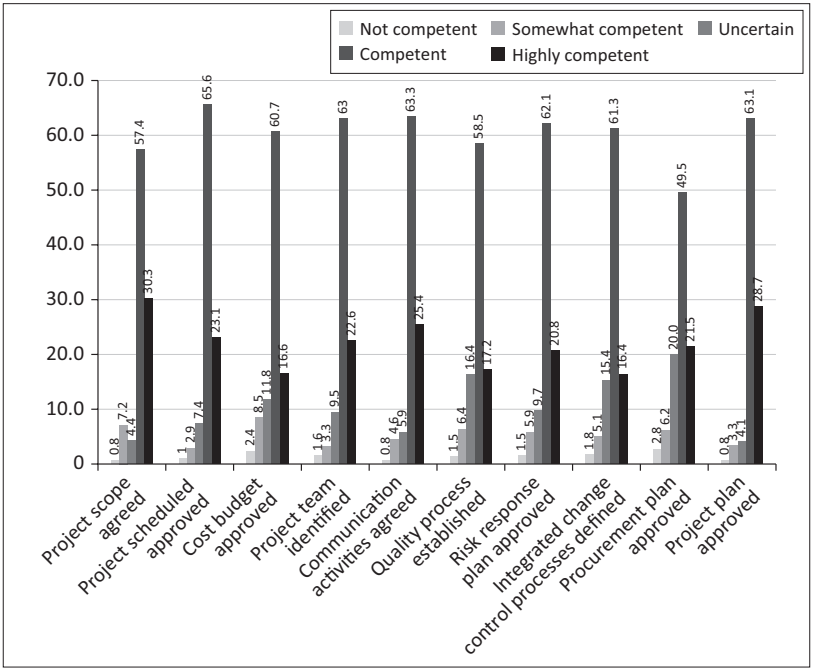

FIGURE 7: Unit of competence – Planning a project.

procurement (71%). Procurement covers a range of activities including contract management as well as analysing the requirements for the materials needed for the project.

Ninety-two per cent of the respondents are competent or highly competent when it comes to getting the project plan approved. This competency covers aspects such as the establishment of the project baselines and the conducting of a kick-off meeting. Tasevska, Damij and Damij (2014) make the case that project planning plays an important role in achieving project success. They state that projects fail at the beginning because of insufficient planning. Given the fact that the project managers are competent in project planning, it can be deduced that their projects should be delivered successfully.

Executing a project

The executing processes that were defined during the planning phase are performed to complete the work. The processes focus on coordinating the efforts of the resources, managing stakeholder expectations and to perform the necessary activities of the project (Project Management Institute 2013b).

The first activity within the executing process is to ensure that the overall project scope is delivered. Eighty-four per cent of the respondents are confident that they deliver on the project scope. This is in line with the 87.7% of the respondents that stated they were competent in getting the stakeholders to agree on the scope. Apart from the fact that the respondents are confident that they are competent enough to produce an agreed-upon scope, they also believe that they are competent to deliver this agreed-upon scope.

Managing the expectations of the stakeholders is not perceived by the project managers as a major problem. They are competent (85.6%) in ensuring that the expectations of the stakeholders are reviewed on a regular basis. They are also competent with their interaction with the said stakeholders to ensure continuous support for the project.

With regard to building a project team and developing the team members, the project managers are competent (86.4%) in managing the human resource side of the project. A large percentage (26%) of the 86.4% is actually very competent in managing the human resources.

An interesting notion from Figure 8 is that project managers are competent in managing quality against the agreed-upon quality management plan (75.1%). This percentage is equal to what is stated in Figure 7. The project managers are competent (75.7%) in establishing quality processes as well as executing these processes.

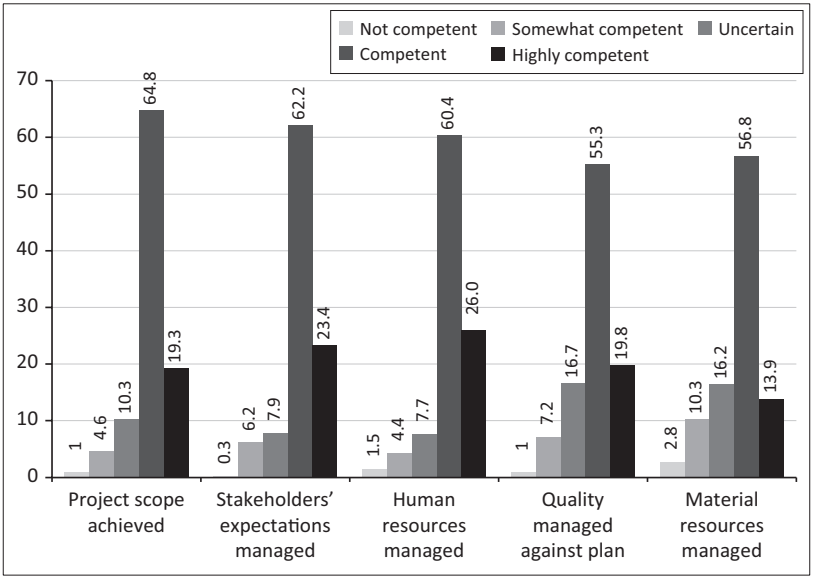

FIGURE 8: Unit of competence – Executing a project.

Managing sellers and the associated contracts is not a problem for project managers. Seventy-one per cent (70.7%) of the project managers state that they are competent in managing material resources.

In general, project managers are competent in executing a project.

Monitoring and controlling a project

The monitoring and controlling of a project span across all the other process groups. The purpose of this process is to track and review the progress and performance of the project. Changes to the project are also identified and acted upon accordingly (Project Management Institute 2013b).

The first competence activity focuses on whether project managers track the project and communicate the status of the project to the stakeholders. Ninety per cent of the project managers responded positively implying that this activity is performed in a competent manner and that performance reports and minutes are produced for stakeholder scrutiny.

With regard to change management, a large percentage (89.9%) of the project managers are positive that this activity is performed in a competent manner. The results correlate with the results presented in Figures 7 and 8.

An interesting notion is that the project managers are more comfortable with the monitoring and controlling of quality than with managing quality against the plan (Figure 8). In total, 83.4% of the project managers are feeling competent or highly competent to manage and control the quality of the various products and artefacts of the project. This implies a 08.3% positive shift from actively managing the quality against the plan. The answer might lie in what is expected of a project manager during execution, versus monitoring and control. During the execution phase it is expected of a project manager to execute quality assurance activities as well as ensuring compliance with quality standards and processes. This is totally different from recording acceptance of completed deliverables, collecting project and product metrics, monitoring deviation from project baselines, recommending corrective and preventative actions and facilitating audits (Figure 9).

Monitoring and controlling risk is again the competence that the project managers are the least comfortable with. Only 72.2% of the project managers feel that they are competent enough to do proper risk management. These results correlate with previous studies on the maturity levels of risk management, and it was found that risk management is the least mature of all the knowledge areas (Marnewick 2013a).

Holding regular team meetings, conducting team building activities, monitoring team satisfaction and providing feedback on team and individual member performance are activities that the project managers are competent in doing. Seventy-nine per cent of the

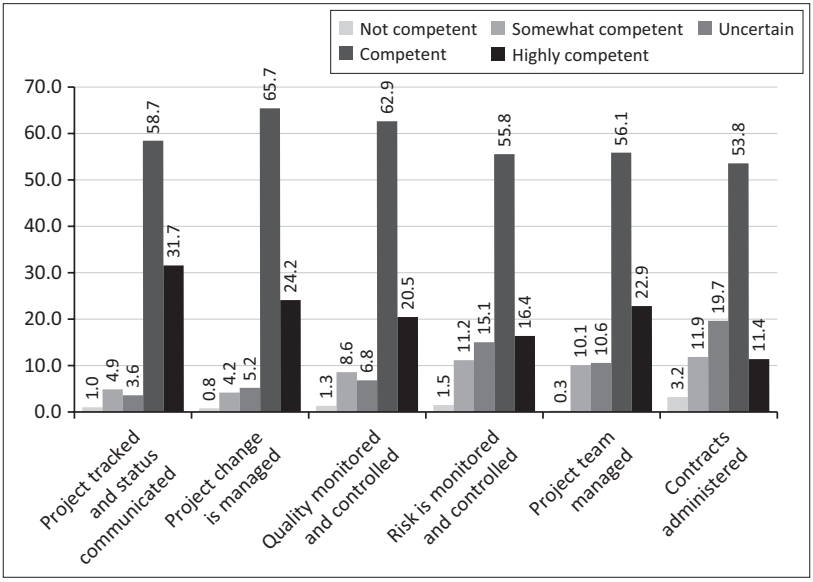

FIGURE 9: Unit of competence – Monitoring & controlling a project.

project managers feel that they are competent in doing these activities and that they are managing their project teams effectively.

Administering contracts (65.2%) is ranked with risk management as the competency that project managers are not comfortable with.

Closing a project

The last process is that of closing a project. Activities that form part of this process include, amongst others, the acceptance of the project outcomes, the releasing of project resources, the measurement and analysis of the stakeholders' perceptions and the formal closure of the project.

Obtaining final acceptance and transitioning all deliverables to operations are activities that project managers are competent in (87.1%). Project managers are also equally competent in ensuring that all project resources are released and that performance feedback is provided to project team members (87.1%).

With regard to surveying the project stakeholders and analysing the results of their feedback, the project managers are less competent (71.9%). This is in stark contrast to the competence of managing stakeholder's expectations (85.6%). The implication is that

project managers manage the stakeholders' expectations during project execution but when it comes to get final approval, this activity is negated.

Eighty-five per cent of the project managers are competent or highly competent in formally closing the project (Figure 10).

Figure 11 is a summary of the project managers' overall competency levels with regard to the project management processes. The responses of not competent, somewhat competent and uncertain were grouped together under not competent, and the responses of competent and highly competent were grouped together under the label of competent.

It is evident from Figure 11 that the project managers, in general, are competent in managing a project. On average, 82.8% of the project managers feel positive about their competence to manage a project.

The next section focuses on the personal competencies of the project managers and is in contrast to the technical competencies that need to be portrayed during the project's life cycle.

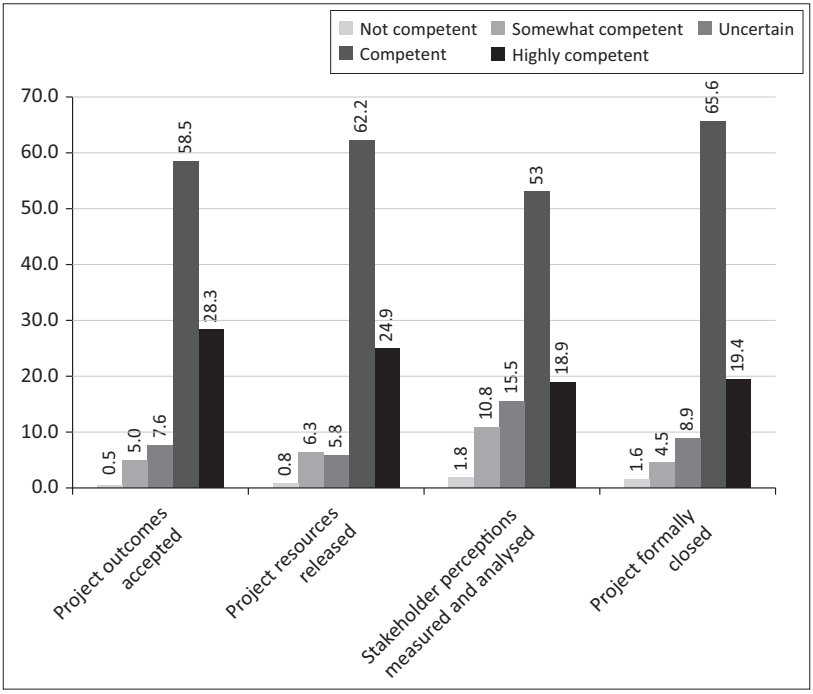

FIGURE 10: Unit of competence – Closing a project.

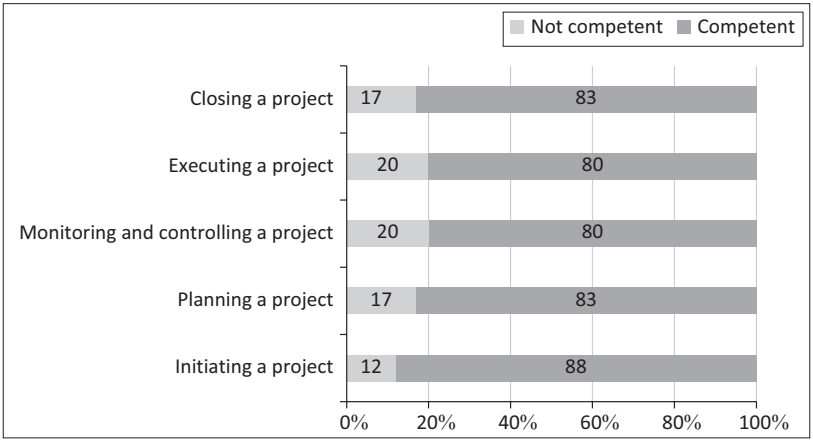

FIGURE 11: Overview of units of performance competence.

Personal competence

The personal competence domain consists of six competencies which are analysed in detail.

Communicating

The first personal competence focuses on the communication skills of the project manager. The focus of this competence is to effectively exchange accurate, appropriate and relevant information with stakeholders using suitable methods.

The first activity focuses on the understanding of and responding to the various stakeholders. Activities include the understanding of explicit and implicit content of communication as well as responding to and acting upon expectations, concerns and issues of the stakeholders. Ninety-three per cent of the project managers feel competent that they are fulfilling their duties with regard to this activity.

With regard to maintaining lines of communication which include engaging stakeholders proactively, disseminating information effectively and maintaining formal and informal communication, the project managers are also highly competent (92.1%) (Figure 12).

Ensuring the quality of information includes activities such as the provision of accurate and factual information and the validation of information. The project managers ranked themselves as competent in this area (93.5%). These results are in line with

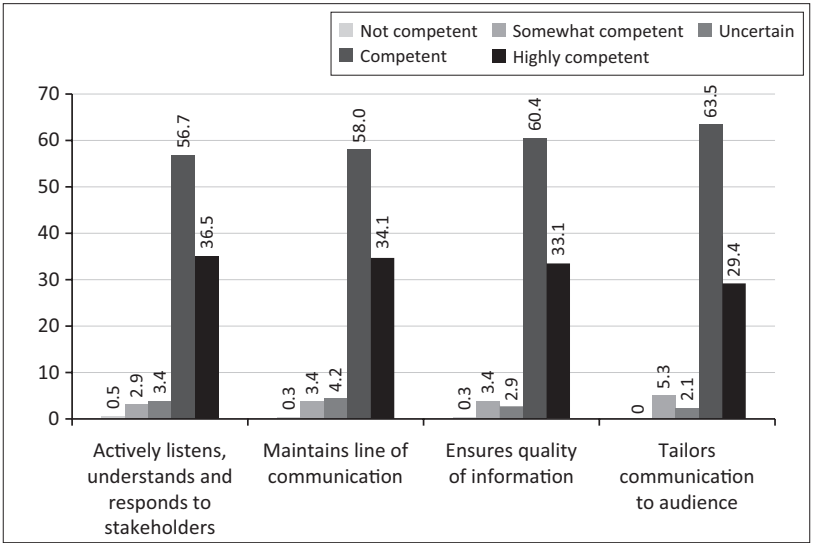

FIGURE 12: Unit of competence – Communicating.

Marnewick (2013a, 2013b) where communication management was the most mature knowledge area.

The project managers are also competent in tailoring the communication to the intended audience (92.9%). Activities include using a suitable communication method and the alignment of the communication with the environment or setting.

In general, the results portray that the project managers are competent or highly competent in communicating accurate, appropriate and relevant information to stakeholders.

Leading

Müller and Turner (2010) reiterated in their 2007 study that there was a positive correlation between project success and leadership competence of a project manager. This competence focuses on how the project manager guides, inspires and motivates team members and other project stakeholders to manage and overcome issues to effectively achieve project objectives.

The project managers are competent to highly competent in the creation of a team environment that promotes high performance of the respective team members (90%). In all the activities of this competence, the project managers rate themselves as either competent or highly competent.

Thirty-seven per cent of the project managers believe that they are highly competent in building and maintaining effective relationships with the various stakeholders. In total, 92% of the project managers portray competence in building trust and confidence with stakeholders and creating an environment that encourages openness, respect and consideration of stakeholders (Figure 13).

Peterson (2007) stated that because:

> [*M*]otivation can inspire, encourage, and stimulate individuals to achieve common goals through teamwork, it is in the project manager's best interest to drive toward project success through the creation and maintenance of a motivating environment for all members of the team. (n.p.)

Eighty-seven per cent of the project managers are competent or highly competent in motivating and mentoring their team members. It can be deduced as a result of the fact that their team members are motivated, that the project is also successfully delivered.

With regard to demonstrating ownership of, accountability for, and commitment to the project, the project managers take full responsibility for taking accountability to deliver the project (93.4%). The project managers are less competent (73.8%) in applying the appropriate influencing technique to each of the stakeholders. It raises a concern that either the project managers do not know their stakeholders or are not familiar with the appropriate influencing techniques.

If leading the team is the one side of the coin, managing the team is the other side. The managing competence focuses on effectively administering the project through

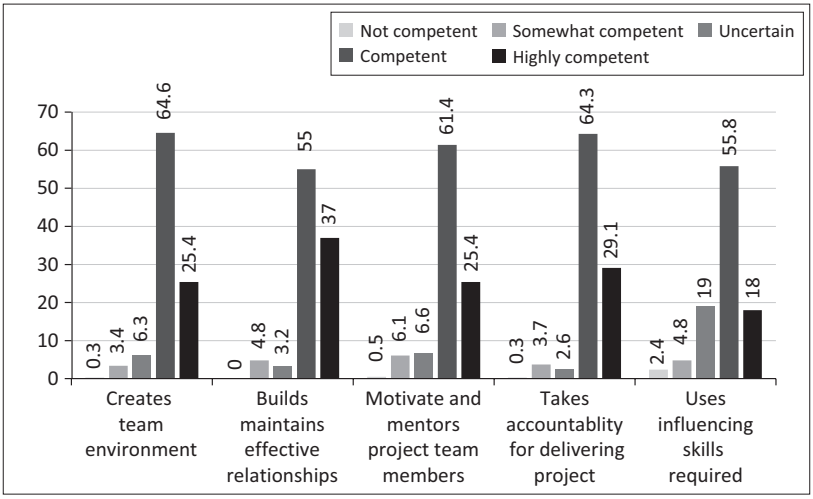

FIGURE 13: Unit of competence – Leading.

the appropriate deployment and use of human, financial, material, intellectual and intangible resources.

Managing

Figure 14 illustrates the competence levels of the project managers. It is evident from the results that the project managers feel competent or highly competent in managing the project.

Building and maintaining the project team focuses on:

- Ensuring expectations and responsibilities are clear to team members and they understand their importance to the project.
- Maintaining a positive attitude and effective relationships amongst team members.
- Identifying, evaluating, and selecting internal and external talent.
- Promoting a healthy work-life balance. Eighty-seven per cent of the project managers are feeling confident that they manage to achieve these.

The second competence focuses on the planning and managing of project success in an organised manner. A high percentage (93.4%) of the project managers are either competent or highly competent with regard to this competence.

Chiocchio *et al.* (2011) mention that team conflict causes a number of negative outcomes, such as decreased individual satisfaction, reduced creativity and risk taking and decreased

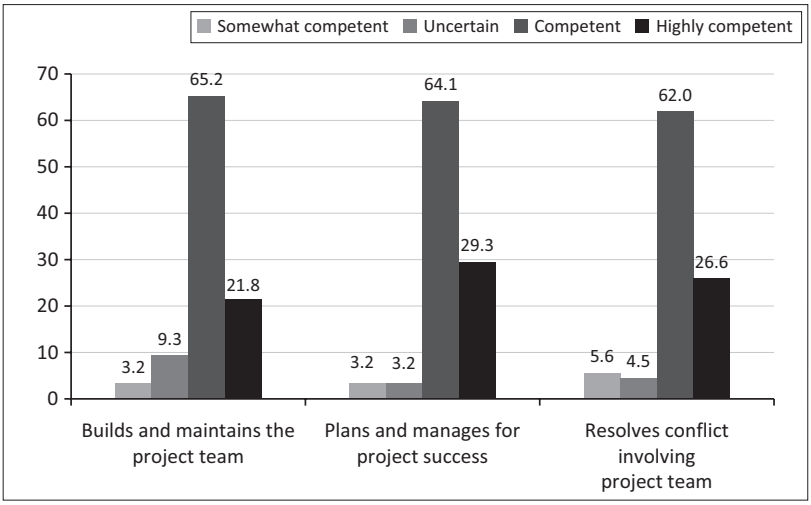

FIGURE 14: Unit of competence – Managing.

team performance. It is thus heartening to see that the project managers are competent or highly competent (88.6%) in resolving conflict that involves the project team.

Cognitive ability

The competence of cognitive ability focuses on applying an appropriate depth of perception, discernment and judgement to effectively direct a project in a changing and evolving environment (Project Management Institute 2007).

The first competence that a project manager must portray is that of taking a holistic view of the project. Ninety-one per cent of the project managers are competent or highly competent in:

- Understanding the project stakeholders needs, interests and influence on project success.
- Understanding how project actions impact other areas of the project, other projects and the organisational environment.
- Understanding both the formal and informal structure of the organisation.
- Understanding organisational politics.

Eighty-eight per cent of the project managers feel competent in effectively resolving issues and solving project-related problems. This correlates with the results of Figure 14 where 88.6% of the project managers state that they are competent in resolving team conflict.

Understanding, selecting and correctly applying project management tools and techniques is seen as a competence that project managers should possess. In 85.9% of the cases, project managers feel that they are competent with regard to the usage of appropriate tools and techniques.

The last competence focuses on seeking and finding opportunities that can improve the project's outcome. Again, the majority of the project managers (83.5%) feel that they are competent in consolidating opportunities and passing them to the organisation.

Effectiveness

Effectiveness focuses on producing the desired results through the usage of appropriate resources, tools and techniques in all the project management activities (Project Management Institute 2007). Figure 16 shows the responses of the project managers, and it is once again evident that the project managers perceive themselves competent.

The activity of resolving project problems focuses on the choice of solutions that maximises project benefit and minimises negative impacts. Eight-eight per cent of the project managers are either competent or highly competent in resolving project problems.

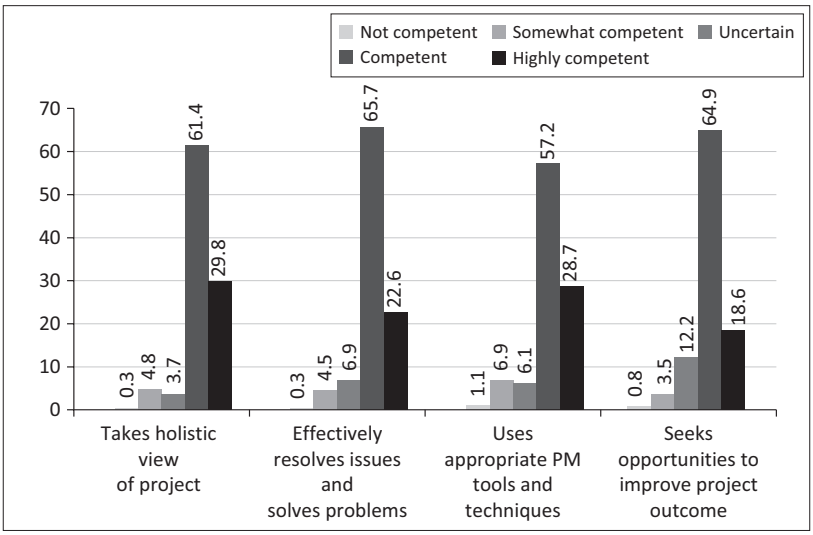

FIGURE 15: Unit of competence – Cognitive ability.

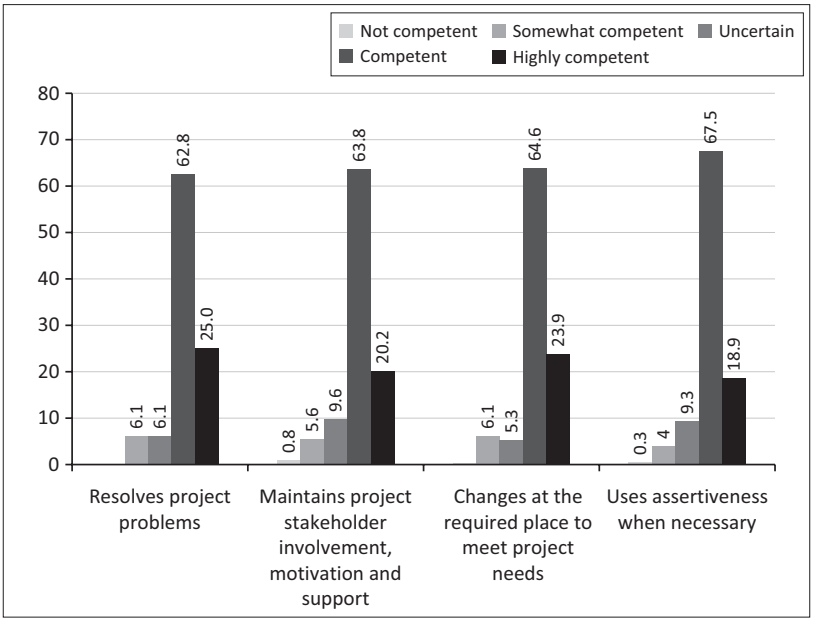

FIGURE 16: Unit of competence – Effectiveness.

The involvement, motivation and support of the various stakeholders is not a problem for the project managers as they are competent (84%) in performing this activity. This activity focuses on using stakeholder communication to maintain stakeholder motivation and constantly seeking opportunities to communicate project status and directions to meet the needs and expectations of stakeholders.

A competency that a project manager should have is that of effectively managing change throughout the project life cycle (Hornstein 2015). The focus should be on changes within the project environment itself and also changes external to the project environment, for example, organisational change. Eighty-nine per cent (88.6%) of the project managers are competent or highly competent in addressing changes as and when they occur. The emphasis is on adapting to changes in the project environment to minimise adverse project impacts.

Assertiveness can be defined as the quality of expressing opinions or desires in a strong and confident way, so that people take notice. Activities include the prevention of inconclusive discussions, making decisions and taking appropriate action as well as making timely decisions based on facts whilst managing ambiguity. The project managers all feel competent that they are assertive when it is necessary (86.4%).

Professionalism

Professionalism is the last of the personal competencies and the focus is on conforming to an ethical behaviour governed by responsibility, respect, fairness and honesty in the practice of project management (Project Management Institute 2007). Five activities form part of this competence and as per the results in Figure 17, a high level of competence is portrayed by the project managers.

The first activity focuses on the project manager's commitment to the project. The focus is on understanding and actively supporting the project's and organisation's missions and goals. The project managers are 96% competent or highly competent in this regard.

Working within a recognised set of ethical standards and seeking to avoid and disclose any possible conflict of interests to all stakeholders are the activities that form part of integrity. The project managers are highly competent in this regard (51.7%) and 43.2% competent.

A high percentage (93.6%) of the project managers feel they are competent or highly competent in the handling of personal and team adversity in a suitable manner. This reflects the results of Figures 15 and 16 where the project managers are competent in dealing with conflict and issues.

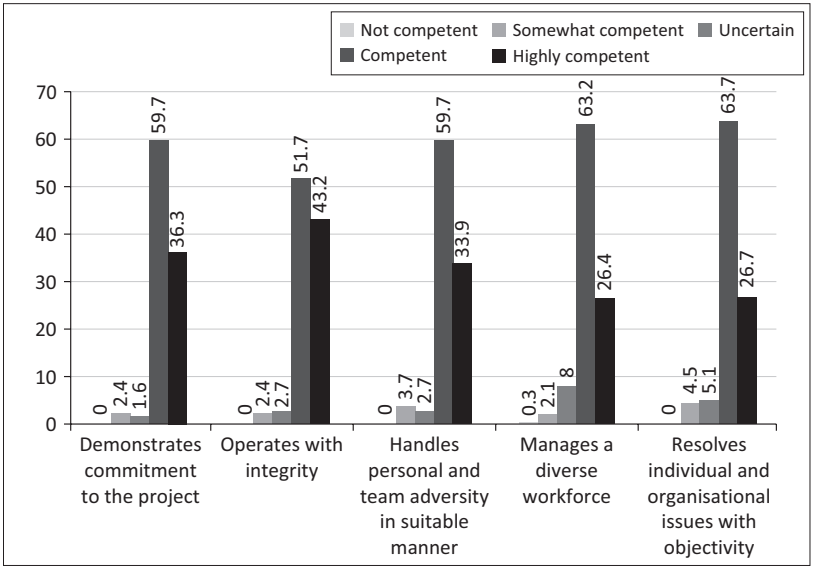

FIGURE 17: Unit of competence – Professionalism.

Horwitz and Horwitz (2007) found that companies are using work teams consisting of employees with diverse backgrounds, knowledge, and expertise to augment their competitive advantage. Ninety per cent of the project managers feel that they are ensuring the team's adherence to cultural issues, legal requirements and ethical values as well as respecting personal, ethnic and cultural differences.

The last activity focuses on whether individual and organisational issues are objectively resolved. The focus in on:

- Respecting the organisational framework for running projects.
- Balancing individual interest with organisational interest.
- Assigning team members in an unbiased way to appropriate tasks.

Ninety per cent of the project managers believe that they are competent or highly competent in resolving issues objectively.

Figure 18 summarises the personal competencies of the project managers and, on average, the project managers' personal competencies are higher than their performance competencies. A personal competency that stands out is that of professionalism. The project managers believe that they are extremely professional with 93% of them stating that they are competent in this regard.

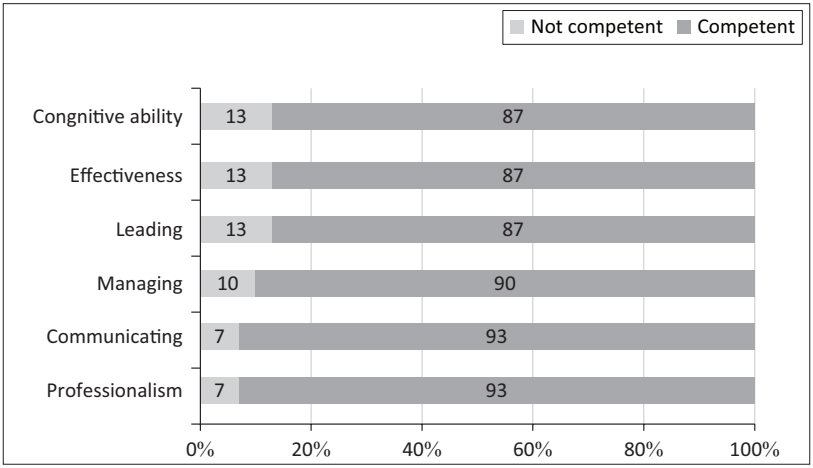

FIGURE 18: Overview of units of personal competence.

The overview of the personal competencies highlights the difference between the performance competencies and the personal competencies. All the units of the performance competence were between 80% and 90%, whereas with the units of the personal competence, the range is between 80% and 95% with half of the units in the 90% bracket.

Cross-industry comparison

Figure 3 indicates the four largest industries presented by the respondents. These three industries represented 60% of the respondents. Project managers need different skills and knowledge that are applicable to their specific industry. Project managers in the building and construction industries will have different skills and knowledge than project managers in the ICT industry.

The results with regard to the competence levels indicate that project managers, irrespective of the industry, are either competent or highly competent in managing a project. The radar charts (Figures 19 and 20) indicate the overall competence levels of project managers per industry. The results were performed using a mapping where five (5) denotes 'highly competent', four (4) denotes 'competent' and three (3) denotes 'uncertain'.

The project managers within the building and construction industry are as competent as the project managers within the ICT industry. The competence levels are calculated as competent. The project managers within the financial services industry are perceived as slightly more competent that their counterparts in the other industries.

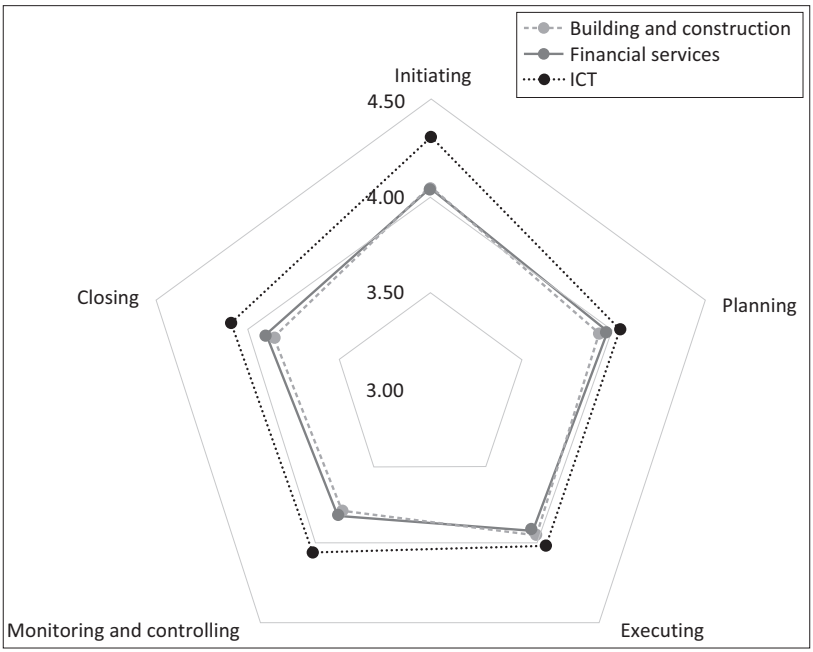

FIGURE 19: Performance competence by industry.

The performance competencies that all project managers are equally competent in are planning and executing a project. The results indicate that, irrespective of the industry, project managers are highly competent in the five performance competencies. The reason might be that project management training in general focuses on the performance competencies. It is, therefore. not a surprise that the performance competence levels are high and consistent across the industries.

The results portrayed in Figure 20 are telling a different story with regard to the personal competencies of the project managers. Where the performance competencies were almost the same across industries, fluctuations are seen when it comes to the personal competencies of the project managers.

As with the performance competencies, project managers within the financial services industry are perceived as more competent than their counterparts. The overall average is 4.22 which equates to competent level. The highest competence is that of professionalism.

Project managers within the building and construction industry are perceived as less competent as illustrated in Figure 20. Although the overall competence level is also

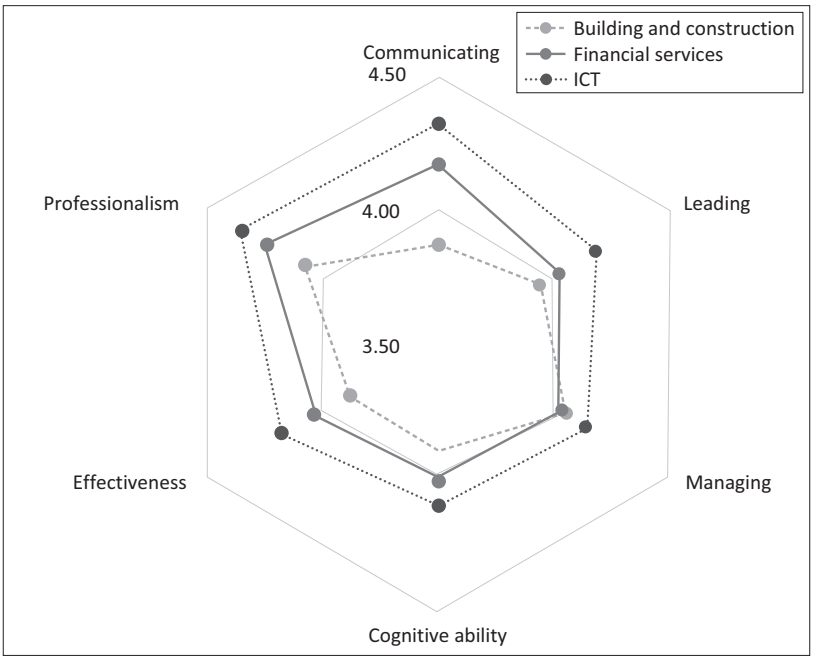

FIGURE 20: Personal competence by industry.

measured as competent (3.95), it is a 0.27 difference which translates to virtually nothing. The results of the ICT project managers indicated that they are also competent (4.08) with regard to the personal competencies.

The reason for these fluctuations might be contributed to the fact that these competencies cannot be trained and learned. These competencies are part of the inherent character of a project manager and portray what kind of person the project manager is.

Conclusion

The emphasis of this chapter was to provide a synopsis of the competence levels of project managers within the South African context. It is evident from the results that the project managers are either competent or highly competent. The results emphasise that the project managers are competent in both the performance and personal competence domains.

The results also indicate that there are no differences between the competence levels of project managers within various industries. Project managers across the three major industries are measured as competent in both the performance and personal competencies.

Given these results, the logical deduction is that the projects managed by these project managers should be delivered successfully. Research relating to project success within the South African context contradicts the competence levels of the project managers and that raises the following question: do project managers have an inflated view of their competencies? The research is based on a questionnaire and no qualitative analysis was carried out to triangulate the perception of the project managers with the perceptions of the team members and stakeholders. Project artefacts were also excluded and were not analysed to determine the competence levels of the project managers.

The following chapters are focusing exclusively on IT project managers' competencies. Each of the two major competencies are analysed in detail.

Chapter 3

Project management certifications' influence on project success

The professionalisation of project management has been a topic of discussion for some time. Professionalising the discipline is argued as the silver bullet to ensure the suitable competencies are recognised to achieve project success (Crawford 2004; Morris *et al.* 2006). Project management competency continuously emerges as a key factor influencing project success (Joseph, Erasmus & Marnewick 2014). This chapter subsequently has the following objectives:

- Discuss project success.
- Discuss the relationship between project management competency and project and/or organisational success.
- Discuss what constitutes project management competency.
- Discuss project management professionalisation through certification.

This chapter has the following structure. The first section discusses the concept of project success and its relationship to project management competency. The second section investigates what project management competency consists of. The final section discusses the role project management certification and professionalising the discipline.

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Project success

The concept of project success is heavily debated as there is much ambiguity around it. Project success was initially defined whether the final output functioned or not. It then evolved into the triple constraint of time, cost and quality. Further research discovered that stakeholders' expectations were omitted, and project success should thus assess stakeholder satisfaction. Benefits realisation to organisations has also recently become a hot topic of discussion and has subsequently been included in measuring project success. The various project management standards provide varying definitions for project success. Figure 21 highlights the attributes of project success definitions in the various project management standards.

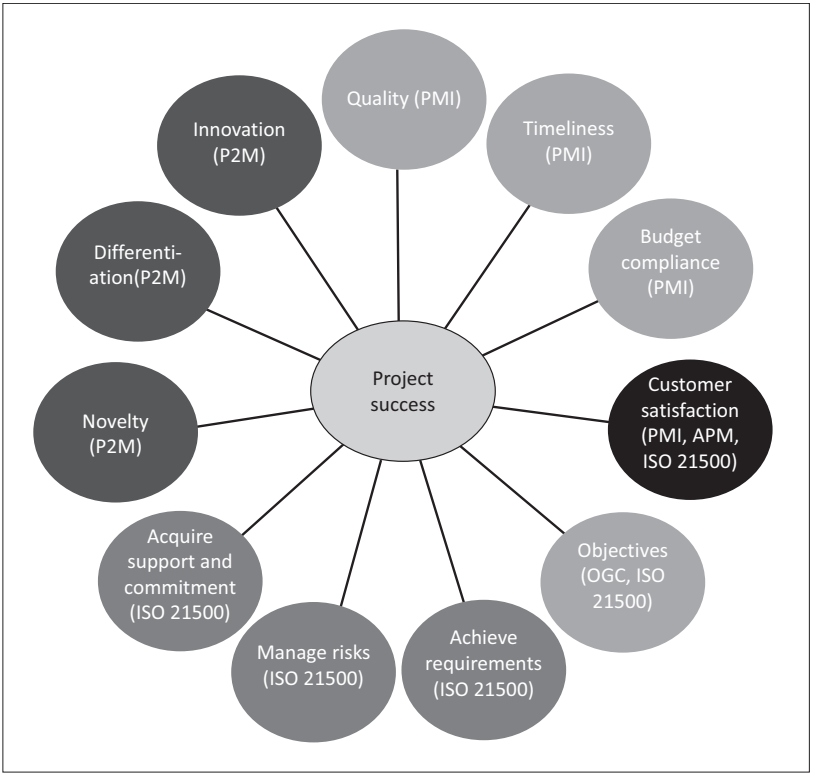

FIGURE 21: Overview of project success definitions as per project management standards (adapted from Ohara [2005], Office of Government Commerce [2009], Association for Project Management [2012], International Organization for Standardization [2012], Project Management Institute [2013b]).

Elements of project success

Variability in project success definitions has led to researchers studying the true elements of project success. Firstly, a distinction between project success and project management success must be made as these terms are often used interchangeably (Ika 2009). There is an argument that project success consists of project management success and project product success. Project management success revolves around the processes as well as the triple constraint of time, cost and quality. Project product success revolves around the overall output of the project and whether or not it was correctly delivered.

Project management success and project product success are unmistakably connected. 'If the venture is not a success, neither is the project' (Pinkerton 2003). There have, however, been cases where projects were not on time or within budget but the final output was deemed a success, for example, the Sydney Opera House. An argument could thus be made that, although project management success can assist with achieving project product success, it is unlikely to prevent project product failure.

Shenhar *et al.* (2001) assert that there are four elements to project success, namely, project efficiency, impact on customer, business success and preparing for the future. Project efficiency has a short term focus as it revolves around the constraints of time and cost. Impact on the customer emphasises the importance of meeting customer requirements and needs. Business or organisational success is the primary reason projects are undertaken. Thus, it is important that the impact a project has on business success be included in assessing project success. Preparing for the future places emphasis on ensuring projects effectively position the organisation to achieve and gain competitive advantage within the marketplace.

Bannerman (2008) expanded on previous research and established five elements of project success, namely, process, project management, product, business and strategic success. Process success focuses on the technical and managerial processes required during a project's life cycle. Project management success is directly comparable to the definition provided above. Product success revolves around ensuring stakeholder expectations are met and satisfaction is realised. Business success is also directly comparable to the definition provided above. Strategic success aligns with gaining and maintaining the competitive advantage whilst also preparing for future opportunities.

It is evident that project success is defined in many different ways thus making it a difficult concept to understand or measure in the real world. Figure 22 combines the various views and provides a holistic view of project success based on research to simplify confusion around the topic.

Project success			
Two-dimensional model	Four-dimensional model	Five-dimensional model	
Project management success	Project efficiency	Process success	Project management success
	Impact on the customer	Product success	
Project product success	Business success	Business success	
	Preparing for the future	Strategic success	

FIGURE 22: Mapping project success elements.

Project management competency and project success

There are a number of factors which influence whether a project will be successful or not. Project management competency is a key factor which often comes up. The notion is that project management competency directly influences project performance and subsequently organisational performance. It has been said that '[*t*]he key to project success is to pick the right project manager' (Crawford 2005). However, little research has been conducted to establish the relationship between competency and project success. The importance of competency is thus questionable until its role is fully understood.

Cohen and Dennis (2010) examined how a chief information officer (CIO) contributes to the overall success of an organisation. An argument was made that a competent CIO should have the relevant skills and knowledge to successfully support and drive information systems (IS) in organisations from projects to business success. Firstly, they discovered that a CIO's age and education has no impact on achieving business success. Alternatively, experience plays a pivotal role in driving IS initiatives so that they lead to business success. It could thus be argued that a CIO's age and education are irrelevant whilst experience is important when pursuing IS projects to realise business success. Secondly, they found that business, technology management and interpersonal political competence were key elements which influenced a CIO's overall competence. Understanding the business domain assists the CIO when selecting, supporting and driving IS projects. Technology is fundamental to all organisations, thus it is essential to be well versed in the technology management as this would support IS projects prior and during their life cycle.

Research in South Africa shows that project manager competency has varied in importance from 2003 to 2013. Joseph and Marnewick (2014) conducted a study on 14 project success factors and compared the rankings between 2003 and 2013. They showed that project manager competency was ranked 5th in 2003, 12th in 2008 and 2011 and 6th in 2013. The inconsistent rankings show that project manager competency is not as important as claimed. Joseph *et al.* (2014) also studied success factors from 2003 to 2013 and discovered that project manager competency is considered more important in successful projects than failed and challenged projects.

The actual influence of competency was further studied in their research. Firstly, they found that there was a weak, yet positive, relationship with project failure and project manager competency in 2008 only. There were no relationships in 2003, 2011 and 2013. Secondly, there was a weak, yet positive, relationship with challenged projects and competency in 2003 only and none in 2008, 2011 and 2013. Finally, there was no relationship between competency and project success at all for all four years. These results thus further beg the question of the influence of project manager competency on project performance. Joseph and Marnewick (2014) did find that project manager competency has a very strong relationship with stakeholder management which agrees with the notion that project management primarily focuses on people management.

Project management competency

There are a number of views and definitions regarding project management competency (Stevenson & Starkweather 2010). Consensus is yet to be achieved regarding a single definition of the term in the project management domain. Given that project management competency continuously emerges as a key component of project success (Joseph *et al.* 2014), it is imperative that project management competency is clearly defined and understood. One definition of competency is the 'ability to mobilise, integrate and transfer knowledge, skills and resources to reach or surpass the configured performance in work assignments, adding economic and social value to the organisation and the individual' (Takey & Carvalho 2015). The PMCDF asserts that project management competency includes knowledge, performance and personal competencies (Project Management Institute 2002). Alternatively, ICB states that people, practice and perspective competencies are the elements of project management competency (International Project Management Association 2015). Crawford (2014) argues that, although there are multiple ways to define and describe project management competency, there are four generally accepted dimensions, namely, skills, knowledge, personal characteristics and experience. Bredillet *et al.* (2015) extensively evaluated the various dimensions and assert that there are three key dimensions: skills, knowledge and core personality characteristics. Although this is comparable to the research of Crawford (2014), Bredillet *et al.* (2015) view experience as a component of skills, whereas Petter and Randolph (2009) view experience

as a component of knowledge and skills. This chapter thus focuses on the three dimensions, namely, skills, knowledge and personal characteristics.

Each dimension is discussed in detail, and the relationships between the competency frameworks will be revealed.

Skills

Project management skills are often classified as technical or soft skills (Petter & Randolph 2009). Technical skills refer to the ability to understand and apply various tools and techniques pertaining to projects in general as well as specific projects such as information systems projects (Keil, Lee & Deng 2013). It is argued that these skills are primarily developed through training and experience (El-Sabaa 2001). Conversely, soft skills include, amongst others, decision making, delegation and teamwork (Stevenson & Starkweather 2010). Leybourne (2007) states that there is a movement away from technical to soft skills (project manager behaviours). This coincides with the notion that organisations are focusing more on soft skills when hiring project managers rather than technical skills (Stevenson & Starkweather 2010). Table 3 provides a comprehensive overview of the various technical and soft skills pertaining to project management.

Table 3 immediately illustrates how research emphasis focuses more on soft rather than technical skills. Technical skills such as the usage of various tools and techniques and understanding business methods can be acquired through training and continuous professional development. One such method to attain these skills is, for example, through certifications such as the PMI's Project Management Professional (PMP) certification. Considering that computers form a fundamental component of organisations today, it seems logical that computer usage skills are required as a project management competency, as this could arguably make the activity of, for example, planning and organising simpler. Understanding business methods could also be a skill acquired through experience which corresponds to the notion that experience is a component of the skills dimension (Bredillet *et al.* 2015).

Table 3 indicates that soft skills primarily focus on communication and people management, which is comparable to the research of (Fisher 2011). Verbal skills are paramount to any project manager as they are responsible for managing and directing the various project members as well as liaising with the various stakeholders. Furthermore, verbal skills become even more important when projects are multinational as there are various languages and cultures involved, thus making communication that much more difficult. Projects exhibit change on a continuous basis and have elements of ambiguity where the various stakeholders have varying interpretations of project information. This requires project managers to be able to manage ambiguity and change on an ad hoc basis to ensure the project delivers the required business benefits as stipulated during the project initiation and planning phase.

TABLE 3: Comparison and overview of technical and soft skills.

Technical skills	Soft skills
• Written skills (Starkweather & Stevenson 2011; Stevenson & Starkweather 2010) • Use of various tools and techniques (Brière *et al.* 2015; El-Sabaa 2001; Keil *et al.* 2013; Takey & Carvalho 2015) • Understanding business methods, processes and procedures (Brière *et al.* 2015; El-Sabaa 2001; Keil *et al.* 2013; Takey & Carvalho 2015) • Computer usage (Brière *et al.* 2015; El-Sabaa 2001) • Understanding project management frameworks, standards and methodologies (Brière *et al.* 2015; El-Sabaa 2001; Keil *et al.* 2013; Takey & Carvalho 2015) • PMP certification (Brière *et al.* 2015; Starkweather & Stevenson 2011; Stevenson & Starkweather 2010) • Planning and organising (Brière *et al.* 2015; El-Sabaa 2001; Keil *et al.* 2013; Leybourne 2007; Takey & Carvalho 2015)	• Verbal skills (Creasy & Anantatmula 2013; El-Sabaa 2001; Keil *et al.* 2013; Leybourne 2007; Starkweather & Stevenson 2011; Stevenson & Starkweather 2010; Takey & Carvalho 2015) • Written skills (Starkweather & Stevenson 2011; Stevenson & Starkweather 2010) • Ability to communicate at multiple levels (Brière *et al.* 2015; Creasy & Anantatmula 2013; El-Sabaa 2001; Keil *et al.* 2013; Leybourne 2007; Starkweather & Stevenson 2011; Stevenson & Starkweather 2010; Takey & Carvalho 2015) • Ability to deal with ambiguity and change (Creasy & Anantatmula 2013; Keil *et al.* 2013; Starkweather & Stevenson 2011; Stevenson & Starkweather 2010) • Ability to escalate (Creasy & Anantatmula 2013; Starkweather & Stevenson 2011; Stevenson & Starkweather 2010) • Decision making (Brière *et al.* 2015; El-Sabaa 2001; Fisher 2011; Leybourne 2007; Takey & Carvalho 2015) • Leadership (Brière *et al.* 2015; El-Sabaa 2001; Fisher 2011; Keil *et al.* 2013; Leybourne 2007; Takey & Carvalho 2015) • Motivation (Brière *et al.* 2015; El-Sabaa 2001; Fisher 2011; Keil *et al.* 2013; Takey & Carvalho 2015) • Negotiation (Brière *et al.* 2015; El-Sabaa 2001; Fisher 2011; Keil *et al.* 2013; Leybourne 2007; Takey & Carvalho 2015) • Team building (Brière *et al.* 2015; Fisher 2011; Keil *et al.* 2013; Takey & Carvalho 2015) • Problem solving (Brière *et al.* 2015; El-Sabaa 2001; Fisher 2011; Keil *et al.* 2013; Takey & Carvalho 2015)

Given that project managers are responsible for managing and directing the various resources required for a project, it is imperative that they are competent decision makers and problem solvers. As obstacles are inevitable during projects, project managers will often have to make tough decisions to ensure the project continues on its set path. These decisions have multiple implications such as, amongst others, impacting the schedule, budget and even business operations both in the short and long term. It is thus imperative that the project manager is able to solve problems as quickly as possible to reduce, mitigate or avoid severe implications.

Leading and motivating project teams is often an issue for many project managers. Team members go through phases where they are reluctant or demotivated to continue working on a project. A project manager must, therefore, continuously motivate the team to ensure the project is delivered as requested. This can be done through negotiation and delegation. A common technique is to provide incentives which give a reason to persevere through tough times. However, monetary incentives are not always the best route for project managers. Team members, just like any other employees, primarily want recognition and appreciation for work carried out. Team building exercises are also considered essential prior, during and after a project. The aim is to ensure teams understand one another with regard to their various strengths and weaknesses, as this will allow them to work more effectively with each other. Furthermore, team building also strengthens relationships between members which facilitate improved communication and collaboration between them.

Knowledge

Project managers' competency is determined by the knowledge they exhibit (Mnkandla & Marnewick 2011). There are two forms of knowledge, namely, explicit and tacit knowledge (Koskinen, Pihlanto & Vanharanta 2003; Nonaka & Takeuchi 1995; Nonaka & Toyama 2015). Education is the primary means for acquiring explicit knowledge. This knowledge focuses on facts around aspects such as material properties, technical information and tool characteristics. Explicit knowledge can be articulated as words and numbers making it easier to communicate and share. For example, the PMBOK® Guide provides explicit knowledge regarding managing projects. This knowledge is defined within the 10 knowledge areas in PMBOK® Guide and is tested when acquiring a PMP certification. Tacit knowledge is primarily attained through experience (Nonaka & Takeuchi 1995; Nonaka & Toyama 2015; Pant & Baroudi 2008). This knowledge is extremely difficult to communicate and share as it is imbedded in a person's experience, revolving around beliefs, perceptions and values. Alternatively, there is knowledge pertaining to the organisation, industry and project type, such as engineering, information systems and finance (Bredillet *et al.* 2013). Industry, organisational and project type knowledge is both explicit and tacit as both knowledge types inform the various phases

and processes during a project (Holzmann 2013). It could be argued that explicit knowledge is analogous to technical skills whilst tacit is to soft skills. Specific project and industry knowledge is, however, required to apply the various skills accordingly.

Project managers can gain explicit knowledge far simpler than tacit knowledge as mentioned. Knowledge around project management concepts is a prerequisite for project managers. Formal project management standards and methodologies form the foundation of this knowledge (Bredillet *et al.* 2015). This mainly includes PMBOK® Guide, PRINCE2, P2M and ISO 21500. Formal standards and methodologies provide the basis for project management concepts as extensive detail is given for each process area, including the inputs, outputs as well as tools and techniques. Project managers can learn the various project management concepts by simply reading these documents. It is also important that project managers have knowledge regarding the tools and techniques which can be used during a project. Having knowledge of tools and techniques such as critical path method, earned value management and work breakdown structure could assist them in managing a project more effectively and efficiently. Knowledge relating to the organisation should also be known and understood by the project manager. Understanding business processes as well as the policies which govern them will provide the project manager with relevant knowledge during the project's life cycle. A lack of understanding could have a negative influence on the project as well as the organisation's day-to-day operations. Alternatively, project type knowledge would also be beneficial to a project manager. For example, construction projects differ from information systems projects. Construction projects require extensive knowledge around structural integrity whereas information systems projects require technology knowledge relating to hardware and software (Lee, Park & Lee 2015).

Tacit knowledge is far more difficult to articulate than explicit knowledge. Project managers with extensive experience often become subject matter experts with regard to project management as they have worked on a multitude of projects, great and small. The knowledge gained over the years translates to an innate ability to manage projects. Furthermore, this directly influences their soft skills. For example, the experience improves their skills in areas such as decision-making, problem solving and leadership as the exposure will provide guidance on what to do under certain circumstances. Although a novice could read up on the aforementioned skills, only experience and exposure can truly develop these skills (Petter & Randolph 2009).

A challenge arises when the knowledge must be transferred from a senior to a junior project manager or between other project managers as the knowledge is imbedded within the manager. Knowledge transfer occurs in four phases (Szulanski 1996): '(1) initiation (need for knowledge), (2) implementation (search for knowledge), (3) ramp-up (use of knowledge) and (4) integration ("routinization" of knowledge)'. These phases are, however, not often followed in practice, thus creating knowledge gaps. Petter and

Randolph (2009) subsequently discovered three methods for sharing and reusing knowledge in project management: verbatim, synthesis and creation. Verbatim is a method where a project manager takes knowledge and directly uses it without altering it. This method does not always work as the project manager may be using inappropriate knowledge for a particular situation, thus negatively impacting the project. Synthesis occurs when a project manager draws on multiple knowledge sources to deal with a situation. This method addresses the shortcomings verbatim and is most widely used during projects. Creation focuses on creating new knowledge via brainstorming. This method is rarely used and requires collaboration between numerous managers, not only project managers, to develop a plan of action for a particular situation. Creation is primarily used when there are no other knowledge sources or past knowledge is no longer reliable. Research argues that poor knowledge transfer is prolific in project management, thus it is essential that methods are explored and implemented to ensure knowledge is effectively disseminated for sustainable project success.

Personal characteristics

The personal characteristics of project managers play a more pivotal role in project management than previously believed (Bakhsheshi & Nejad 2011). The personal characteristics of a project manager directly impact their ability to manage a project effectively and efficiently. Furthermore, their personal characteristics are fundamentally linked to their personality. Table 4 shows an aggregated view on the various project manager personal characteristics.

An initial review of the characteristics reveals they are analogous to the soft skills previously discussed. It can thus be argued that certain soft skills can be learnt over time whilst others are innate within the project managers themselves. Characteristics relating to people's interactions are the most prevalent, which correspond to the notion that project management is primarily people management. Delivering successful projects requires a project manager to be firm whilst being able to negotiate, as these are key to effective leadership and ensuring project team members fulfil their responsibilities. Project managers should also exhibit a desire to learn as this directly influences their ability to acquire both explicit and tacit knowledge. Two interesting characteristics are honesty and integrity, as they are often not discussed in research. Project managers are under severe pressure to deliver projects on time and within budget. This arguably forces them to make critical decisions which test their honesty and integrity. There could be cases where project managers have lied to stakeholders regarding project progress to protect their jobs. Another possibility is that project managers have made decisions which directly influence the quality of the project output whether product, service or both. For example, projects in areas such as construction have stringent requirements regarding structural integrity, as there could be a loss of lives if a building is not built correctly.

TABLE 4: Comparison of studies on personal characteristics of project managers (adapted from Bakhsheshi and Nejad (2011)).

Personal characteristics of project managers	Study
• Flexibility and adaptability; preference for significant initiative and leadership; aggressiveness, confidence, persuasiveness, verbal fluency; ambition, activity, forcefulness; effectiveness as a communicator and integrator; broad scope of personal interests; poise, enthusiasm, imagination, spontaneity; able to balance technical solutions with time, cost, and human factors; well organised and disciplined; a generalist rather than a specialist; able and willing to devote most of his time to planning and controlling; able to identify problems; willing to make decisions; able to maintain proper balance in the use of time	(Archibald 1976)
• Multidisciplinary oriented, Global problem oriented, effective decision maker and problem solver, have management knowledge, have analytical ability, creative, impressive communicator, motivator, flexible, and the most important one proper temperament such as calm, realistic, quick thinking	(Stuckenbruck 1976)
• Drive and ambition; the desire to lead and influence others; honesty and integrity; self-confidence; intelligence; technical knowledge	(Kirkpatrick & Locke 1991)
• Problem-solving ability; results orientation; energy and initiative; self-confidence; perspective; communication; negotiating ability	(Turner 1999)
• Honest; competent; forward looking; inspiring; intelligent; fairness; open minded; courageous; straightforward; imaginative	(Peters 2007)
• Ambition; drive and tenacity; self-confidence; psychological openness; realism and an insatiable appetite for Learning	(Lafley & Charan 2008)
• Dealing with problems; risk evaluations; honesty and integrity; understanding project team problems; having Knowledge about project technology; business management competence; management principals; communications; alertness and quickness; versatility; energy and toughness; decision-making ability	(Kerzner 2009)

Honesty also directly relates to corruption, which is extremely prevalent in Africa. Honesty and integrity are arguably characteristics which are just as important as those relating to people interaction.

Bakhsheshi and Nejad (2011) studied the relationship between project types and project manager personal characteristics. Table 5 shows the characteristics of effective and ineffective personal characteristics for different project types. Projects were classified as urgent, complex, novel and normal. Honesty and conscientious is prevalent in all project types for effective personal characteristics. Alternatively, being passionate and fair is considered ineffective for all project types.

TABLE 5: Effective and ineffective personal characteristics for different project types.

Project type	Effective personal characteristics	Ineffective/less effective personal characteristics
Urgent project	Honesty, conscientious, intelligence	Self-control, passionate emotional, impartially & fairness
Complex project	Honesty, conscientious, creative & imaginative	Impartially & fairness, passionate emotional, enthusiastic & curiosity
Novel project	Honesty, creativity & imaginative, intelligence	Passionate emotional, Impartially & fairness, self-control
Normal project	Honesty, persistence, conscientious	Passionate emotional, impartially & fairness, enthusiastic & curiosity

A popular method for assessing personal characteristics of project managers is the Meyers-Briggs Type Indicator (MBTI). MBTI is used to identify personality traits of individuals by assessing four personal traits:

- Extrovert (E) versus introvert (I).
- Sensing (S) versus intuitive (N).
- Thinking (T) versus feeling (F).
- Judging (J) versus perceiving (P).

There are 16 possible combinations of personality types which are used to establish what job or profession a person is suitable for. Wideman (2002) categorised project manager MBTI types into four groups:

- Project leaders: INTJ, ENTJ, ISTJ and ESTJ.
- Project leaders and followers: INTP, ENTP, ENFJ and ESFJ.
- Project followers: INFJ and ISFJ.
- Unsuited/Questionable: INFP, ISFP, ESFP, ENFP, ISTP and ESTP.

Fully fledged project managers (project leaders) should explicitly have personalities with thinking and judging characteristics. This is logical as project managers are required to, amongst others, make decisions, solve problems as well as manage people and resources. Cohen, Ornoy and Keren (2013) expanded their study and discovered more about project managers' personalities. They discovered that project managers have intuitive and thinking characteristics which primarily align to the soft skills required. Secondly, sensing and feeling project managers are few and far between. Finally, project managers who are introverts, as well as sensing and feeling, are primarily placed on special project types as the combination of these characteristics is rare.

Project management competency consists of three dimensions, namely skills, knowledge and personal characteristics. Bredillet *et al.* (2015) argue that it is unethical for project managers

to claim they have all the required skills and knowledge yet projects continue to perform dismally. It is the project managers' duty to ensure they are adequately proficient in project management to ensure projects perform successfully. Each dimension does not operate in isolation as they are inexplicably interrelated as previously discussed. Personal characteristics support and enable both technical and soft skills. Personal characteristics also support and enable the generation of explicit and tacit knowledge, as project managers should crave acquiring knowledge throughout their careers. Explicit and tacit knowledge form the foundation of technical skills in particular and also help in improving soft skills. The three dimensions work together in developing project management competency. Improved project success should be realised when the appropriate project management competency has been attained. Improving project success subsequently allows organisations to realise strategic goals and overall organisational success. The relationship between the three dimensions, project management competency, project success and organisational success is shown in Figure 23.

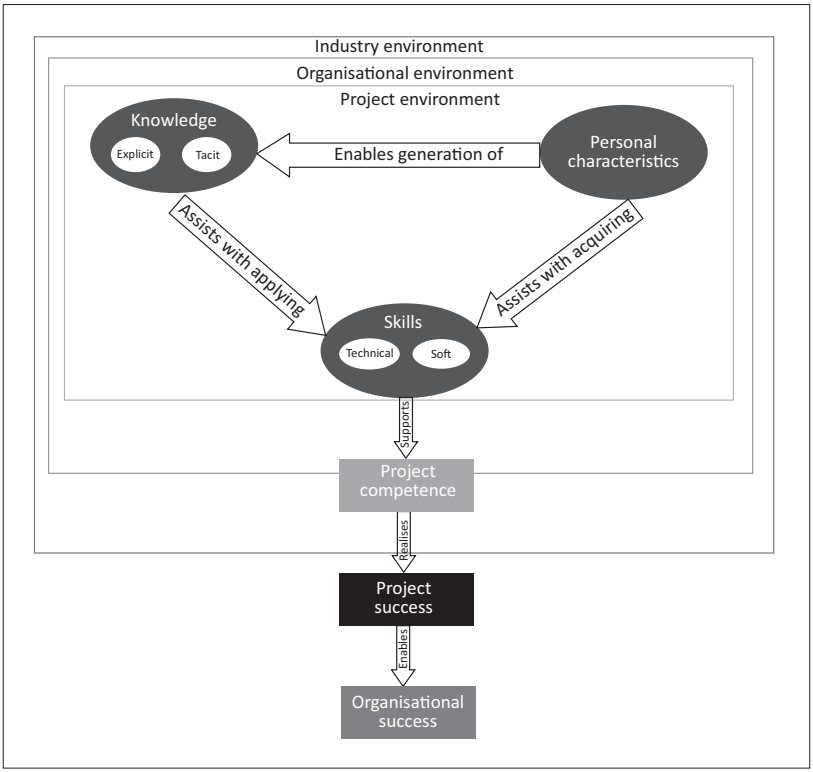

FIGURE 23: Relationship of project competency dimensions to project and organisational success.

The role of project management certification is discussed next as this approach is considered the 'saving grace' for professionalising the discipline.

Project management certification

Project management has evolved through the introduction of various standards. However, introducing standards is not sufficient enough to enable developing project management as a profession. Professionalising project management has coerced professional bodies into developing a means for assessing competencies in project management, that is, certifications. Project management standards are used as the foundation when developing certifications. Figure 24 shows the various elements required when designing and building a professional certification.

A certification programme is (Institute for Credentialing Excellence 2014):

> [*D*]esigned to test the knowledge, skills, and abilities required to perform a particular job, and, upon successfully passing a certification exam, to represent a declaration of a particular individual's professional competence. (n.p.)

There is a notion that certification is essential to develop the required competencies for project management. A multitude of project management certifications have been introduced over the years. The most prolific certifications are showed in Table 6.

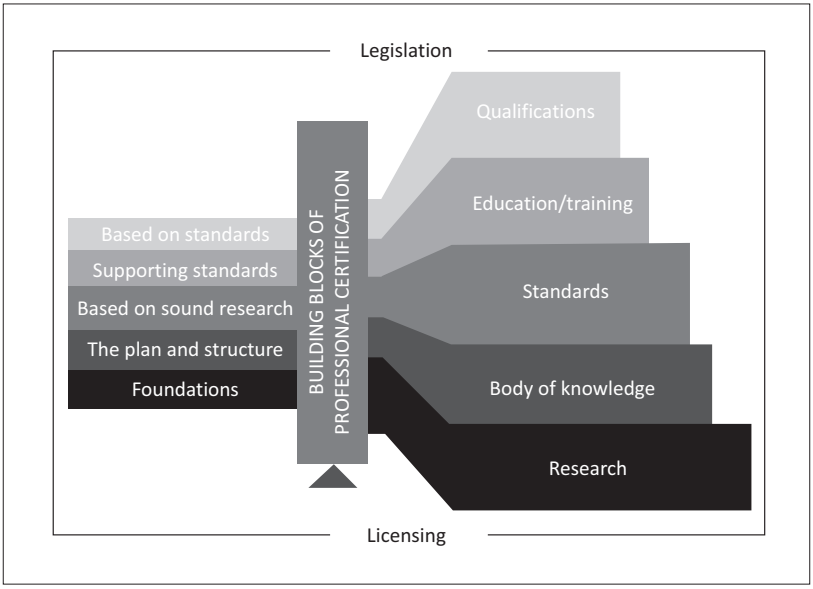

FIGURE 24: Building blocks of professional certification (adapted from Crawford [2004]).

TABLE 6: Project management certification overview.

Professional body	Standard basis	Certification	Entry requirements		Certification assessment	Learning environment	ISO 17024 Certified
			Prior education	Work experience			
Project Management Institute (PMI)	Project Management Body of Knowledge (PMBOK)	Certified Associate in Project Management (CAPM)	High school certificate/ diploma	1500 hours' experience on a project team (without project management education)	150-question multiple-choice exam	Formal study course Self-study	No
		Project Management Professional (PMP)	Bachelor's degree or high school certificate/ diploma	4500 hours spent leading and directing projects with bachelor's degree 7500 hours spent leading and directing projects with high school certificate	200-question multiple-choice exam		Yes
		PMI Agile Certified Practitioner (PMI-ACP)	High school certificate/ diploma	2000 hours working on project teams and 1500 hours working on agile project teams	120-question multiple-choice exam		No
		PMI Risk Management Professional (PMI-RMP)	Bachelor's degree or high school certificate/ diploma	3000 hours' experience in project risk management with bachelor's degree 4500 hours' experience in project risk management with high school certificate	170-question multiple-choice exam		No
		PMI Scheduling Professional (PMI-SP)	Bachelor's degree or high school certificate/ diploma	3500 hours' experience in project scheduling with bachelor's degree 5000 hours' experience in project scheduling with high school certificate	170-question multiple-choice exam		No
International Institute for Learning (IIL)	PMBOK	Advanced Project Management Certification (APMC)	None	3 years' project management experience	66 hours, 6 modules, 3 to 12 months	E-learning	No

Table 6 continues on the next page →

TABLE 6 (Continues ...): Project management certification overview.

Professional body	Standard basis	Certification	Entry requirements		Certification assessment	Learning environment	ISO 17024 Certified
			Prior education	Work experience			
CompTIA	PMBOK	CompTIA IT Project+	None	1 year managing small- to medium-scale projects recommended	100-question multiple-choice exam	Formal study course Self-study E-learning	No
International Project Management Association (IPMA)	International Project Management Association Competence Baseline (ICB)	Certificated Project Management Associate (IPMA Level D)	None	None	Multiple-choice exam	Formal study course	Yes
		Certificated Project Manager (IPMA Level C)	None	3 years' project management experience	Assignments Workshop Interview		
		Certificated Senior Project Manager (IPMA Level B)	None	5 years' project management experience	Project report (real world) Interview		
		Certificated Projects Director (IPMA Level A)	None	5 years' portfolio and/or programme management experience	Written exam Case study reports Interview		

Table 6 continues on the next page →

TABLE 6 (Continues ...): Project management certification overview.

Professional body	Standard basis	Certification	Entry requirements		Certification assessment	Learning environment	ISO 17024 Certified
			Prior education	Work experience			
Association for Project Management (APM)	APM Body of Knowledge (APMBOK)	Introductory Certificate: APM Project Fundamentals Qualification	None	None	60-question multiple-choice exam	Formal study course Self-study E-learning	No
		APM Project Management Qualification (APMP)	None	Some project management experience recommended	10-question open-ended exam		
		Practitioner Qualification	APMP	3 years' project management experience	Case study assessment (individual and group work) Interview		
Office of Government Commerce (OGC)	Projects In Controlled Environments 2 (PRINCE2)	PRINCE2 Foundation	None	None	75-question multiple-choice exam	Formal study course	No
		PRINCE2 Practitioner	PRINCE2 Foundation	None	80-question open-ended exam		Yes
		PRINCE2 Professional	PRINCE2 Practitioner	None	Fictional case study assessment		No

The majority of project management certifications are based on the PMBOK, which implies that the PMI's standard is arguably the most widely accepted project management standard. With regard to work experience, the PMI certifications require between 1500 hours (approximately 60 days) and 10 500 hours (approximately 438 days) of experience to participate in the various certification programmes. APMC requires three years of project management experience whilst IPMA certifications range between no experience and five years' project management experience. These requirements suggest that individuals need some tacit project management knowledge to participate in a certification programme. Although PRINCE2 certifications require no prior work experience, they are complementary to one another. For example, an individual can only pursue PRINCE2 Practitioner if they have completed PRINCE2 Foundation.

PWC revealed in 2007 that 77% of project managers are certified, which is an increase from 73% in 2004. PMP and PRINCE2 Practitioner are the two most prevalent certifications held. PMI performed a study in 2013 to assess the impact certification has on project performance. They revealed that there is a higher change of project success when project managers were certified either through in-house or external certification programmes. Project management certification in Africa was documented in the 2013 Prosperus report. The report showed that the majority of respondents were not certified. Similarly, PMP and PRINCE2 Practitioner were the two most prevalent certifications as well.

Increasingly large sums of money are spent on certification programmes by organisations. For example, a total of 21 935 individuals were PMP certified worldwide between February 2014 and July 2014. Attending a PMP course costs approximately $1 300.00 whilst the exam fee is $555.00. Organisations spent approximately $40.69 million in six months on project management certification alone. There is controversy in the research domain regarding the impact project management certification has on project performance. The argument is that certification has little influence on project performance as skills and knowledge are primarily attained through mentoring and experience (Keil *et al.* 2013). Certifications are considered too theoretical in nature and thus require more practical components to improve an individual's project management skills and knowledge (Walker 2008).

Conclusion

The role and importance of project management competency is questionable as there are conflicting views whether or not it contributes to project and organisational success. This chapter established that there are three dimensions to project management competency, namely, skills, knowledge and personal characteristics, and that they are interrelated.

All three dimensions work together to create a competent project manager. The impact and role of project management certification was also discussed. Similarly, there are varying views regarding the importance of certification in developing project management competency. If the project management discipline is to truly professionalise itself like engineering, researchers and practitioners have a long, hard road to travel to make it a reality.

Chapter 4

Information technology project managers' performance competencies

The collected data requested respondents to rate their own perceived competence with regard to conducting projects. The competencies were divided into the process groups of the project life cycle, namely (Schwalbe 2013):

- **Initiation**: Activities related to project selection and formally recognising that a new project has now been undertaken by the organisation.
- **Planning**: All activities that serve to arrange resources, materials and finances in order to complete the project by performing tasks in an iterative and sequential manner.
- **Execution**: Activities undertaken to put all project plans into action in order to provide the customer with a deliverable.
- **Monitoring and controlling**: Verifying that all requirements as stipulated by the customer are being met during execution of the plan, whilst managing any changes as they occur.
- **Closing**: Performing all activities required to formally end the project and transfer the deliverables to the customer for their use.

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These competencies were referred to as professional or performance competencies and relate to activities that a project manager should be competent in, in order to successfully deliver a project (Mnkandla & Marnewick 2011). These specific activities span across all phases of a project and form part of standards and methodologies for project management (Association for Project Management 2012; Project Management Institute 2002, 2013b).

Overall results

The responses from all questions and all respondents are collated to gain an overall perspective. As indicated by Figure 25, project managers are quite confident in their abilities to manage a project across all process groups.

Only in very few instances do project managers feel less than competent. The responses under the 'uncertain' category could indicate that a respondent, perhaps, may not be familiar with the standard terminology. However, this response cannot be construed to mean that respondents consider themselves competent in a particular area

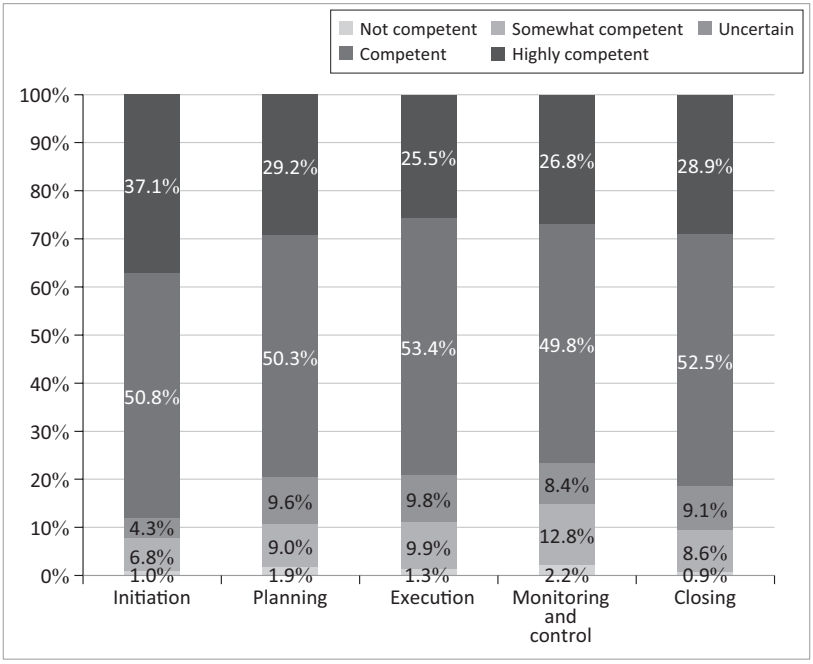

FIGURE 25: Performance competencies across all process groups.

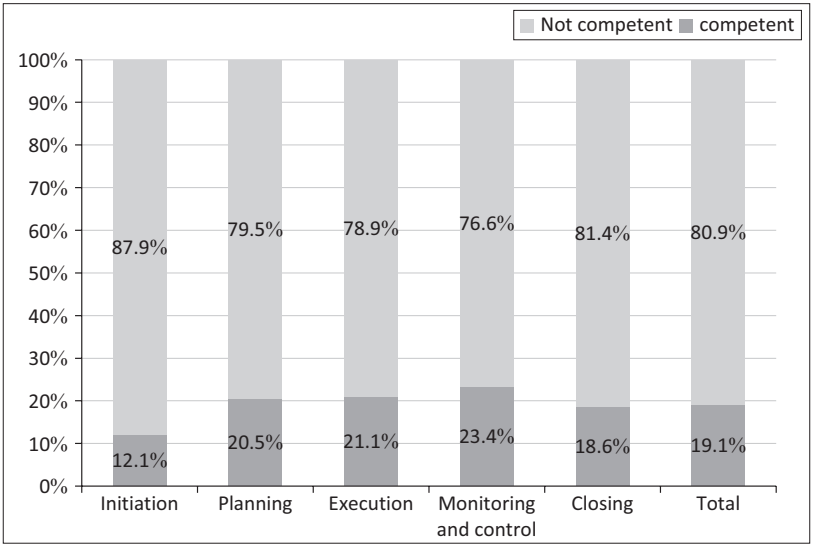

FIGURE 26: Confidence of project managers.

and as such cannot be confident in performing such tasks. It seems that when combining the results for responses in the competent and highly competent categories, project managers are extremely confident in their abilities in completing a project successfully as indicated by Figure 26:

The responses from the 'competent' and 'highly competent' categories are grouped into a 'competent' category, whereas the other categories are grouped into a 'not competent' category. The process group that project managers feel they were most competent in is during the planning phase of a project. The process group that project managers felt the least comfortable with overall is during the monitoring and controlling phase of a project. Respondents indicated the highest total number of responses in the 'uncertain, 'somewhat competent' and 'not competent' categories. Overall, the average project manager indicates that he or she perceives themselves to be at least competent in managing projects in the IT sector.

Unit of competency: Initiation

The initiation process group is vital for the successful completion of the project (Clements & Gido 2012). That is because projects are selected and the initial direction is set. Ideally, projects are only selected where the product will contribute to achieving the overall strategy of the organisation and is therefore strategically aligned

(Marnewick & Labuschagne 2012). Where projects exhibit such strategic alignment, the chances of project success increase (Erasmus, Marnewick & Joseph 2014).

In this unit of competence, respondents were required to indicate which activities they perceived themselves to be competent in. These activities are divided in the following areas:

- Project alignment with organisational and customer needs. Projects are only pursued because of the perceived benefits they promise to deliver. If these promised benefits do not align to what the customer and organisation require, the project cannot be justified.
- Preliminary scope reflecting the stakeholder needs and expectations. Initial high-level requirements are to be elicited from the customer to determine what the scope of the project should be. This initial scope can be adapted or refined during later stages of the project.
- Understanding of high level risks, assumptions and constraints. At the very beginning of a project, much of the detail required for planning the project is not available. During the initiation phase, however, enough information exists to determine the high-level risks associated with conducting similar types of projects. Certain assumptions can be made and documented to support a common understanding between the customer and project manager. The high-level constraints should also be made explicit in order for the planning phase to arrange resources and schedules to accommodate the boundaries set.
- Understanding stakeholder needs. The project must take cognisance of the needs of other parties that may be influenced by the project and not exclusively the customer's needs.
- Gaining approval of the project charter. Obtaining final approval is the output of this phase and legitimises the existence of the project. The selected project manager is therefore endowed with authority to complete the project under the auspices of executive support. Cooperation from all stakeholders is assumed and required by the project charter.

Figure 27 indicates the responses from project managers regarding their level of perceived competence during the initiation phase of a project. This unit of competence received the highest rating by respondents.

Each of the five sub competencies of this unit of competence is analysed in detail in the following discussion. Figure 28 below indicates that project managers are quite confident that they can achieve this alignment with customer and organisational needs:

By achieving this alignment, the project is ensured of maximum business support as well as delivering what the customer requires. The sub-competency that was rated lowest is establishing the needs and expectations of key stakeholders. This aspect is vital in order to accurately determine the requirements for the project. This sub-competency still scores very highly though.

Table 7 indicates that a relationship exists between determining stakeholder needs and establishing the characteristics of the product.

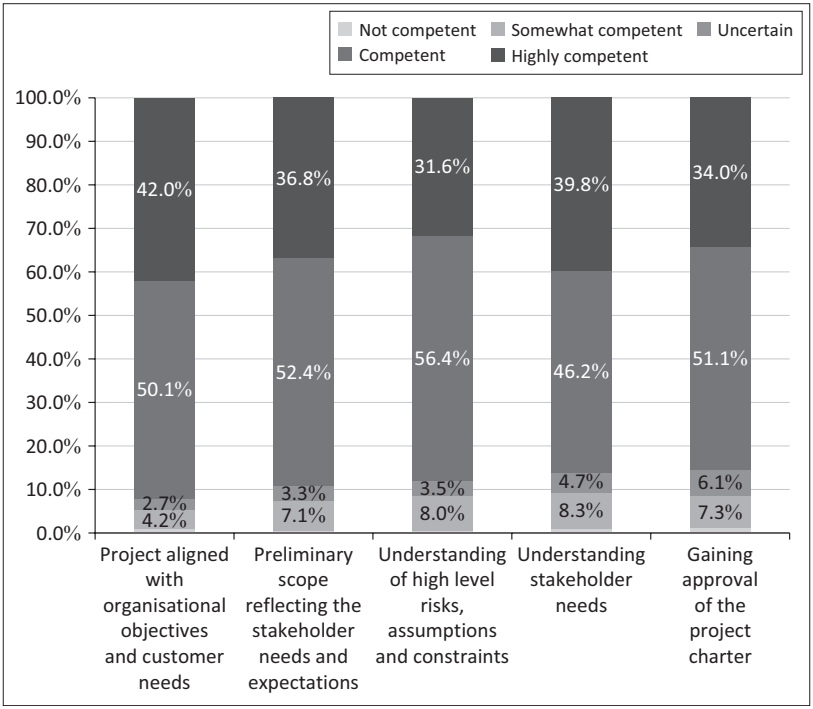

FIGURE 27: Unit of competence: Initiating a project.

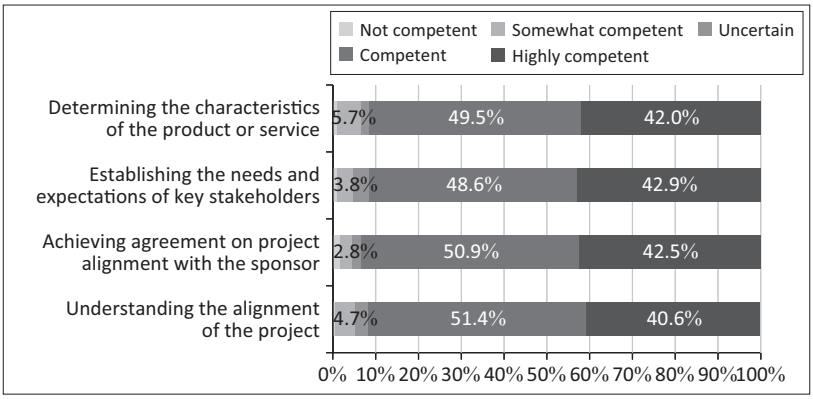

FIGURE 28: Project aligned with organisational objectives and customer needs.

TABLE 7: Correlation of stakeholder needs and product characteristics.

Establishing the needs and expectations of key stakeholders	Determining the characteristics of the product or service
Pearson correlation	0.639**
Sig. (2-tailed)	0.000

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

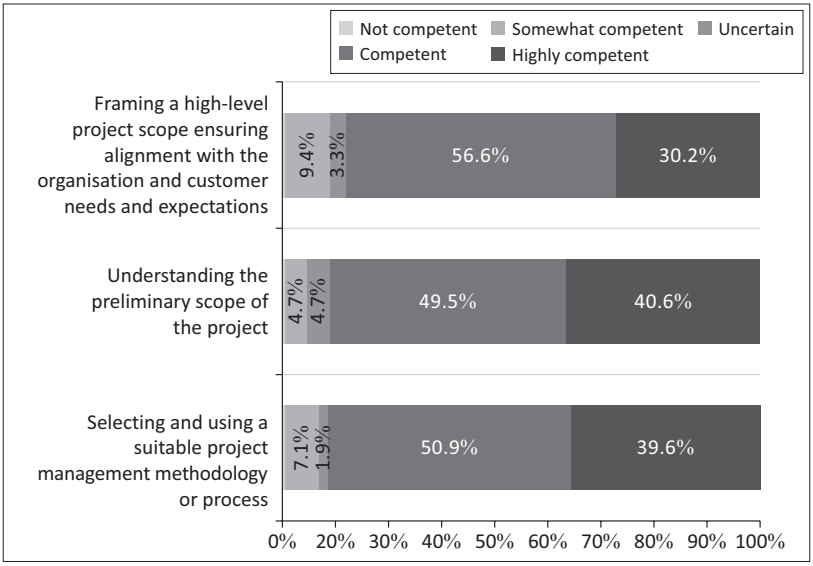

FIGURE 29: Preliminary scope statement reflects stakeholder needs and expectations.

A statistically significant relationship of medium strength exists. This would seem to imply that stakeholder needs are considered when determining the characteristics of the product. This result is gratifying; however, one would possibly like to see a stronger relationship. A stronger relationship would imply that stakeholder needs and requirements are the greatest source of information when determining the characteristics of the proposed product or service.

These needs would have to be reflected in the preliminary scope statement. Figure 29 indicates to what extent project managers regard themselves as competent.

Project managers seem to be least confident in their abilities when framing a high-level project scope that is aligned to customer needs, whilst the opposite is true of them selecting an appropriate methodology. Framing the high-level project scope is a natural output after having established stakeholder needs.

Table 8 indicates to what extent the understanding of the project's alignment is correlated with the framing of a high-level project scope that is also aligned with customer needs and expectation.

Although a moderately strong relationship exists, this may cause one to pause. If the alignment of the project is truly understood, one would expect that to be present in a high-level scope document. This result is also not satisfactory. The alignment of the project with organisational goals and stakeholder expectations is not adequately communicated through a high-level scope. An opportunity for missing the intended target may emerge.

Figure 30 indicates that project managers are more confident in identifying risks than assumptions and constraints at this stage of the project.

This seems to be counter-intuitive as not much information exists at this stage to confidently define and quantify high-level risks. There may be more information available to demine high-level constraints and assumptions. This is an interesting feature of the data that could be explored more thoroughly in future.

TABLE 8: Project alignment and understanding needs and expectations.

Framing a high-level project scope ensuring alignment with organisation and customer needs and expectations	Understanding the alignment of the project
Pearson correlation	0.666**
Sig. (2-tailed)	0.000

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

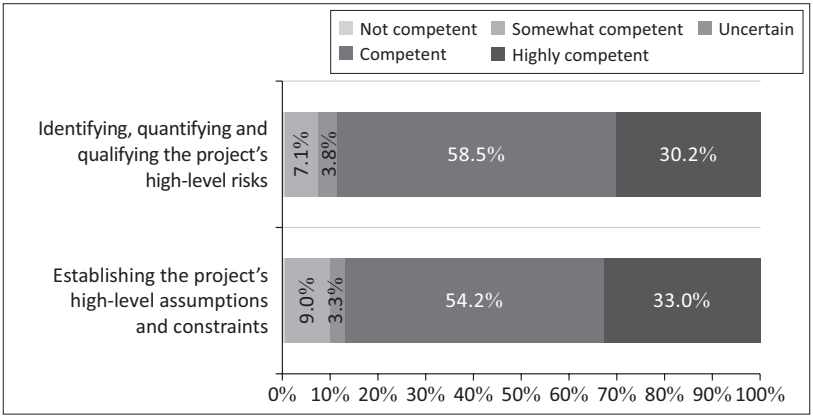

FIGURE 30: High-level risks, assumptions and constraints are understood.

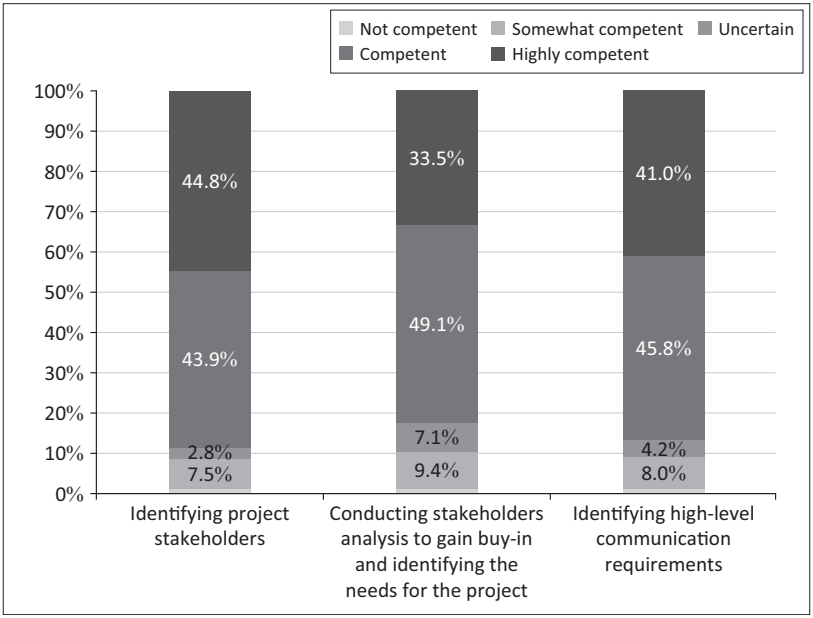

FIGURE 31: Stakeholders identified and their needs understood.

In Figure 31 respondents are requested to rate their competence in the indicated three areas.

In more than 10% of the instances, project managers were not confident in their abilities to identify stakeholders. When certain stakeholders are not identified right from the onset, various requirements and needs may also not be captured. The result may be an inadequate project scope and project charter.

Respondents also indicate that they are least confident in conducting a stakeholder analysis to gain buy-in and identifying needs for the project. This may be another missed opportunity that all stakeholders are properly identified, along with their requirements and needs.

Table 9 indicates that the activity of identifying stakeholders and their needs do not necessarily achieve alignment of the project scope with needs and objectives.

This is cause for concern. Although project managers are very confident in all these activities, it does not seem that the process of scope alignment is understood very well. One would expect these moderately weak relationships to be much stronger for true scope alignment with stakeholder needs to be a reality. This is indeed one of the objectives for the development of a scope document (Burke 2013).

TABLE 9: Alignment of project scope and the identification of stakeholders and their needs.

Project Scope	Variable	Framing a high-level project scope ensuring alignment with organisation and customer needs and expectations
Identifying project stakeholders	Pearson correlation	0.423**
	Sig. (2-tailed)	0.000
Establishing the needs and expectations of key stakeholders'	Pearson correlation	0.484**
	Sig. (2-tailed)	0.000

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

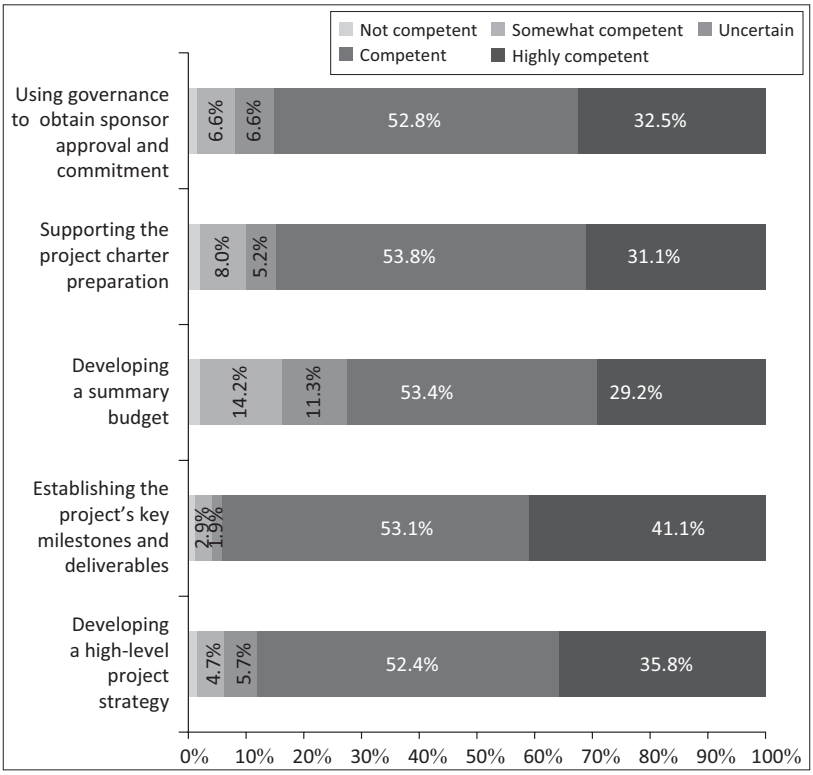

FIGURE 32: Project charter approved.

Project managers generally seem confident if producing an approved project charter. In Figure 32 it is, however, interesting to note that the level of confidence drops significantly when project managers are confronted with a summary budget.

This could be within reasonable expectations as detailed project information is not available as yet. Project managers are also very cognisant of the importance of establishing an expectation with regard to a budget for a project and may not be confident in committing to a figure at this stage.

The initiation unit of competence is indicated as the area where project managers are the most confident in their abilities. However, it may not be overly pessimistic to state that seemingly minor concerns exist at this stage that may greatly affect the remainder of a pursued project. The issues indicated in this section are vastly important and, if not adequately addressed from the onset, may greatly increase the project's sensitivity to failure.

Unit of competency: Planning

The main purpose of the planning process group is to produce a coherent, detailed and robust project management plan (Project Management Institute 2013b). Statements relating to processes in this process group are once again put to project managers to rate their perceived competence. These broadly cover aspects of scheduling, budgeting, quality planning, risk management, contracts and approvals. Overall, project managers viewed themselves second highest in terms of being competent. Figure 33 indicates the perceived competence as stated by responding project managers with regard to planning activities.

A few main areas of concern are evident in the planning phase. These are budgeting, procurement management, quality management and risk management. Forming a major

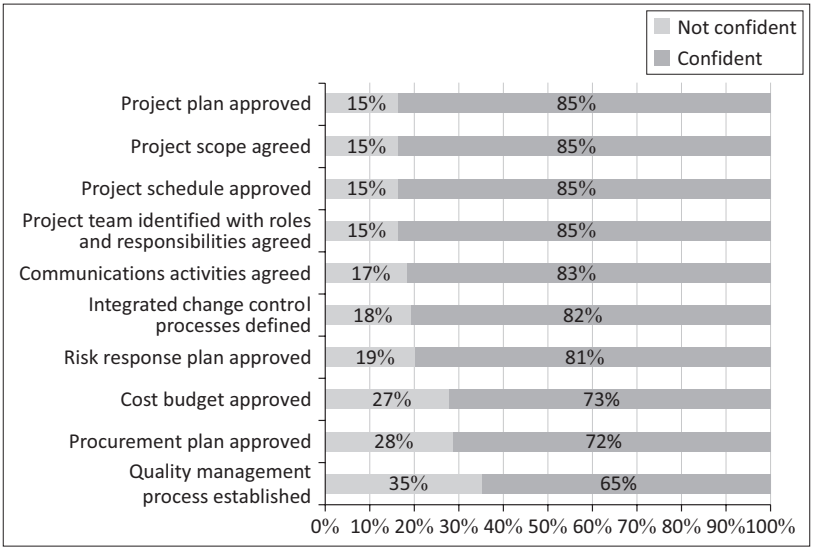

FIGURE 33: Unit of competence: Planning a project.

part of the triple, quadruple or quintuple constraints, it is vitally important for the success of a project to adequately plan these activities (Schwalbe 2010b). For organisations that measure project success by delivering a product fit for use or customer satisfaction (Joseph 2014), these may be of less concern in terms of project success. However, the ultimate outcome and sustainability of conducting projects in such a manner where cost, quality and risk is not of major concern, is a serious question to be answered at some point.

Cost budget approved

Budget planning aims to provide a baseline for the expenditure of project funds during certain points of the project (Project Management Institute 2013b). This budget may be created by using a top-down approach, where a total figure is divided amongst work breakdown structure (WBS) tasks, or bottom-up, where WBS task owners motivate for a specific figure and all figures totaled up (Marchewka 2012). Figure 34 indicates the perceived competence of project managers where budget planning is concerned.

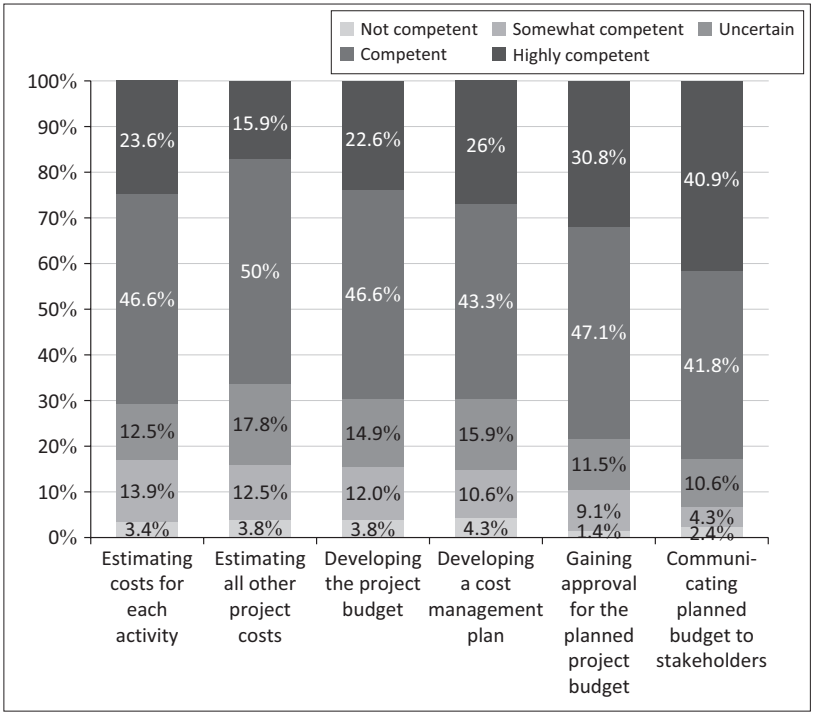

FIGURE 34: Cost budget approved.

Project managers feel they are very competent in distributing the planned budget to stakeholders. This is hardly surprising as many planning documents would follow similar communication channels. Similarly, project managers seem to be very confident in gaining acceptance and approval of project budgets.

Project managers also perceive themselves as being able to develop the entire project budget and cost plan. However, project managers are less confident about cost estimation in terms of project tasks as well as other ancillary project costs. This is, once again, a foundational issue on which the output for budgeting is based. If the input, that is, cost estimates, is inaccurate then the final result will not be accurate either. Budget inaccuracies may lead to loss of executive or customer support or a depleted cash flow when it is required to complete a scheduled task. This in turn may lead to early project termination and ultimate project failure, regardless how project success is measured.

Risk response plan approved

Risk management is a vital activity that a project manager is required to be competent in. Risk management requires a project manager to identify possible occurrences that could have a detrimental effect on the successful completion of a project (Burke 2013). More than merely identifying such occurrences, a project manager needs to be able to develop mitigating plans for these eventualities in order to reduce or eliminate the effect of active risks.

It has long been recognised that risk management as a knowledge area is one of the least matured knowledge areas in all of project management (Erasmus & Marnewick 2014a; Marnewick 2013b). The lower overall levels of confidence displayed by project managers bear this out as well, as indicated by Figure 35:

On the face of it, project managers do seem quite confident that they are competent in creating a proper risk response plan that can be approved. The levels of perceived competence are, however, lower against overall levels of confidence.

The main area of concern for risk planning is estimating the costs associated with risk responses. Whilst this is not necessarily a cost management process, it directly impinges on budget planning as contingency allowances need to be made. Inaccuracies here may, once again, increase the chances of project failure when risks start to manifest themselves during the project life cycle.

Project managers do seem quite confident in identifying possible risks as well as gaining acceptance of this risk response plan. What is very surprising is that 17% of respondents indicated that they were unsure of how to document a risk response plan. It is difficult to understand why project managers are confident in developing a risk management plan but less so when it comes to a risk response plan because the latter

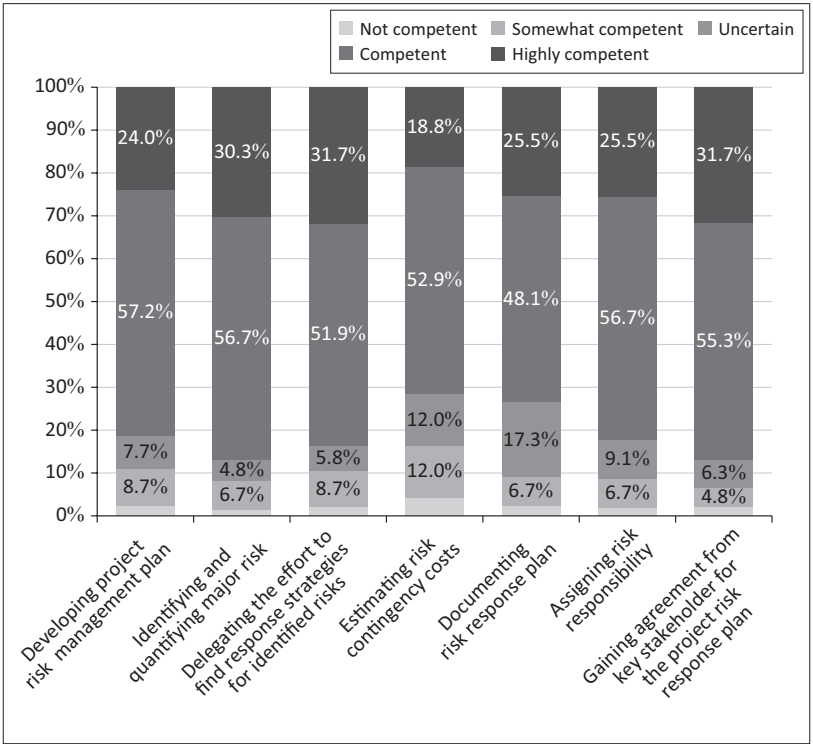

FIGURE 35: Risk response plan approved.

is included. A risk management plan is not actionable if the project manager cannot respond to imminent or active risks. This disjoint is a major issue to investigate because it seems that project risk management may not be well understood by project managers, regardless of their confidence in planning for risk.

Project managers seem confident in their ability to lead or delegate the responsibility to find risk response strategies. This result when viewed together with the confidence of documenting a risk response plan may suggest that project managers delegate in this matter more than they lead.

Procurement plan approved

Many projects require external resources or materials in order to complete a project. These resources and materials are obtained through a procurement process that requires

wider organisational involvement and is not just managed internally by the project (Clements & Gido 2012).

Twenty eight per cent of respondents indicated that they were not confident in getting a procurement plan approved. Figure 36 indicates the activities that project managers need to be competent in in order to successfully plan for procurement:

Project managers seem to be confident in their abilities to obtain approval for the procurement plan as well as analysing material requirements for the project. It is, however, evident that project managers are not very confident on planning contract administration. This may be as a result of the reticence of project managers to deal with legal documents and contracts. In the case where a project manager is supported by the legal professionals in the organisation, this should not be a problem.

Similarly, project managers are also not confident in dealing with external labour procurement. This is an activity that requires the expertise of human resource professionals and, perhaps, also legal professionals. These external resources are also not under the direct control of the project manager. This may result in the project manager feeling less empowered to manage these resources effectively.

The project manager also does not feel confident in planning for purchases and acquisitions. This activity may include additional processes such as soliciting requests for proposals or quotations. Whilst this is in the ambit of a project manager's abilities, the project manager may not have the authority, time or inclination to conduct a lengthy or complicated solicitation process.

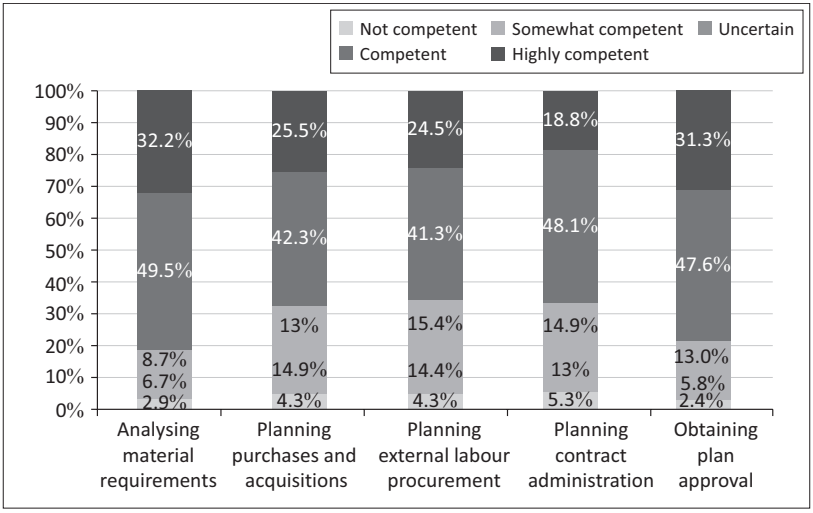

FIGURE 36: Procurement plan approved.

Not all projects need to procure external resources. Should the project only require internal resources then most of the activities in this sub-competency need not be performed. If, however, procurement does take place, it increases the complexity the project manager needs to manage.

Quality management process established

Quality is often an intangible attribute of a product or project that is difficult to measure and quantify (Moustafaev 2014; Reeves & Bednar 1994). For this reason, project managers may find this sub-competency difficult to perform.

Project managers are least confident in this sub-competency in the planning phase. Figure 37 indicates that project managers are very uncertain of how to measure quality in deliverables, processes and project management performance.

This is very concerning as verifying whether a deliverable meets the customer's requirements is key to establishing whether a project is successfully completed.

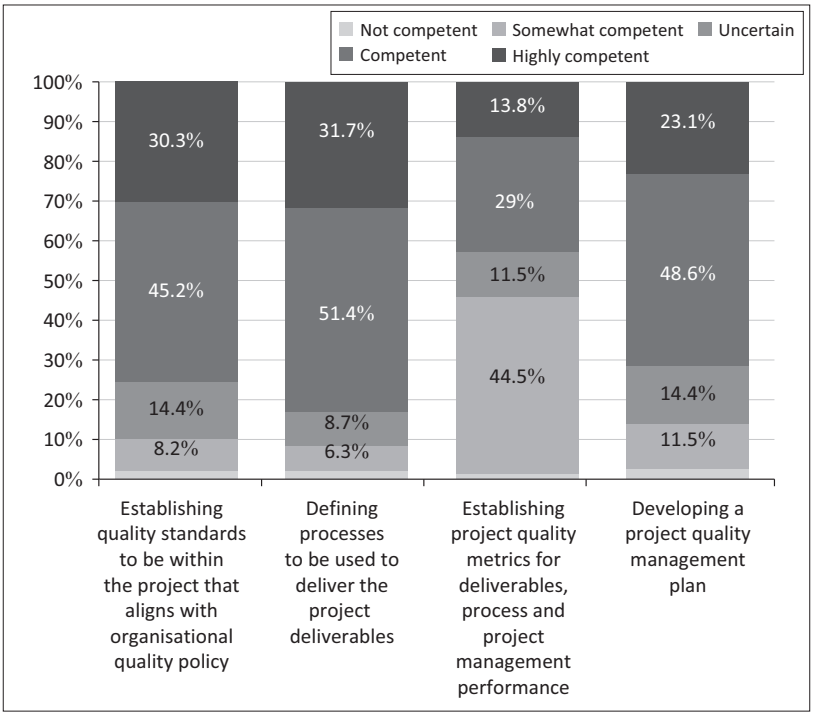

FIGURE 37: Quality management process established.

Project managers seem confident in establishing processes to deliver project deliverables. However, planning for quality, establishing standards for quality and measuring quality are areas where project managers are not as sure of their capabilities as in other areas of project management.

Project managers may be able to deliver a deliverable, but are not sure if the deliverable is of acceptable quality. Should the customer not be satisfied with what is delivered, rework may be required that may extend the project's budget and schedule. This domino effect introduces much uncertainty with regard to cost and time planning, areas that project managers indicate they are very competent in.

Project scope agreed

The project scope is established when the customer and the project manager agree on what the project will consist of (Marchewka 2012). For this reason, it is critically important for the project manager to accurately understand what the requirements of the customers are so as to translate them into deliverables. It is also important for project managers and the customer to agree on what would fall outside the scope of the project.

Project managers also regard themselves as very adept in gaining agreement on the project scope. Figure 38 indicates that the implementation of scope management and obtaining agreement for the WBS defined scope are areas where project managers are greatly confident.

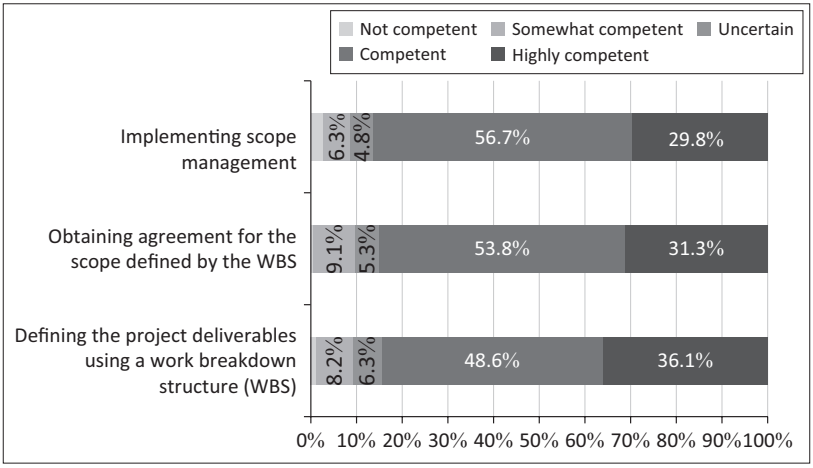

FIGURE 38: Project scope agreed.

However, project managers deem themselves less competent in defining deliverables through the use of a WBS. Clearly this disconnect between defining the scope and agreeing on scope by way of a WBS can be problematic. Project managers may find themselves agreeing or gaining agreement to a deliverable that is ill-defined. This may result in further inaccuracies being used for planning and may result in a deficient product being delivered to the customer.

Project schedule approved

The project schedule is vital as it serves as a roadmap for project team members to complete the planned work (Schwalbe 2013). Through this document, project team members can know exactly when, where and which tasks need to be completed.

Project managers also do not regard gaining approval of the project schedule as an area of concern. Figure 39 indicates that project managers consider themselves especially adept at communicating the project schedule, defining activities and dependencies, scheduling against resource commitments and obtaining final formal approval.

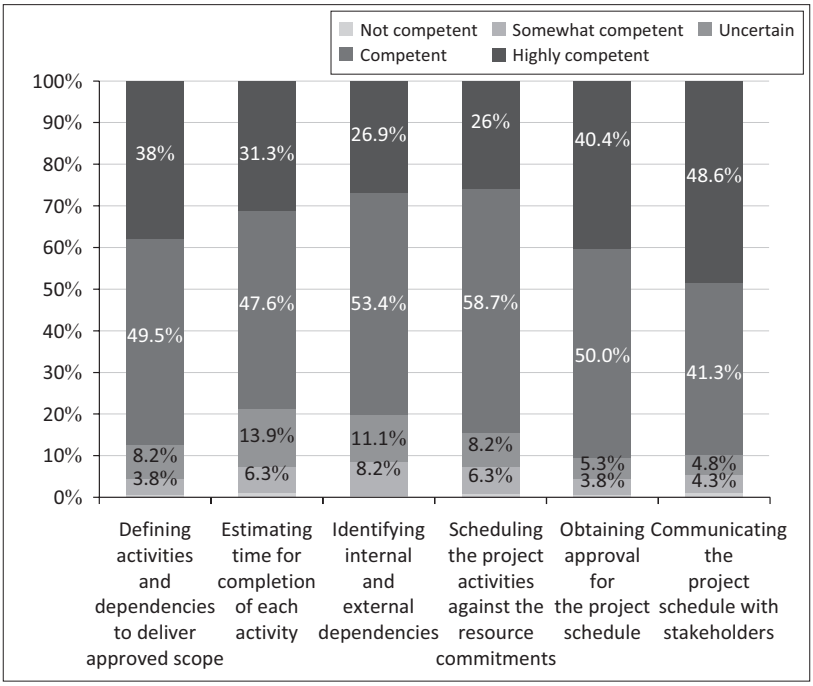

FIGURE 39: Project schedule approved.

There are, however, questions around the project manager's ability to identify internal and external dependencies as well as estimating the time for completion of each activity. These two aspects are at the very heart of scheduling a project. The highest number of 'somewhat competent' or 'uncertain' responses were recorded in these two components. Should the duration of an activity be over- or underestimated, the resulting schedule will be inadequate. If internal and external dependencies are not taken into consideration, the logical order of activities may not be correctly sequenced in the final schedule.

Although the results are still relatively high, the picture painted by the above two competencies serve as a signpost as to where planning inadequacies may occur during scheduling.

Project team identified with roles and responsibilities agreed

All project team members need to understand exactly what they are responsible for in order to ensure that all deliverables and activities are addressed (Clements & Gido 2012). Figure 40 indicates that project managers are highly confident in their abilities to relate towards identifying who should be on the project and assigning their roles and responsibilities.

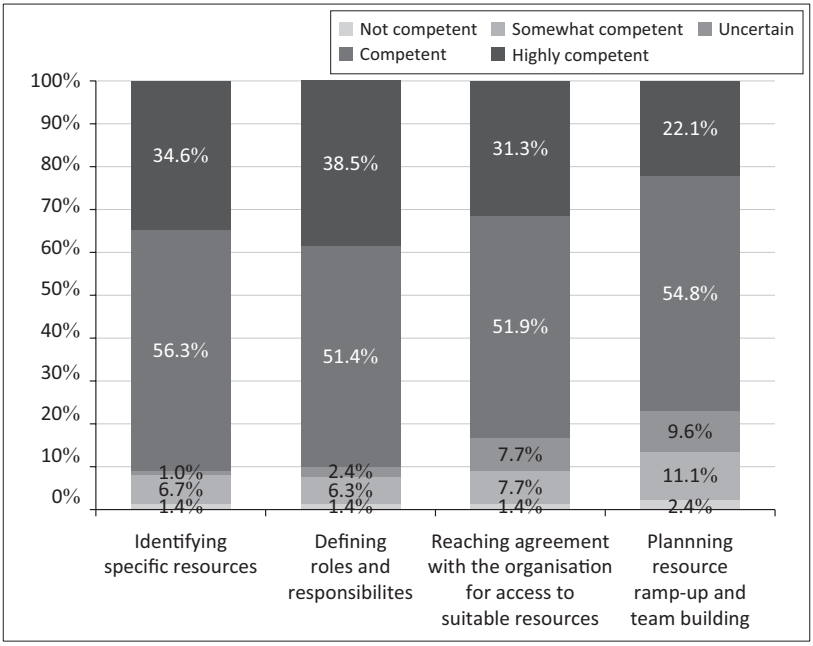

FIGURE 40: Project team identified with roles and responsibilities agreed.

This is a satisfactory result because this would promote communication between the organisation and the project team as well as internally between project team members. Project managers, however, seem to have some doubts regarding their ability to ramp up resources before a specific activity and team building.

Resource ramp-up refers to readying resources closer to the time when they are required, rather than keeping them ready and assigned right from the start of the project. This ensures effective use of resources for the entire organisation and not just the project. The project manager must at all times be aware of what tasks are near term and how long it is required to prepare resources to complete a specific task.

Team building is important to build team cohesion (Grobler & Wärnich 2011). Failing this, a climate for distrust and miscommunication may be created. This is an area where project managers must attempt to improve their competence.

Communications activities agreed

Communication is vital to ensuring the success of a project (Erasmus & Marnewick 2014a; Erasmus *et al.* 2014). Previous studies indicated that communication is one of the most important factors that contribute to the success of an IT project. Sadly, it is also one of the factors that project managers feel very confident in their abilities, but in actual fact, is performed poorly in practice.

Figure 41 indicates the high levels of confidence that project managers exhibit in building a communication plan, scheduling communication activates and selecting suitable tools for communicating project information to an audience.

However, it seems that project managers do have some doubts in all three these components. Building the communication plan requires the project manager to identify who needs what kind of information and in what frequency. Almost 18% of project managers indicated they were not confident in their abilities to do so. A poorly designed communications plan may result in all manner of mistakes during the execution and monitoring and controlling phases of the project.

Scheduling activities to address the communication plan requires project managers to schedule activities such as reporting meetings and when reports need to be circulated on the schedule. Many project managers do not perform this activity and simply rely on the communications plan as a reference to what, when and to whom reporting needs to take place. Similarly, the communication requirements of the different audiences in the project will require selecting the appropriate tools to get the message across correctly (Clements & Gido 2012).

Clearly, project managers deem themselves able to communicate effectively. This result is not unsurprising but caution must be taken when interpreting this result. Previous studies indicated that in practice, the picture is not as positive as project managers make it out to be.

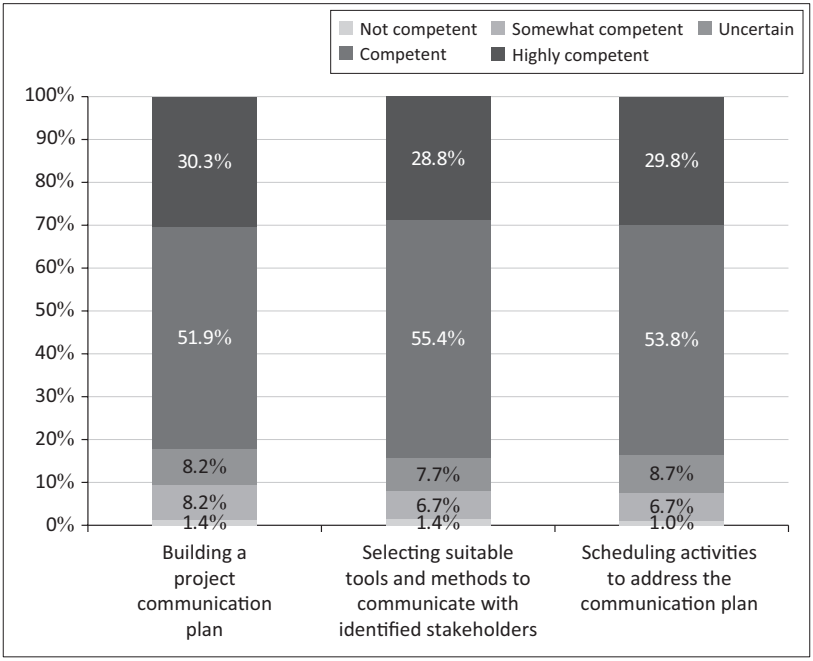

FIGURE 41: Communication activities agreed.

Integrated change control processes identified

Change control processes are required to ensure that inevitable project changes are properly documented, analysed and implemented, or rejected by the project manager (Erasmus *et al.* 2014; Joseph 2014). This is also carried out to ensure that scope creep is not experienced so as to inflate the already agreed upon activities required to complete the project successfully (Schwalbe 2013). Figure 42 indicates that project managers consider themselves competent to manage change in a project.

The results also indicate higher levels of doubt in their abilities. It is natural that project managers should feel slightly less confident when introducing changes to an agreed plan. However, planning for this contingency is vital should it occur. More than 20% of project managers are not confident in leading or delegating the effort to establish a change control process. This is a worrying statistic as all the other sub-components are dependent on this one issue.

If project managers cannot establish a change control process properly, its use can also not be properly ensured and neither can this process be communicated effectively.

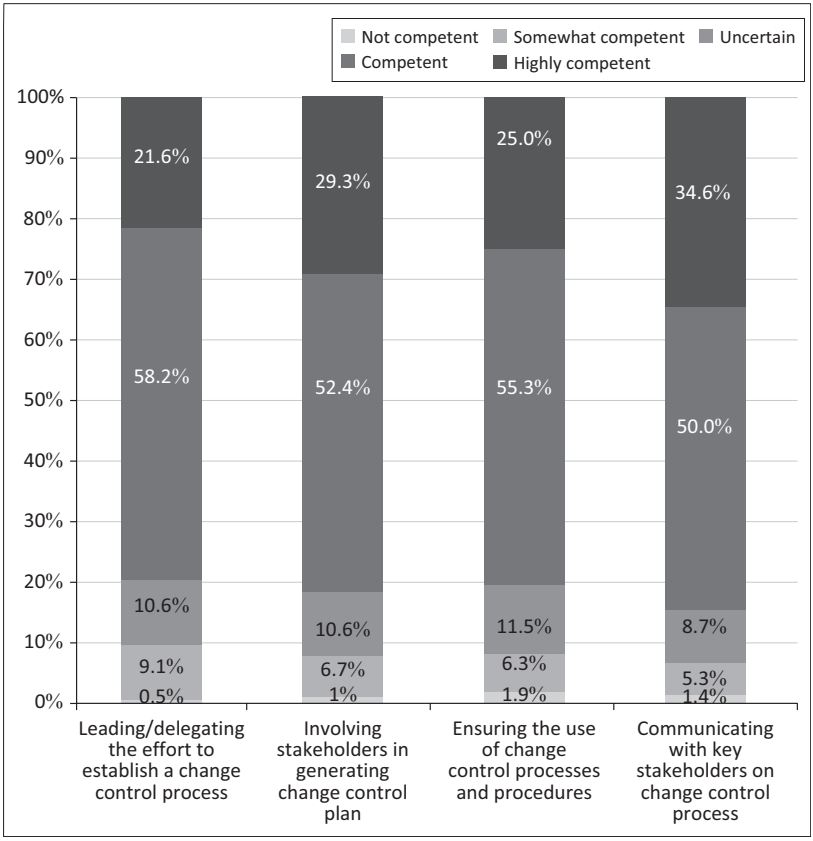

FIGURE 42: Integrated change control processes identified.

The lack of leadership in establishing this plan will also lead to not including stakeholders in establishing this plan.

As this sub-competency is very important for the success of a project, project managers ought to become highly competent in the change control process. Not just in their own estimation, but also in practice.

Project plan approved

Finally, the complete project plan needs to be approved. This is the culmination of all the planning effort that includes the previous nine sub-competencies. Figure 43 indicates a split in the confidence project managers exhibit in this sub-competency.

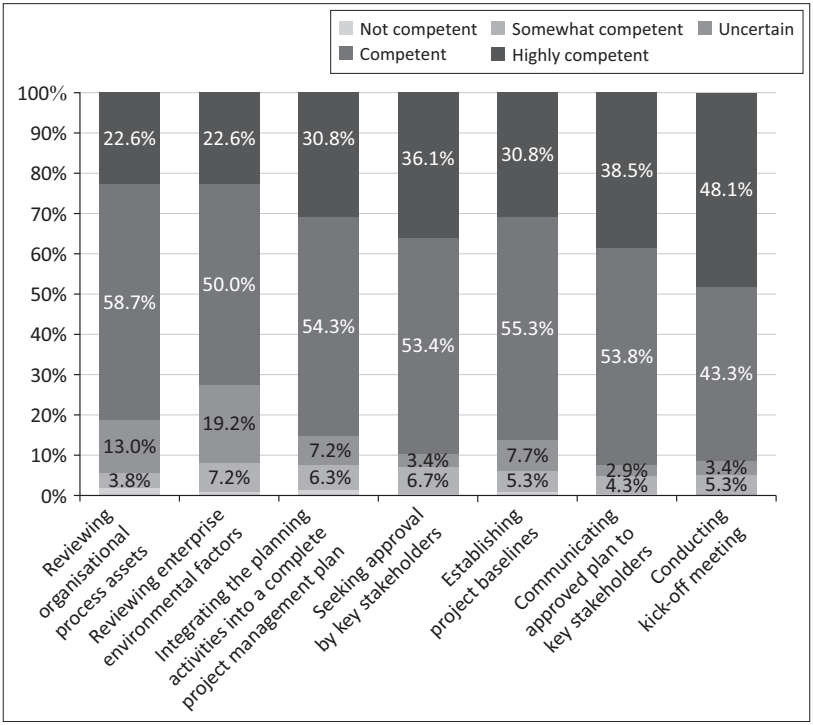

FIGURE 43: Project plan approved.

On the one hand, project managers are very confident with regard to the process of gaining project plan approval. This includes the activities of holding a kick-off meeting, establishing project baselines, seeking approval from key stakeholders, and, finally, communicating the approved plan to key stakeholders.

Some doubts exist in the minds of project managers concerning reviewing organisational process assets and the enterprise's environmental factors. The organisational process assets refer to an internal perspective where project managers need to be conversant with their organisation's processes and how they may influence the project. Failing to do so may result in a project being slowed down in order to accommodate obligatory organisational processes.

Overall, project managers are quite confident in their abilities to plan a project. The main issues revolve around cost, quality, risk and procurement management. These four sub-competencies are all components of project management success and failing to perform these properly may result in project failure.

Unit of competency: Execution

During the execution phase, the developed plans are put into action. Any deficiencies in planning will now be translated into reality. Regardless of how well the project is executed, poor planning represents a significant risk to the success of the project.

The respondents were requested to indicate their perceived competence with regard to the management of human resources, physical resources, quality and stakeholder expectations. Figure 44 indicates that project managers are extremely confident in how well they manage stakeholder expectations.

This may be because they consider their documentation development skills in planning to be excellent. Similarly, the respondents felt that they have a good grasp on human resource management as well as achieving project scope. The greatest doubt exists in managing quality against plan as well as managing material resources.

Quality managed against plan

As previously discussed, managing quality is about delivering the product with certain intangible features that influence how well the product fulfills its intended uses. Quality in the context of IT projects may differ vastly depending on whether software development, enterprise architecture or various infrastructure projects are attempted

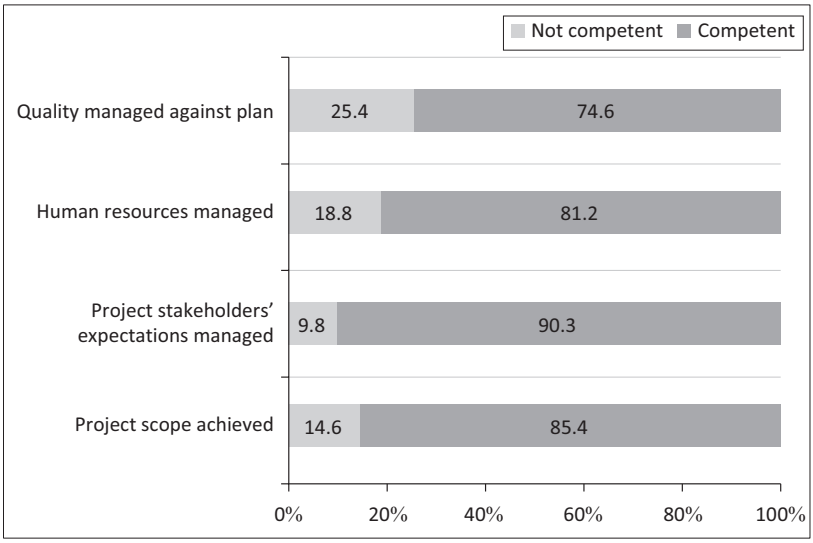

FIGURE 44: Unit of competence: Execution.

(Schwalbe 2013). It is the responsibility of the project managers to determine what quality entails in their own environment.

Project managers seem to have some uncertainty as to the management of quality. Figure 45 provides insight as to where the bulk of uncertainty may lie.

Being aware of the quality standards in a specific context is a foundational issue if quality is to be managed. Fortunately, project managers seem to be confident that they have the right quality standards and that they are conversant in them. There are, however, some uncertainties especially with the lack of project management standards available until 2013. With the establishment of ISO21500 Guidance on Project Management standard released in 2013 by the International Standards Organisation (ISO), project managers are now able to refer to this guide as a resource for completing projects in a responsible manner (Stellingwerf *et al.* 2013).

Additionally, there may be other industry standards that a project manager in a particular industry needs to adhere to, as well as certain standards as required in the IT domain, regardless of which industry the project is being completed in. This increase in complexity of the project may introduce confusion as to which standards need to be applied.

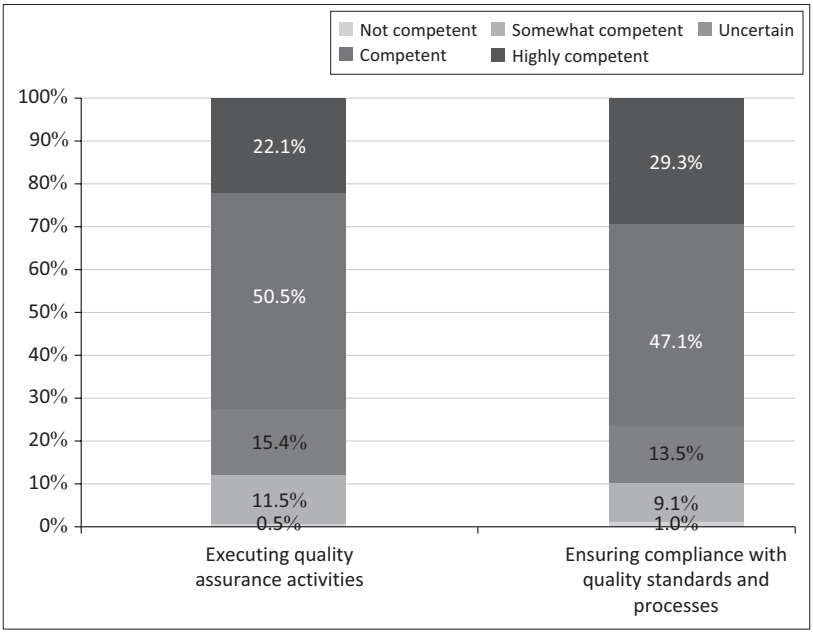

FIGURE 45: Quality managed against plan.

TABLE 10: Correlation of the establishment and execution of quality assurance.

Executing quality assurance activities	Establishing project quality metrics for deliverables, processes and project management performance
Pearson correlation	0.524**
Sig. (2-tailed)	0.000

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

However, project managers are not as confident when it comes to assuring quality or ensuring that the quality plan is being adhered to. Quality may be seen as the result of adhering to customer requirement in an effective manner (Clements & Gido 2012). However, if all stakeholder requirements are not elicited, then quality may be lacking in the end result. It is however of great concern that no strong relationship exists between the establishment of quality management metrics in the planning phase and the execution of quality assurance activities in the execution phase. Table 10 demonstrates this medium strength relationship.

This is an unsatisfactory result in that, if these metrics are established, they ought to be used in assuring quality. If project managers are confident in their abilities in the one, it does not necessarily mean they are confident in the other. Project managers ought to have the ability to establish appropriate metrics and the ability to use them to assure quality.

This result may also occur when project managers are not equipping themselves with tools that are able to determine variances in quality from the quality standards and requirements, the result of which may also be a failed project or one that needs substantial rework to the final deliverables, therefore delaying completion.

Material resources managed

IT project managers may have to procure and manage equipment and raw materials, especially in infrastructure projects. Although the volumes and complexity may not be on such a high level as in the engineering or construction sectors, project managers require this competency in order to effectively deliver a final product. Figure 46 indicates that although many project managers feel competent in managing materials, this aspect was one of the highest in terms of being 'somewhat competent'.

Project managers feel very confident in all the sub-competencies. They, however, seem slightly less confident in executing procurement tasks against a schedule. This would require the use of lead schedules. The uncertainty may arise because of the external nature of procurement where the project managers have to rely on supplies outside their organisation. This contrasts with internal sourcing, which project managers felt they are competent in doing.

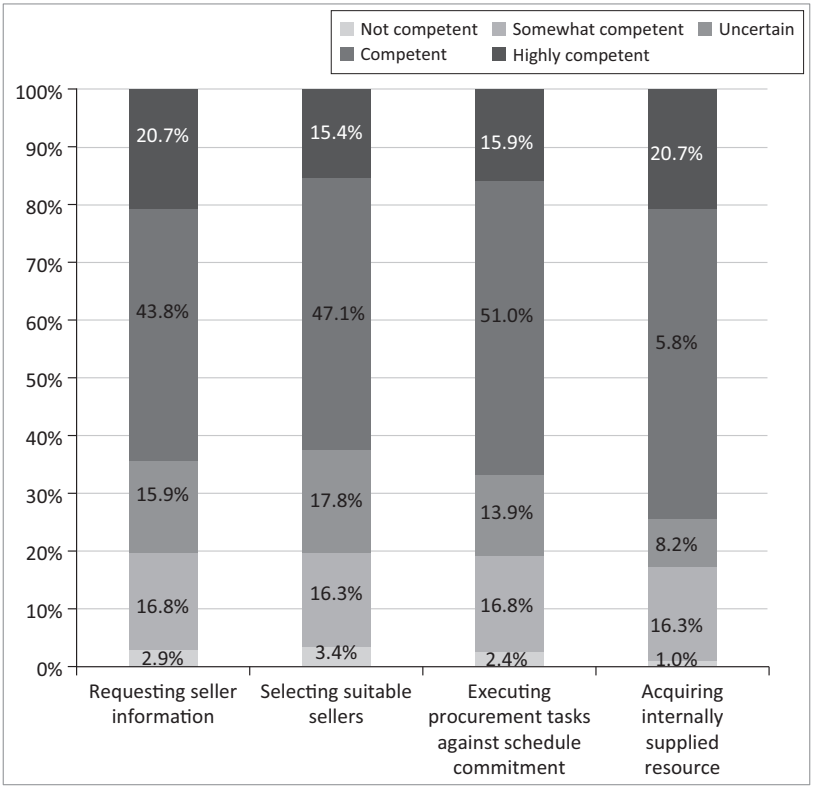

FIGURE 46: Material resources managed.

Project managers also seem less confident in requesting seller information as well as selecting a suitable seller. This process may be highly technical as it requires the project manager to have in-depth knowledge of the customer's requirements that need to be fulfilled by the external contractors or materials.

Although all four aspects in this unit of competence are vastly important, the fact that uncertainty exists in terms of managing quality and materials increases the chances of project failure. Overall, project managers do perceive themselves as competent with regard to executing a project.

Human resources managed

In the execution phase, the project manager must manage the assigned human resources according to the project plan. The assigned team members must now form a cohesive unit.

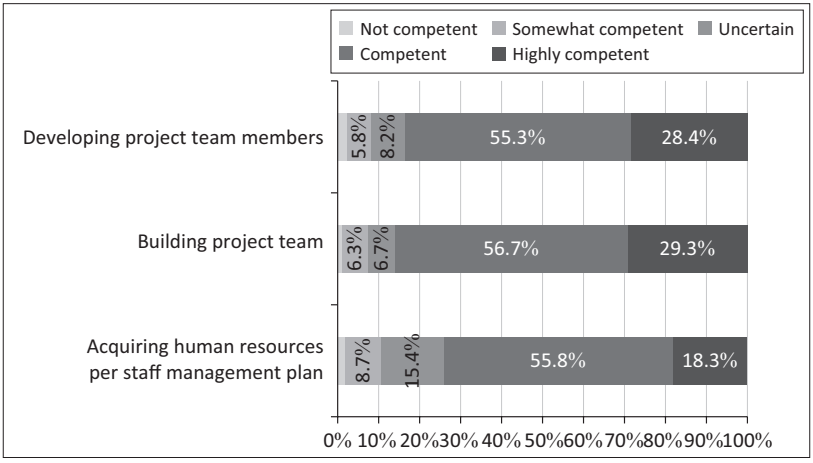

FIGURE 47: Human resources managed.

Figure 47 indicates that project managers feel confident in working with individual team members as well as the whole group.

It is also evident that project managers are less confident in actually acquiring the human resources as per the agreed staff management plan – if such a document exists – as contained or implied by the project management plan. This is interesting as one would expect the organisation to perform according to its commitment to the project and avail themselves of the promised resources on time. In reality, this may be easier said than done and it is, therefore, critical that executive support is brought to bear to ensure such cooperation from the rest of the organisation to the project.

Project stakeholder's expectations achieved

Project stakeholder expectations should have been explicitly stated in the project management plan. The project manager should also be in frequent communication with the stakeholders to ensure that stated expectations are met and, where previously unstated expectations are raised, that they are addressed as well.

Figure 48 indicates that project managers are quite confident in their abilities to manage their stakeholders' expectations.

They feel comfortable interacting with stakeholders to ensure their continued support as well as reviewing these expectations throughout the project to ensure they are being met. There appears to be little concern with the management of stakeholders' expectation in the execution phase.

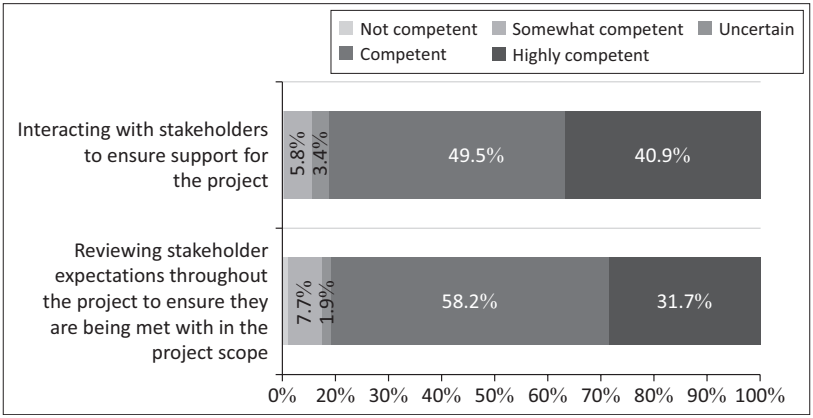

FIGURE 48: Project stakeholders' expectations managed.

Project scope achieved

During the execution phase, all effort is expended with the aim of achieving the scope as set out during the planning phase. From Figure 49, it is clear that project managers are quite task oriented.

This is evidenced by the fact that project managers harbour little doubt as to their abilities in identifying and closing performance gaps as well as verifying if a task has actually been completed. This is, of course, vital in satisfying the stakeholders' expectations with regard to the final outcome of the product.

Evidently, there are also some doubts with regard to managing phase transitions. With larger, more complex projects it may be necessary to divide the project into smaller, manageable phases (Kerzner 2013). If the stakeholder is, however, not satisfied with the outcome of a previously completed phase, return work may be required that will further destabilise the activities of a current phase.

Additionally, project managers seem less confident in executing the risk management plan as agreed upon in the planning phase. Table 11 reveals a concerning correlation.

There exists a weak correlation between the confidence project managers have in developing the risk management plan and its execution. Even if a project manager is confident in developing a risk management plan, it does not automatically imply that they would be confident in executing it. Once again, the disparity between planning and executing seems to be evident. Project managers ought to be able to execute the plan they diligently worked on. Given the prominence of risk management as a success factor to IT

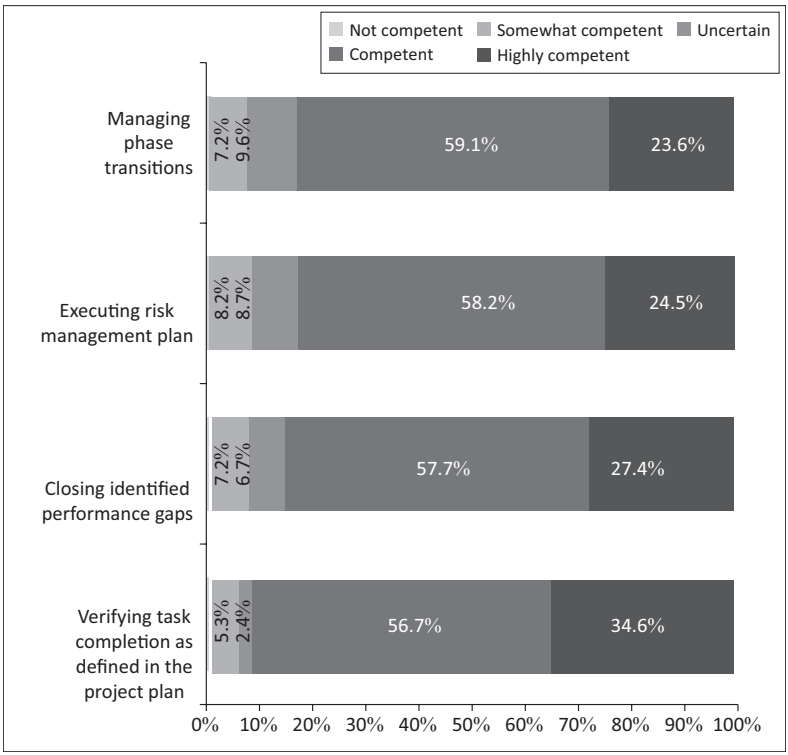

FIGURE 49: Project scope achieved.

TABLE 11: Correlation between the development of a risk management plan and its execution.

Executing risk management plan	Developing project risk management plan
Pearson correlation	0.569**
Sig. (2-tailed)	0.000

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

projects, it is imperative that project managers be proficient in managing actual risk (Erasmus *et al.* 2014; Joseph 2014).

Unit of competency: Monitoring and controlling

The process group of monitoring and controlling a project happens in parallel with execution (Clements & Gido 2012). This is the process of ensuring progress is made and

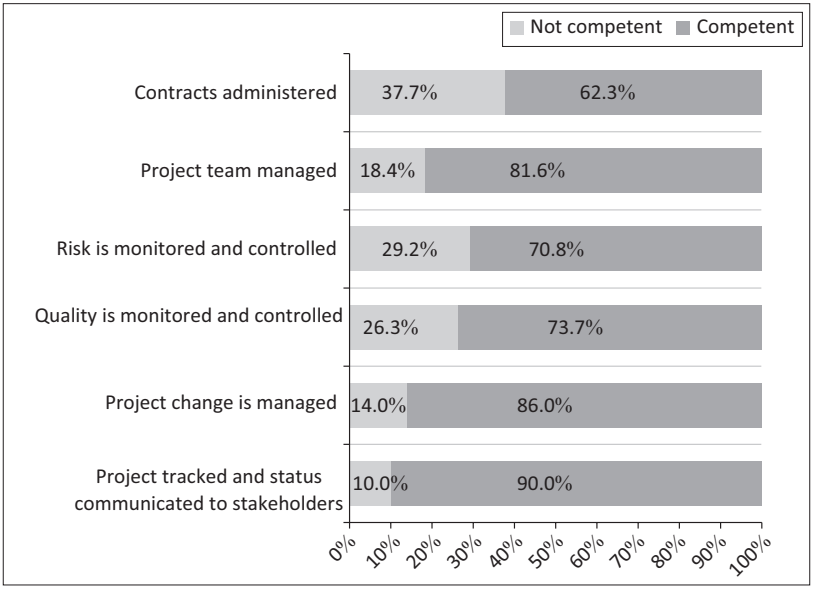

FIGURE 50: Unit of competence: Monitoring and controlling.

variances are managed. This is achieved through the management of stakeholders, quality, changes, the project team, risk and contract.

The overall results indicated that the most doubt in a project manager's competence manifests in this process group. Figure 50 indicates the responses of project managers in this unit of competence.

Project managers are most confident in the areas of managing project change and tracking project status and reporting to stakeholders. Project managers seem to harbour more doubts in administering contracts, risk management, quality management and contract administration. Given the result from the previous units of competence, the pattern is continued.

Project tracked and status communicated to stakeholders

In this sub-competency, project managers are expected to communicate the status to stakeholder's, as well as initiating action plans when variations from the project plan are identified. Figure 51 indicates that project managers are relatively confident in their abilities to perform such actions.

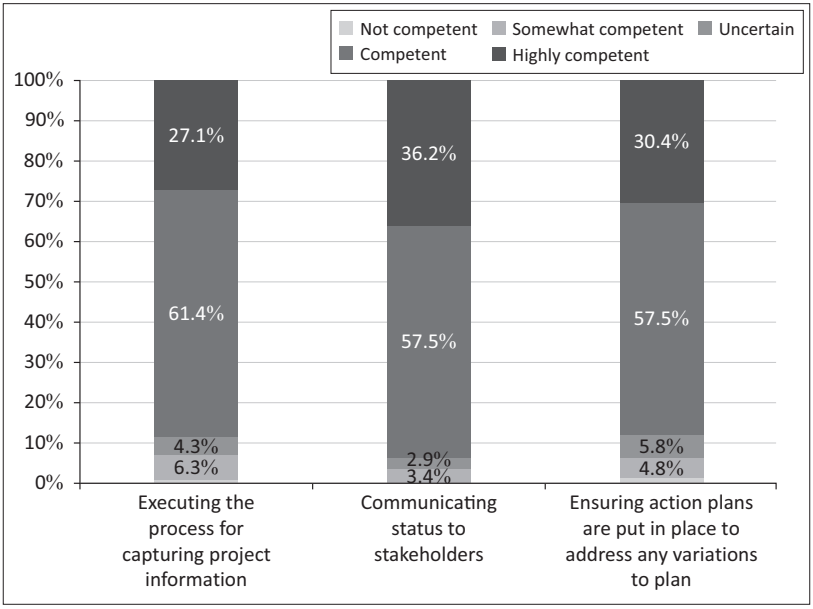

FIGURE 51: Project tracked and status communicated to stakeholders.

TABLE 12: Communication plan relationships.

Communicating status to stakeholders	Building a project communication plan
Pearson correlation	0.464**
Sig. (2-tailed)	0.000

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

Project managers feel they are exceptionally adept at communicating the status to stakeholders via reporting channels; however, slightly less so in terms of gathering the reporting information. This is normally a task the project administrator assists with where one is available (Schwalbe 2010b).

Similarly, project managers also consider themselves very capable of putting action plans into place to address any variations. One would hope this also includes initiating the change management process where appropriate.

Overall, project managers certainly perceive themselves as masters of communication. In this instance, this is certainly true. However, Table 12 indicates that even though reporting may take place, it does so almost without cognisance of the communications plan that should be established during the planning phase.

There exists a weaker than expected relationship between the establishment of a communications plan and subsequent communication of project status to stakeholders. This is unacceptable because even if project managers are confident in the communications plan they developed, they may not be confident in using that plan to communicate to stakeholders. Clearly, the issue of clear communication is still a matter that needs to receive proper attention regardless of how competent project managers seem to regard themselves.

Project change is managed

As previously elaborated, project change management is critical to prevent an undocumented increase in scope as well as ensuring neglected aspects of the project are included in the formal documentation.

Figure 52 indicates that although project managers consider themselves competent in managing project change, there are some pockets of uncertainty that need to be addressed.

Some uncertainty or perceived lack of confidence emerges around executing the configuration management process. Configuration management is a method of control

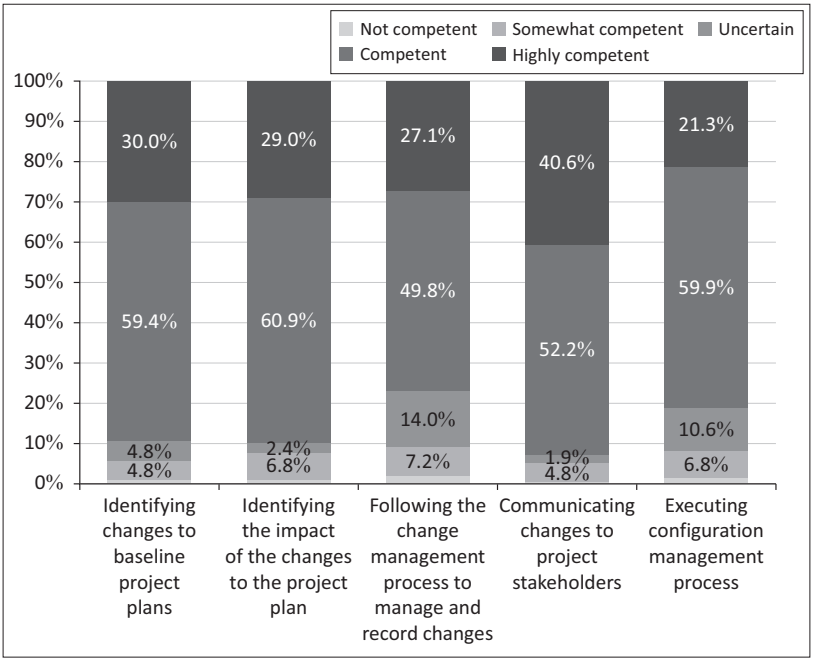

FIGURE 52: Project change is managed.

TABLE 13: Correlation between ensuring the use of change control process and following it.

Ensuring the use of change control processes and procedures	Following the change management process to manage and record changes
Pearson correlation	0.493**
Sig. (2-tailed)	0.000

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

to ensure a deliverable exhibits the requirements as stated by the customer and serves to make these explicit for clear communication (Association for Project Management 2012). This forms part of quality management, which we have seen is already an area of lower confidence for project managers.

Another area of concern is in project managers feeling less confident in following the change management process once changes are required or requested. More than 23% of project managers were not confident in following the change control process they themselves had set up. Table 13 indicates the disparity.

An almost weak relationship exists between the variable of ensuring the use of a change control process that was established in the planning phase and actually following it in the monitoring and controlling phase. Although a relationship does exist, it is far too weak to what ought to be a very strong relationship.

If these activities are not completed properly, inefficient change management takes place and scope creep emerges. A project manager can be extremely competent in communicating a change to stakeholders. However, if no changes are perceived, a change management process does not exist, or is not followed, and changes are not implemented in adapting configurations, then the reporting of changes has very little value.

Risk is monitored and controlled

Similarly, neglecting emerging risk may also lead to project failure. This risk may be identified previously in the planning phase or there may be risks that emerge through the course of the project having not been identified previously. Figure 53 indicates that project managers do not perceive themselves as competent as in most other areas of project management.

Project managers are most confident in the component of recognising new risks as well as reviewing response strategies and updating the risk response plan. This may indicate that the risk register is actually being used as a living document. It also seems that they are quite confident in developing contingency plans when the unfortunate reality of unforeseen risks occurs. This may indicate that project managers are forced to implement contingency strategies far more often than would be necessary if extensive risk identification had taken place.

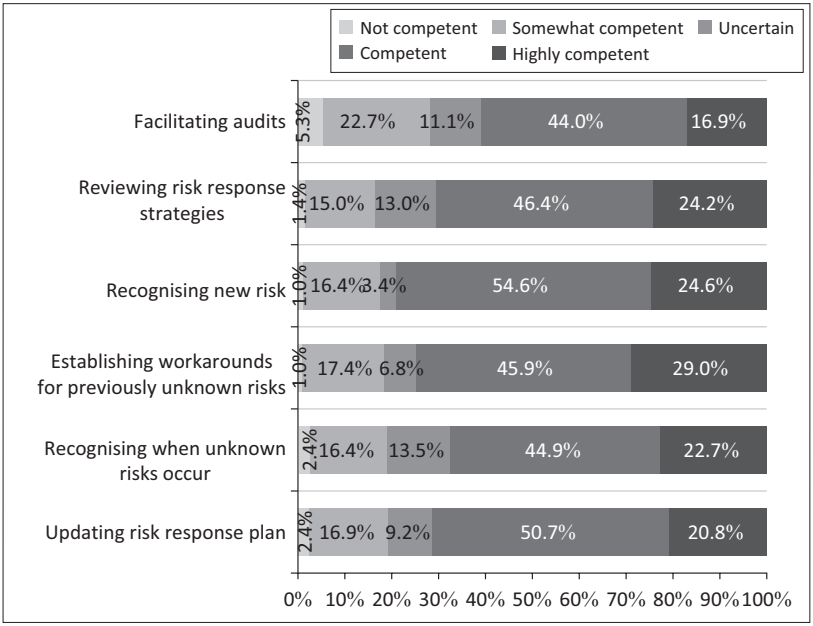

FIGURE 53: Risk is monitored and controlled.

Unfortunately, it also seems that project managers do not feel comfortable in their abilities to recognise when these previously unknown risks occur and are locked in damage control exercises known as 'fire-fighting'. This further illustrates the point of risk management being the least matured knowledge area in project management.

A concern which touches on governance is the uncertainty surrounding the conducting of risk audits. This vital governance activity must ensure that the risk management process is effectively executed and all reasonably identifiable risks are taken into account. It is critical to understand which risk is active and what the perceived impact and likelihood would be. Neglecting the health status of a project may decrease the value of reporting and hamper the timeous response to risk occurring.

One may be sympathetic to the project manager's plight as it relates to risk. Doubt and uncertainty is inherent to the concept of risk. Therefore it may be reasonable to assume that a lower level of confidence may be evident in this sub-competency.

Contracts administered

Closely related to the materials management aspect of execution is the contracts management issue of monitoring and controlling. Procurement of materials and other

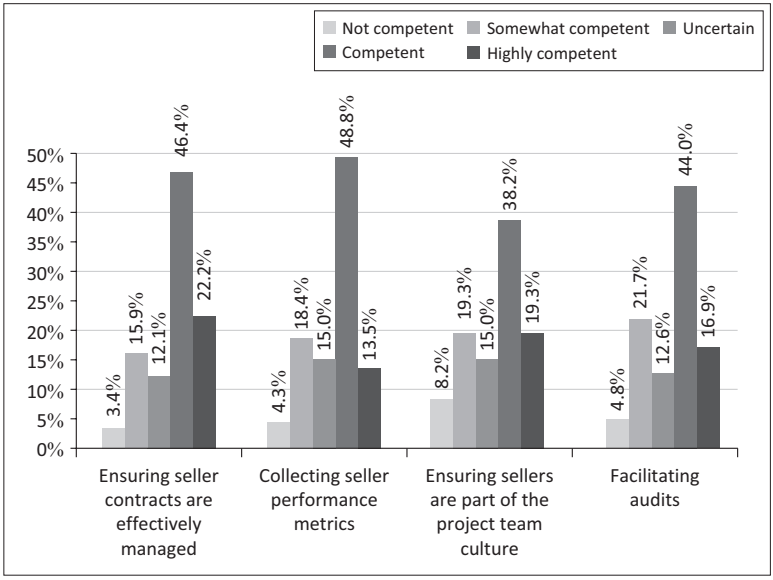

FIGURE 54: Contracts administered.

resources often happen under the auspices of contract management and could therefore be linked. Figure 54 indicates the difficulties some project managers have in terms of managing and administering contracts.

Project managers feel confident in managing contracts as well as measuring the performance of such contracts. They do, however, indicate that they are not always certain whether these external parties fit in with the project team. Neither do they feel comfortable with conducting audits to determine whether contracts are fulfilling exactly what was contracted for. This is yet another example of the failure of implementing effective governance.

Apparently, project managers feel less confident about their competence in monitoring and controlling than what they do in initiation and planning. The emerging of unidentified risks, administering external contracts and managing materials may introduce more variables and complexities. Dealing with this complexity has become a familiar context for IT projects, especially where requirements are not always forthcoming from the customer.

Project team managed

It is important for the project manager to establish the health of the project team to ensure high performance during the course of the project. Figure 55 indicates some of the concerns project managers have on their ability to do so.

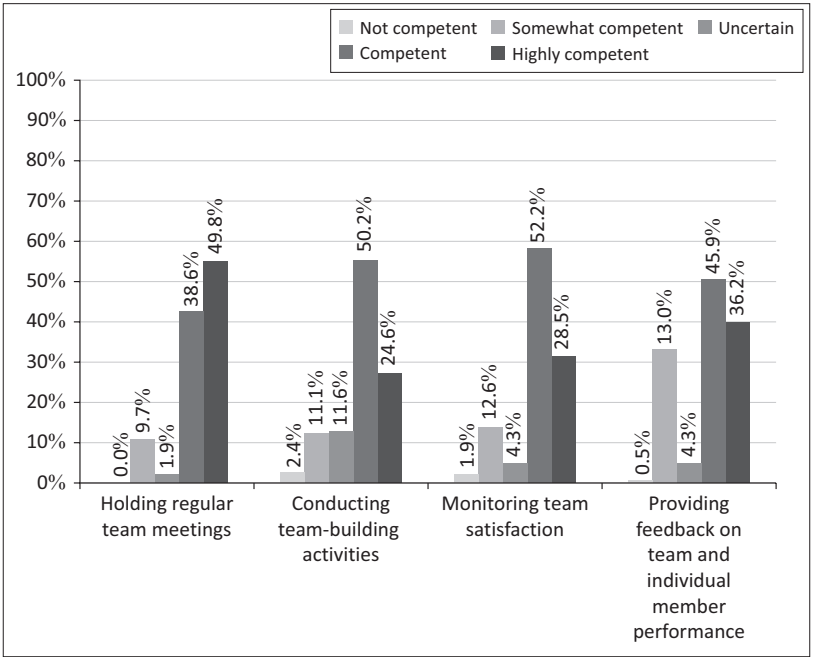

FIGURE 55: Project team managed.

Project managers seem to perceive themselves as less competent in providing feedback to the team and the individual about performance and in conducting team-building activities. In the fast-paced environment of IT projects it may be true that little time is available to spend on such matters. Although very important, these components may not be addressed. They also find it more difficult to monitor team satisfaction than other tasks.

Project managers once again consider themselves masters of communication in the sense that they are highly competent in holding regular team meetings.

Quality is monitored and controlled

Verifying if quality is achieved as stipulated by the quality management plan is important in terms of meeting customer requirements and expectations. Ensuring quality is built-in right from the start will also reduce the need for rework on completed activities.

As indicated in the previous discussions, quality management is an issue that project managers struggle with. Figure 56 indicates many of the underlying issues.

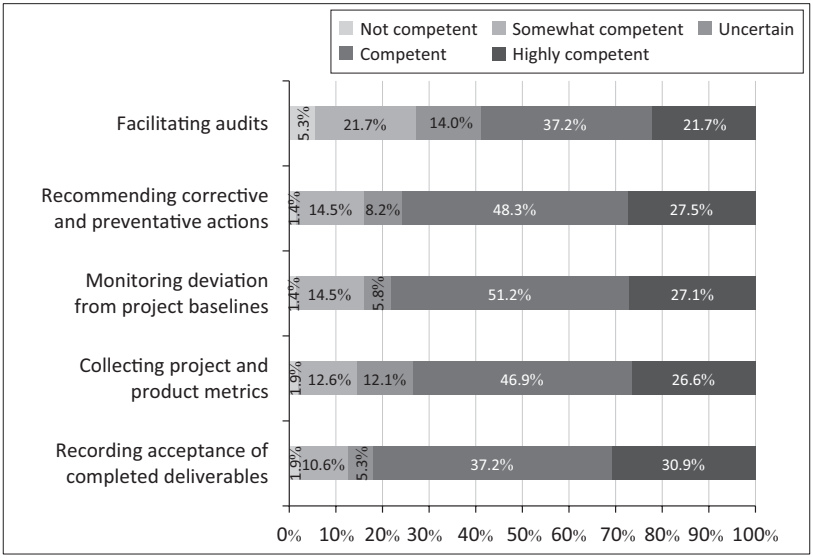

FIGURE 56: Quality is monitored and controlled.

Facilitating quality audits is important to ensure all aspects of the product are to the customer's requirements. This vital governance aspect is, once again, neglected by more than 40% of project managers. The collection of project and product metrics seems to harbour some doubts as well. Given this, it will be difficult for the project manager to identify deviations from the project baseline if the metrics are not available or understood. The further effect would be that the project manager may not be able to identify the appropriate corrective actions to be taken.

All that remains is for the project manager to record the acceptance of completed deliverables once the project stakeholders are satisfied their needs have been met. Of course, this will be difficult to achieve if the project manager is unable to verify if the quality targets have been achieved, given that the metrics are not understood or available.

Clearly, the management of quality is a major issue that needs to be seriously addressed.

Unit of competency: Closing

It is often said that very little attention is paid to closing a project properly as all the work has been completed (Munier 2014; Scott-Young & Samson 2009). Neglecting project closeout deprives the organisation of much project knowledge, experience and learning.

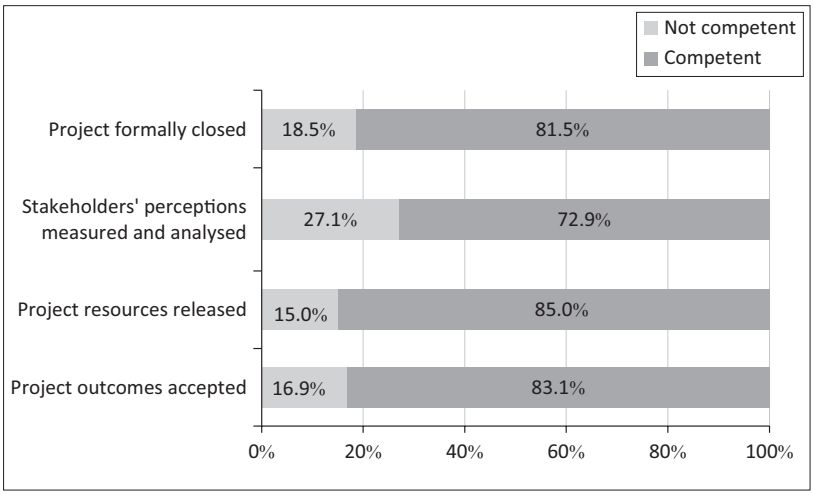

FIGURE 57: Unit of competence: Closing.

This unit of competence required respondents to indicate how confident they are in getting project outcomes accepted, releasing project resources, measuring and analysing stakeholder perceptions as well as formally closing the project. Figure 57 indicates the results from this section.

Although relatively confident in their abilities to close a project, project managers do exhibit some doubts in their abilities to measure and analyse stakeholder perceptions.

Stakeholder perceptions measured and analysed

The measurement of stakeholder perceptions is an area where some of the lowest levels of project manager confidence is found. Figure 58 testifies to this fact by indicating the very low levels of confidence for the surveying of stakeholders and analysing of their results.

Throughout the project life cycle, project managers have rated their communication skills very highly. Suddenly, we observe that project managers are not confident in surveying project stakeholders, nor are they confident in distilling knowledge from this information that could be gained from stakeholders.

This could entail that project managers perceive themselves as being very adept at disseminating information and not so much at receiving feedback. It could also entail that project managers are too busy to conduct this post-project review activity, after

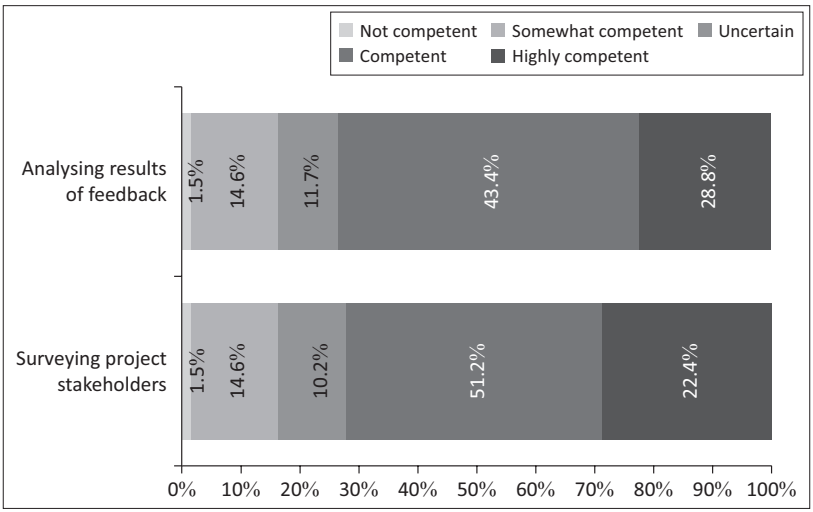

FIGURE 58: Stakeholder perceptions measured and analysed.

TABLE 14: Stakeholder feedback relationship.

Analysing result of feedback	Surveying project stakeholders
Pearson correlation	0.881**
Sig. (2-tailed)	0.000

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

deliverables have been accepted by the customer. It may even mean that project managers do not consider such feedback valuable.

However, it is observed that in the case that a stakeholder's feedback is elicited, it seems to be analysed, as shown in Table 14.

A very strong, statistically significant relationship exists between the surveying of project stakeholders and the analysis of that feedback. This indicates that project managers who regard their abilities to get feedback quite highly are also in a position to adequately analyse the feedback received. One would hope that this happens in practice.

Project outcomes accepted

Attempting to get the stakeholders to accept the project outcomes is key in formally closing the project. A project cannot be closed if any deliverables remain incomplete or not accepted. It does seem that project managers are confident in their abilities to get project outcomes accepted as indicated by Figure 59.

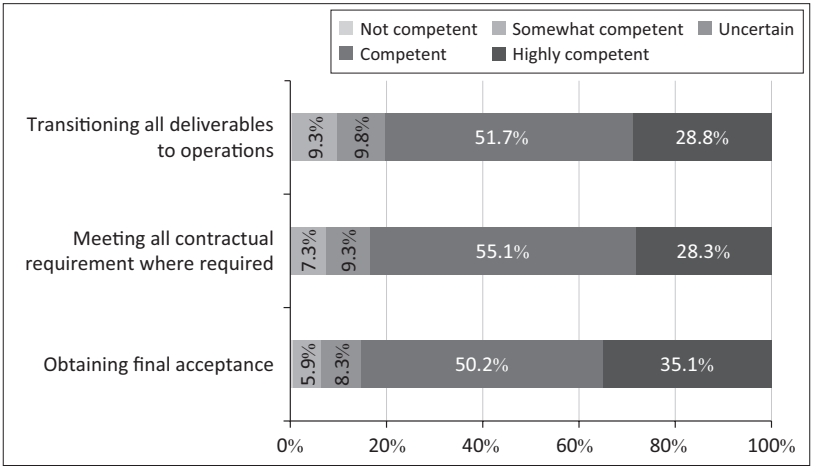

FIGURE 59: Project outcomes accepted.

It is however interesting to note that more than 16% of project managers are not confident that all contractual requirements were met during the completion of the project. This continues the trend where project managers are not always confident in their abilities with regard to contract management.

Project managers also seem to have some uncertainty with regard to transitioning the project deliverable to operations. This is the practice of transition management and it must be made clear from the start where the project's responsibility ends and where the responsibility for operations begins.

Obtaining final acceptance does not seem to be a major issue of concern for project managers as most are happy to indicate they are competent. However, if project managers have not been reporting to the stakeholders on a regular basis, they may rightly be unsure of whether the outcomes will be accepted.

Project resources released

Once the final deliverables have been handed over to the relevant stakeholders, the resources the project has had claim to need to be released back to the organisation. In Figure 60, it is clear that some project managers are not quite sure what these processes entail.

Almost 20% of project managers do not know the internal process for releasing resources back to the organisation. Many times this may happen automatically or without the explicit consent or knowledge of the project manager.

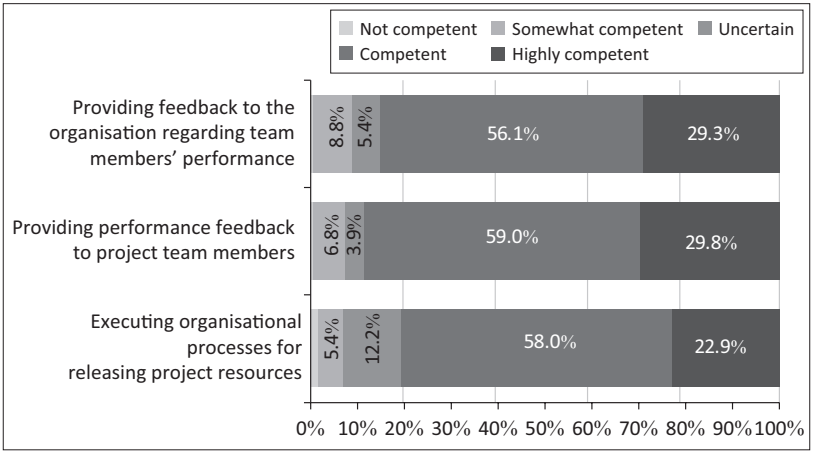

FIGURE 60: Project resources released.

Project managers are more confident in their abilities to provide feedback to the project team members on their performance than to the organisation itself. There may be an element of politics in this matter because the project manager may have to work with these individuals again in future and would not risk harming the relationship with negative feedback to their superiors.

Project formally closed

Finally, the project needs to be closed formally. This serves to indicate to the organisation and the stakeholders that no further work shall be carried out on the project and that operations are now responsible for maintaining the product. Should any remaining issue be uncovered after formal acceptance by the stakeholders, the project cannot be reopened. A new project or initiative should rather be launched to address these issues should all stakeholders agree to do so. Figure 61 indicates what project managers might include in the closing of project activities.

The closing of financial activities is an area where project managers feel distinctly uncomfortable. This continues the theme of project managers perceiving themselves as less competent when it comes to budgeting and financial matter.

Project managers also feel less confident of their skills when it comes to project documentation and learning. This view is supported by the reticence of project managers to obtain valuable customer feedback. If this organisational learning does not take place, there is no chance for the projects to improve on their past performance and they will be doomed to repeat the same mistakes.

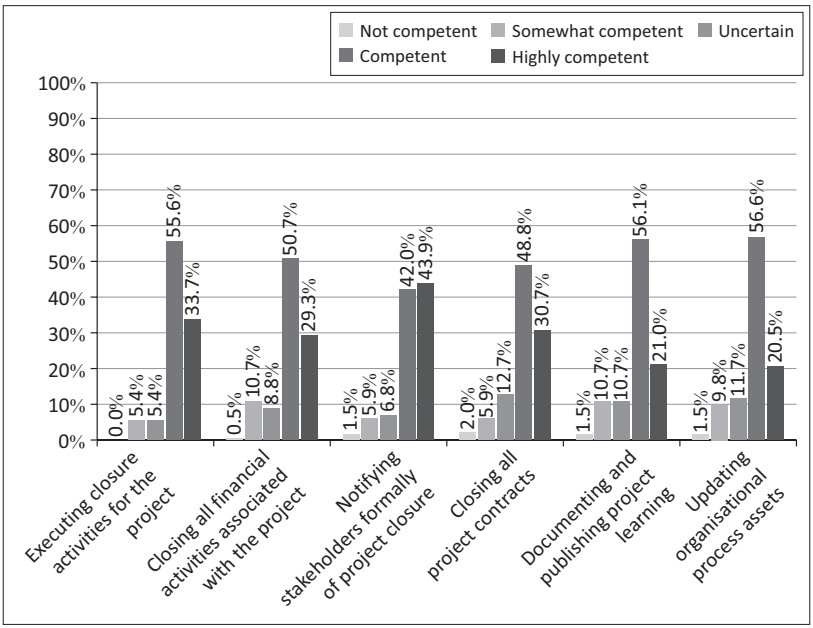

FIGURE 61: Project formally closed.

Conclusion

Project managers seem confident in their abilities overall. They perceive themselves competent in managing projects. When these results are mapped across the process groups in the project life cycle, an interesting picture emerges in Figure 62.

When adding all responses for the competent and highly competent categories, project managers seem most confident in their abilities to initiate a project. This confidence decreases as the project gathers momentum towards completion. The unit of competence where project managers are least confident is in monitoring and controlling a project, and then more confidence is gained in closing the project.

The reason for this decline in confidence could be as a result of ever increasing complexity when moving from initiation to closing. Another possible reason is that the project manager, having been supremely confident in his or her abilities to initiate and plan a project, experiences unexpected events which might not have been planned for.

Deficiencies in the initiation and planning phase as a result of not identifying all stakeholders, and all risks and all requirements, lead to deficiencies being built into the

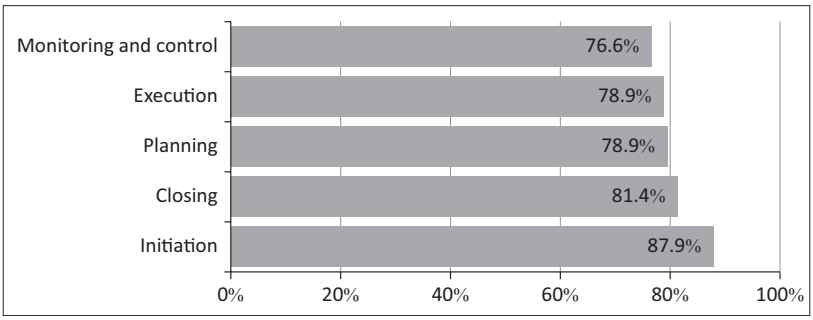

FIGURE 62: Units of competence levels of confidence.

project plan. This deficient project plan is then executed and monitored and controlled. This bullwhip effect could serve to increase uncertainty and introduce even further complexity into the project management process.

It must be said that, although a project manager perceives his or her ability as highly competent, this data do not confirm that the project manager is in fact competent. This can only be determined by on-site auditing. Figure 63 illustrates the competencies in which project managers have almost absolute confidence in their abilities.

These competencies typically include activities surrounding communication skills. They are communicating plans, achieving agreement, defining roles and responsibilities, and so forth. However, as was seen in the section closing projects, project managers do not always feel confident in eliciting customer feedback or any form of criticism. This one-way form of communication does not serve to enhance the management of projects.

Clearly, project managers are confident in releasing project resources as they need to return to operations as well as getting project outcomes accepted as documented. However, formally closing the project and including customer feedback and perception in closeout documentation is a stumbling block.

By not including customer feedback in documents such as a lessons learnt report, deprives the organisation of much knowledge. Similarly, if a project cannot be closed formally, this provides opportunities for customers to continually request amendments and reopening of resolved issues. Additionally, projects that do not end could become operational matters that the project manager must continually manage.

On the other end of the scale, Figure 64 indicates the competencies across all process groups that project managers are the least comfortable with.

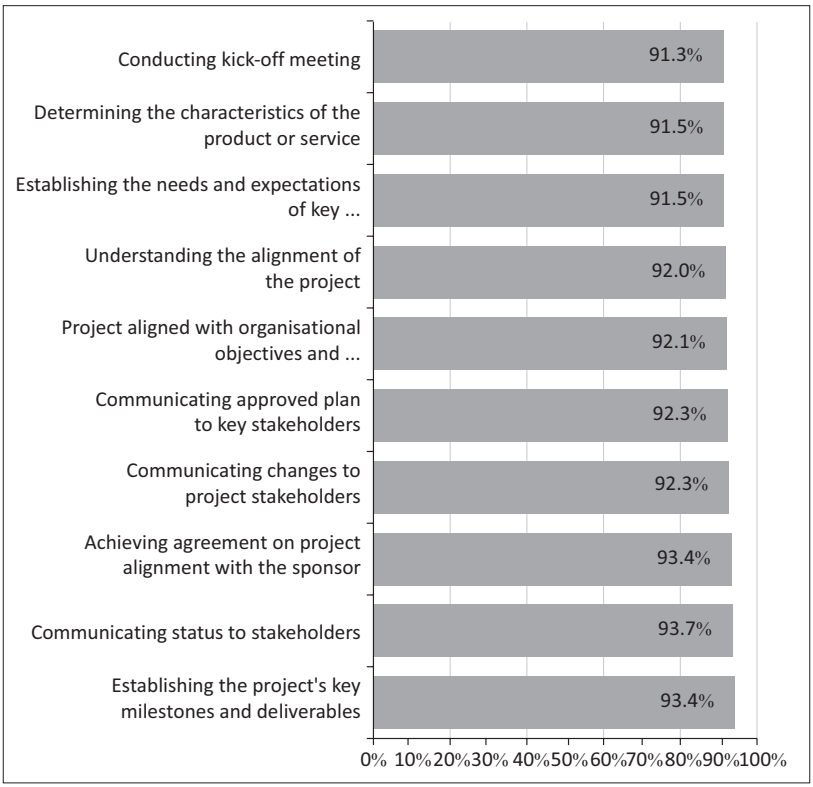

FIGURE 63: Competencies project managers are most confident in.

These competencies mostly align to issues in risk, cost and quality management. In all of these aspects, the average respondent felt less than competent. This is greatly disconcerting as these are part of technical project success criteria. If project managers are not confident in their abilities in performing tasks that are at the very core of project management, then the organisation cannot be confident of project success.

It is pertinent to note that all three auditing activities are included in this list. The governance of project management seems to be an issue that needs to be dealt with quite seriously if projects are to be guided to achieve a desired goal.

Research indicates that project success rates of South African IT projects are stagnant below 40% in Figure 65.

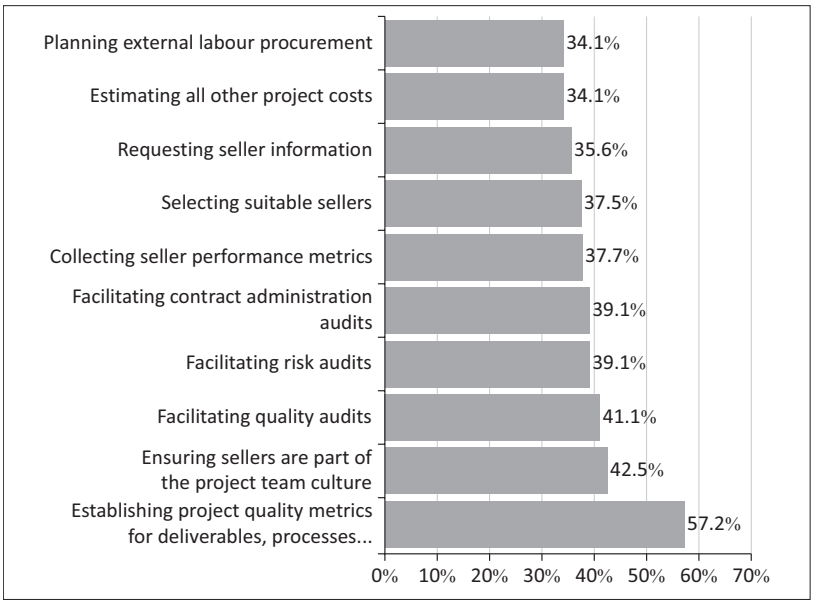

FIGURE 64: Ten competencies project managers are least confident with.

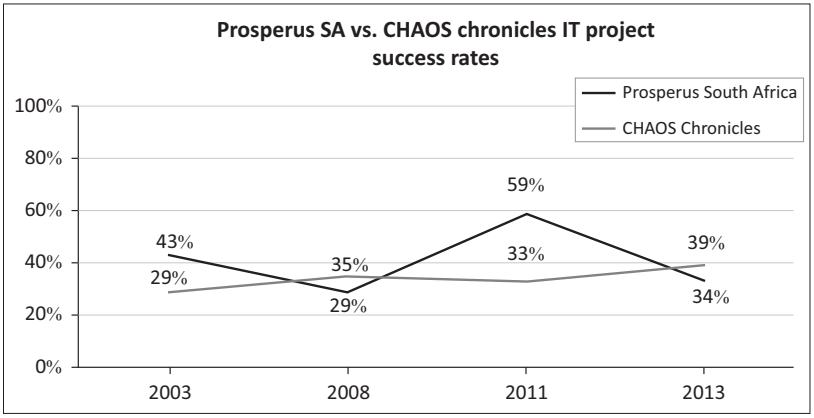

FIGURE 65: IT Project success rates 2003–2013 (Erasmus *et al.* 2014; Marnewick 2013a).

These poor results indicate that not all is well in the South African IT project management; although, clearly, this is more or less in line with the experience of the rest of the world with regard to IT project management. Project managers on average perceive

themselves as more than 'competent'. Project results for the last decade indicate that less than a third are successful. These results cannot be reconciled.

The following possibilities are proposed:

- Project success is measured with the incorrect metrics.
- Project managers are competent in the wrong activities.
- Project managers are, in fact, not competent when they perceive they are competent.
- (or) Project unit of competencies has no bearing on project success and some other variable is responsible for determining project outcomes.

The following areas of improvement are suggested should project managers on average wish to increase their actual competence in project management:

- **Communication in general**: Communication involves more than disseminating information, but also requires customer feedback.
- **Risk management**: Increasing risk management expertise ensures that variances are minimised, and the originally communicated project plan can be implemented with minimal disruptions.
- **Cost management**: Although project managers are not necessarily trained accountants, more care must be taken in estimating and then managing costs.
- **Rigour in initiation and planning**: The more accurate the initial point of departure for the project, the less variance and self-induced complexity and risk may arise. This knock-on effect is clearly seen in how competent project managers perceive themselves throughout the project.

Chapter 5

Information technology project managers' personal competence

The personal competence domain consists of the following six competencies which are analysed in detail: communicating, leading, managing, cognitive ability, effectiveness and professionalism. The first personal competence focuses on the communication competence of the IT project manager. Communication is one of the 10 knowledge areas of the PMBoK® Guide and is seen as an important skill for IT project managers to master.

Communicating

A quick glance at Figure 66 indicates that IT project managers are evaluating themselves as competent in the domain of communication. What is interesting is that none of the IT project managers rated themselves as not competent.

According to research carried out by the PMI, '... communications is a core competency that, when properly executed, connects every member of a project team to a common set of strategies, goals and actions' (Project Management Institute 2013a:2). The research also found that there is a positive relationship between effective communication and

How to cite: Marnewick, C., Erasmus, W. & Joseph, N., 2016, 'Information technology project managers' personal competence', in Information technology project managers' competencies: An analysis of performance and personal competencies, pp. 106-149, AOSIS, Cape Town. http://www.dx.doi.org/10.4102/aosis.2016.itpmc07.05

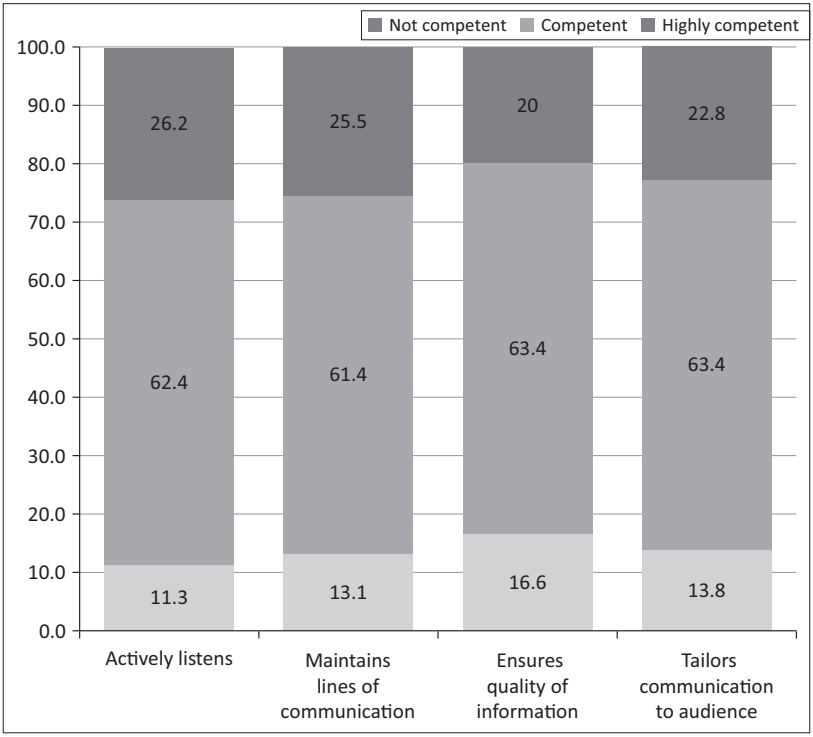

FIGURE 66: Unit of sub-competence: Communicating.

successful projects. Together with this, 55% of project managers are in agreement that effective communication with all the relevant stakeholders is the most critical success factor. A problem that does arise from communication is that project managers, in general, have difficulty communicating with the appropriate levels of clarity and detail. This is caused by the divide between each stakeholder and its understanding (or lack thereof) of project-specific, technical language. Successful project managers are substantially better at delivering project-related information in a timely manner, providing sufficient clarity and detail whilst using non-technical language. This is achieved through a choice of appropriate settings or media for the delivery of the information (Project Management Institute 2013a).

The first sub-competence within the communicating competence focuses on the relationship that the IT project manager has with the various stakeholders of the project. The focus is on the way and manner that the IT project manager actively listens, understands and responds to the needs of the various stakeholders.

Stakeholder management is an important aspect of communications skills, and a new knowledge area was created for stakeholder management in the 2013 edition of the PMBOK® Guide. Stakeholder management focuses on the continuous identification, analysis and planning of actions to communicate and negotiate with, and influence stakeholders (Association for Project Management 2006). Stakeholders are involved in setting the success criteria for a project and it is therefore imperative that the IT project manager is competent in communicating with all the relevant stakeholders.

The first sub-competence within the communication competence focuses on whether the IT project manager actively listens to the various stakeholders and understands and responds to the various stakeholders. Active listening is a communication technique which requires IT project managers to provide feedback about what they hear from the stakeholder, by way of restating or paraphrasing what they have heard in their own words to confirm what they have heard and moreover, to confirm the understanding of both the stakeholder and, the IT project manager. Table 15 illustrates the IT project managers' competence with regard to actively listening to their various stakeholders, understanding explicit and implicit content of communication and responding to and acting upon the expectations, concerns and issues raised by the stakeholders. Forty-five per cent are of the opinion that they are highly competent in actively listening to the stakeholders, whilst another 50.7% are feeling confident that they are competent in active listening to the stakeholders.

The second component focuses on whether IT project managers understand the explicit as well as the implicit content of the communications that take place during the lifespan of a project. Implicit communications are facial expressions, body language, gestures, postures or vocal qualities. These are used to get a message across. Implicit communication is very powerful but it is also hard to interpret as the IT project managers can be confused about the message they received from the stakeholders. Explicit communication rules are about what either the IT project managers or stakeholders say or write and is direct, clear and straightforward. This gives little room for confusion or interpretation. A small portion (9.3%) is not comfortable with this competence. The majority of the IT project managers (90.7%) are of the opinion that they are either competent or highly competent in understanding the explicit and implicit content

TABLE 15: Components of actively listens.

Level of Competence	Listens actively	Understands explicit and implicit content of communication	Responds to and acts upon expectations, concerns and issues
Not competent	4.8	9.3	6.6
Competent	50.7	51.7	55.9
Highly competent	44.5	39.0	37.6

of communication. This contradicts PMI's research (Project Management Institute 2013a:5) that 'IT project managers ... have difficulty communicating with the appropriate levels of clarity and detail'.

The third component focuses on whether IT project managers respond to and act upon the stakeholders' expectations, concerns and issues. Once again, the IT project managers are feeling either competent (55.9%) or highly competent (37.6%) in dealing with the stakeholders' expectations, concerns and issues.

The second sub-competence focuses on the lines of communication within a project. This competence consists of three components, namely, the proactive engagement of stakeholders, the effective dissemination of information and maintaining both formal and informal communication. Table 16 provides the competency level of IT project managers with regard to maintaining the lines of communication.

Alladi and Vadari (2011) are of the opinion that stakeholders should be engaged with from as early as possible within the project's lifespan. Stakeholders should be involved as early as the initial phase of the project itself in order for stakeholder's expectations to be included in the requirements of the final product and/or service. The information that is presented in Table 16 indicates that IT project managers perceive themselves as competent and/or highly competent (92.7%) when it comes to proactively engaging stakeholders.

The second component focuses on how effective is information disseminated to the various stakeholders. Information dissemination can be carried out in three ways (Table 16).

- **Dissemination for awareness**: The focus is on making stakeholders aware of the work of the project.
- **Dissemination for understanding:** The project manager is aware that there are stakeholders that will benefit either directly or indirectly from the project. It is therefore important that these stakeholders have a deeper understanding of the project.
- **Dissemination for action:** The focus is on targeting stakeholders that are in a position to influence and bring about change within the project.

TABLE 16: Components of maintains lines of communication.

Level of Competence	Engages stakeholders proactively	Disseminates information effectively	Maintains formal and informal communication
Not competent	7.2	10.7	6.9
Competent	52.4	54.1	49.7
Highly competent	40.3	35.2	43.4

Schwalbe (2010a) refers to the AA-BB-CC model when it comes to the dissemination of information:

- **A**udience: perform stakeholder analysis.
- **A**ction: what do you expect from stakeholders.
- **B**arriers: what would limit communication.
- **B**enefits: what are the benefits to the audience (stakeholders) of performing the actions.
- **C**ommunication channels: which channels are suited to which stakeholders.
- **C**ontrols: check if messages have been received and understood.

The IT project managers are in the majority of instances (89.3%) confident that they can disseminate information effectively to the various stakeholders. It must be noted that the questionnaire did not measure how the information is disseminated by the IT project managers.

As seen earlier, maintaining communication is an important aspect of any project. Communication happens through both informal and formal communication. Informal communication takes place outside the formal communication structures of the project. Informal communication can help in building trust and to establish good working relationships amongst team members but, more importantly, between the project manager and the stakeholders (Project Management Institute 2013b). Formal communication, on the other hand, involves the utilisation of the formal communication channels within a project. Information is collected and flows up to the stakeholders for review and decision making, whilst orders flow down from the stakeholders to the project manager and project team for implementation. The IT project managers are extremely positive about their competence levels in this regard. Ninety-three per cent of them believe that they maintain formal and informal communication with the various stakeholders. This implies that trust and good working relationships are in order.

The third sub-competence focuses on the quality of information that is disseminated to the stakeholders. The focus is on using the appropriate information sources, which should provide accurate and factual information. The project manager should also validate the information to ensure that accurate and factual information is disseminated.

It is clear from the results in Table 17 that IT project managers perceive themselves as proficient on ensuring the quality of information. Using the appropriate information sources (91.4%), providing accurate and factual information (91.1%) and seeking the validation of information (90.3%) indicate that the IT project managers are competent in this regard.

Providing quality information to stakeholders is meaningless if the communication is not tailored according to the needs of the specific stakeholder. Each stakeholder has specific needs when it comes to receiving information. The component focuses on

TABLE 17: Components of ensures quality of information.

Level of Competence	Uses appropriate information sources	Provides accurate and factual information	Seeks validation of information
Not competent	8.6	9.0	9.7
Competent	59.3	56.6	52.4
Highly competent	32.1	34.5	37.9

TABLE 18: Components of tailors communication to audience.

Level of Competence	Provides relevant information	Uses suitable communication method for the audience	Aligns communication with environment or setting
Not competent	6.6	9.0	10.0
Competent	53.4	57.9	54.5
Highly competent	40.0	33.1	35.5

whether IT project managers provide relevant information to the stakeholders. It is very easy in today's technological era to send vast amounts of information at the click of a button. Experienced and proficient IT project managers do understand that only information relevant to a specific stakeholder should be sent to that stakeholder. Information overload refers to the difficulty a stakeholder can have in understanding an issue and making decisions that can be caused by the presence of too much information (Edmunds & Morris 2000). Looking at Table 18, it is evident that IT project managers are either competent (53.4%) or highly competent (40%) at providing only the information that is needed by a stakeholder. Because this information is targeted, stakeholders cannot complain about information overload, which implies that stakeholders should be able to make sound decisions.

Various communication methods can be used during the project's lifespan and can be classified as interactive, push or pull communication (Project Management Institute 2013b). The choice of a suitable communication method needs to be discussed and agreed upon with each of the stakeholders. The choice of a method might depend on the stakeholder's familiarity with a tool, time constraints and requirements. A small percentage (9%) of the IT project managers are not comfortable with this competency but the rest of the IT project managers (91%) are comfortable with this competency.

Only one respondent felt that he is not competent with aligning communication with the environment. But once again, the IT project managers are competent (54.5%) or highly competent (35.5%) that they can align communication with the environment.

This concludes communication as a competence for IT project managers. From the results it is evident that IT project managers are competent in the effective exchange of accurate, appropriate and relevant communication with stakeholders using suitable methods.

Leading

This sub-competence focuses on '... guiding, inspiring and motivating team members and other project stakeholders to manage and overcome issues to effectively achieve project outcomes' (Project Management Institute 2007).

Figure 67 provides a quick overview of the IT project managers' competence levels with regard to leading the team members. It is obvious that they perceive themselves as competent in leading the team to effectively achieve the outcomes of a project.

The first sub-competence focuses on the creation of a team environment that promotes high performance. A collaborative team environment is essential for the success of any project team. Influences that originate in the project environment have an

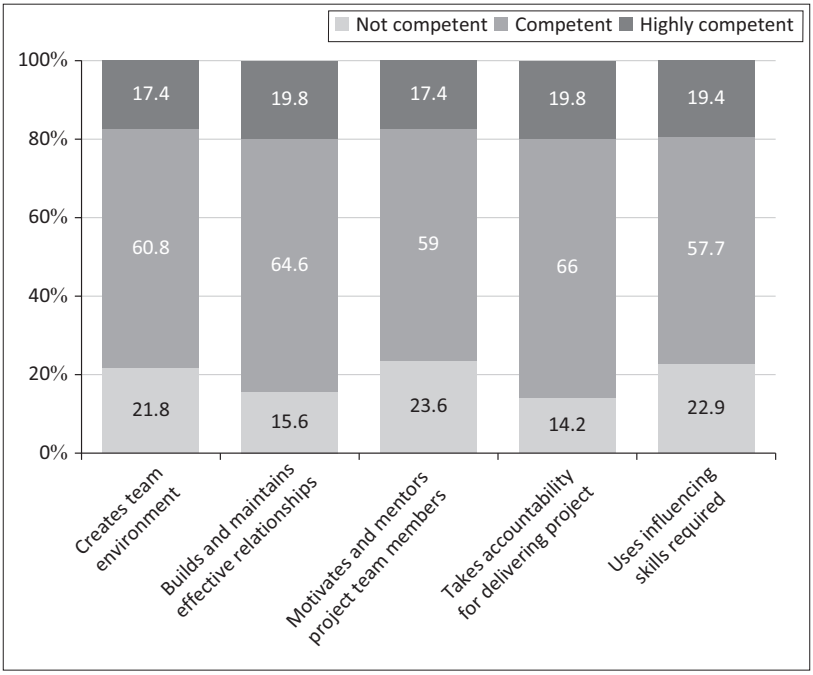

FIGURE 67: Unit of competence: Leading.

impact on the team with strong behavioural implications (Thamhain 2004). Organisational conditions that satisfy the personal and professional needs of team members seem to have the strongest effect on commitment, the ability to deal with risk and contingencies and overall team performance.

The components of this sub-competence are illustrated in Table 19.

It is evident that the IT project managers perceive themselves as competent in this regard as well. In order to create an environment of positive expectations, the IT project manager needs to recognise the abilities of the team members and, in accordance with the team member's abilities, support the decisions that the team members make. Given the results in Table 19, the IT project managers are positive about their competence (55.6% competent and 36.8% highly competent).

The IT project manager must also promote learning within the team and advocate the development of the team members on a personal and professional level. Team members must be granted the opportunity to improve their own awareness and identity, develop talent and new skills, enhance quality of life and contribute to the realisation of dreams and aspirations. The project manager must ensure that the schedule makes room for personal and professional development. The project budget must also incorporate aspects like training that will assist team members to develop their careers. The IT project managers within the sample express their competence and believe that they are promoting personal and professional development, with 88.2% believing that they are either competent or highly competent in doing so.

A project is completed by individual team members but these team members form part of the greater project team. Team members are not isolated islands and need to work together. IT project managers are confident in their competence to encourage teamwork as only 11.5% of them confide that they are not competent.

Eighty-six per cent of the IT project managers are of the opinion that they are either competent or highly competent in demanding high performance from the team members and also that they are themselves high performers. There is substantial literature available

TABLE 19: Components of creates team environment that promotes high performance.

Level of Competence	Expressing positive expectations of team	Promote team learning & advocates professional & personal development	Encouraging teamwork consistently	Demand & models high performance
Not competent	7.6	11.8	11.5	13.9
Competent	55.6	55.6	51.7	52.4
Highly competent	36.8	32.6	36.8	33.7

on high performers and what the various characteristics are, but in general, high performers focus on quality as a priority in the workplace.

The second sub-competence within the leading unit of competence focuses on the building and maintenance of effective relationships. The results of the analysis are depicted in Table 20.

The success of a project is dependent on the team and how well the team functions. Project managers must ensure that they are always professional and that personal issues do not interfere with the project. One of the first aspects that the project manager must focus on is to ensure that relationships with all the stakeholders are confined to the project itself. Personal relationships will clutter the project manager's ability to take rational decisions. With regard to this competency, the IT project managers are competent (59%) and highly competent (29.2%) that they are confining relationships to project-related matters.

The building of trust and confidence with stakeholders is another competence that project managers must excel at. This can be achieved through acting with integrity in all situations, keeping commitments, providing consistent messages in all situations, supporting team members when confronted with unjustified criticism, maintaining composure, and demonstrating fair treatment of partners and sellers, to name but a few (Project Management Institute 2007). According to Smyth, Gustafsson and Ganskau (2010), trust is socially constructed and is developed iteratively in largely intuitive ways that are frequently unconscious and intangible. Therefore, IT project managers should facilitate the development of trust and create an awareness of the importance of trust and the value of trust itself. A large number of the IT project managers feel that they foster trust and confidence with stakeholders as presented in Table 20.

The third component within building and maintaining effective relationships is to encourage openness, respect and consideration of the stakeholders. This type of environment is created through an open-door policy; the project manager is approachable at all times for project-related matters, is sensitive and genuinely interested in the feelings

TABLE 20: Components of builds and maintains effective relationships.

Level of Competence	Confining relationships to work-related matters appropriate to the project and local culture	Building trust & confidence with stakeholders	Creating an environment that encourages openness, respect & consideration of stakeholders
Not competent	11.8	8.7	8.7
Competent	59.0	49.7	54.5
Highly competent	29.2	41.7	36.8

and values of team members and stakeholders, and documents evidence of fair and fact-based decisions. According to the results, the IT project managers are competent (54.5%) or highly competent (36.8%) in creating an open environment.

Table 21 presents the components to motivate and mentor team members within IT projects. These three components focus on making sure that the team members understand the importance of the project within the organisation, by rewarding performance and to mentor team members.

Each and every project is undertaken to deliver value to the organisation. Through the alignment of projects to the organisational vision and strategies, value is created as projects contribute to the realisation of the vision and strategies. Team members want to know what the reason is for doing a project. IT project managers are either competent or highly competent (88.9%) in communicating to the team members the purpose of the project and how it relates to the realisation of the organisational strategies. Team members feel thus worthy of belonging to a team that contributes to the overall success of the organisation and this fuels their motivation. This is in line with research that Marnewick (2011) carried out on what motivates teams. The results indicate that team members are motivated by the achievement of goals.

Marnewick (2011) also establishes that recognition of a team member's work by the project manager leads to satisfaction and ultimately motivates the team member to perform better. Recognition is one of the motivational factors as per Herzberg (1987). Almost 20% of the IT project managers are not feeling competent in rewarding performance of their respective team members, implying that team members might feel unwanted and demotivated. This in turn might have a negative impact on the delivery of the project itself.

Zackariasson (2014) made the following statement:

> [*I*]t is incredibly important to learn from someone who is more experienced than yourself. A person that both can show you the ropes, but also instigate knowhow and self confidence in order to fully contribute to [*project management*]. (p. 734)

TABLE 21: Components of motivate and mentors project team members.

Level of Competence	Establishes and communicates to the team the project vision, mission statement and strategic value	Rewards performance according to organisation guidelines	Establishes mentoring relationships for team members' development
Not competent	11.1	19.8	18.8
Competent	51.4	52.1	55.6
Highly competent	37.5	28.1	25.7

The response from the IT project managers is very clear. They are competent (55.6%) or highly competent (25.7%) that they are establishing various mentoring relationships to develop the team members. Lindén, Ohlin and Brodin (2011) are of the opinion that mentorship should be approached as a reciprocal learning relationship, embedded in the rapidly changing project environment and within the context of the organisation at large.

In can be concluded that IT project managers are competent in motivating and mentoring the project team members.

Project managers must be well aware of their responsibilities and the accountability towards the project, whether the project is ultimately classified as either a success or a failure. It should also be remembered that the project managers alone cannot be held accountable for the outcome of the project, although they have a fair share of responsibility. This is because the project manager is very dependent on the project team. But at the same time, it is highly important that the project manager is accountable to the teams' efforts and the project stakeholders.

With regard to the component by which a project manager must demonstrate ownership of, commitment to and accountability for the project, few (4.2%) of the respondents thought that they are not competent in doing so. A majority of respondents are either competent (50.3%) or highly competent (45.5%). This implies that the IT project managers are fully aware of the fact that they are accountable for the delivery of the project.

According to Turner, Lingard and Francis (2009), work-life balance can be defined as the extent to which a project manager is 'equally engaged in – and equally satisfied with' their work and personal roles. They also acknowledge that a positive engagement in these two roles contributes to good mental and physical health. An aspect that might have a negative impact on the work-life balance is long working hours, which is defined as 45 hours or more per week (Turner *et al.* 2009). According to the OECD[2] evidence suggests that long work hours may impair personal health, jeopardise safety and increase stress. The majority of the IT project managers believe that they do strike a healthy balance between their work and their private life. In totality, 86.8% of them believe that they are either competent or highly competent in achieving work-life balance. This positive balance should also have a positive impact on the project itself as the project manager would not expect his team members to compromise their work-life balance, and as a result positive energy is created which results in a successful project.

The last component focuses on to what degree does the project manager support and promote the actions and decisions of the team members and the team at large. Actions speak louder than words and, according to the Project Management Institute (2007),

2. http://www.oecdbetterlifeindex.org/topics/work-life-balance/

some of the actions should include keeping abreast of project team activities and maintains accountability for delivery of work and taking a stand in front of higher authorities to support the team's project actions as if they were their own.

Looking at the results portrayed in Table 22, IT project managers are extremely competent in supporting the team with 55.9% of the respondents feeling competent and 37.5% of the respondents feeling highly competent.

The last sub-competence within the leading unit of competence focuses on how and when project managers are using their influencing skills to manipulate the outcome of the project. Two components contribute to this sub-competence, namely, applying an appropriate influencing technique to each of the stakeholders and making use of experts or third parties to persuade others.

To be competent in applying an appropriate influencing technique, IT project managers must exhibit some of the following skills: the skill to apply different styles on different occasions, the skill of strong facilitation and negotiation skills and the ability to educate.

The results in Table 23 highlight that IT project managers are, in 13.5% of the instances, not too comfortable with this component. Saying that, 55.6% are competent and 30.9% are highly competent in applying the appropriate influencing technique.

A fifth of the respondents (20.8%) are not competent in using experts to persuade others. It means that these IT project managers are not competent in using the positional

TABLE 22: Component of takes accountability of delivering the project.

Level of Competence	Demonstrates ownership of, accountability for, and commitment to the project	Aligns personal activities and priorities toward increasing likelihood of achieving project goals	Supports and promotes team's actions and decisions
Not competent	4.2	13.2	6.6
Competent	50.3	57.6	55.9
Highly competent	45.5	29.2	37.5

TABLE 23: Components of uses influencing skills when required.

Level of Competence	Applies appropriate influencing technique to each stakeholder	Uses experts or third parties to persuade others
Not competent	13.5	20.8
Competent	55.6	52.8
Highly competent	30.9	26.4

power of a stakeholder or using a stakeholder's knowledge power to influence team members and subsequently the outcome of a task and/or activity. The remaining 79.2% are, however, either competent or highly competent in using experts to persuade the team members.

The perception is created by IT project managers that they are either competent or highly competent in guiding, inspiring and motivating team members and other project stakeholders to manage and overcome issues to effectively achieve project objectives. This confidence in their own competence is portrayed in the fact that in total 88% of the respondents feel either competent or highly competent in leading the project.

IT project managers cannot just lead a project but should also be competent in managing a project. This competence is discussed in the next section.

Managing

Managing a project focuses on how effectively an IT project manager can administer the project through the appropriate deployment and use of human, financial, material, intellectual and intangible resources (Project Management Institute 2007). The managing unit of competence consists of three sub-competences, namely, building and maintaining the project team, planning and managing project success and resolving conflict within the project team.

Figure 68 provides a high-level overview of the competence levels of IT project managers. It is clear from this figure that IT project managers are competent in managing a project as well as the project team.

With regard to building and maintaining the project team, IT project managers are competent (58.7%) or highly competent (26.3%). This implies that they can understand and apply a team formation model, such as Tuchman's team development model, that consists of forming, storming, norming and performing (Schwalbe 2010a). IT project managers are also competent (63.4%) or highly competent (20.9%) in planning and managing project success. Joseph *et al.* (2014) mentioned that the success rate of IT projects has been stagnating, whereby only 34% of all IT projects were deemed successful, whilst 32% of all IT projects were doomed to failure. These results create an anomaly where IT project managers believe they are competent in planning and managing project success, but empirical evidence shows otherwise. The third competence focuses on how effective IT project managers are in resolving conflict. Conflict can be positive as new ideas or solutions can be inspired but, most of the time, conflict creates negativity which is detrimental to the success of the project (Meredith & Mantel 2012).

Each of the three sub-competencies are analysed in detail in the following sections, and the focus is, firstly, on how competent IT project managers are in building and

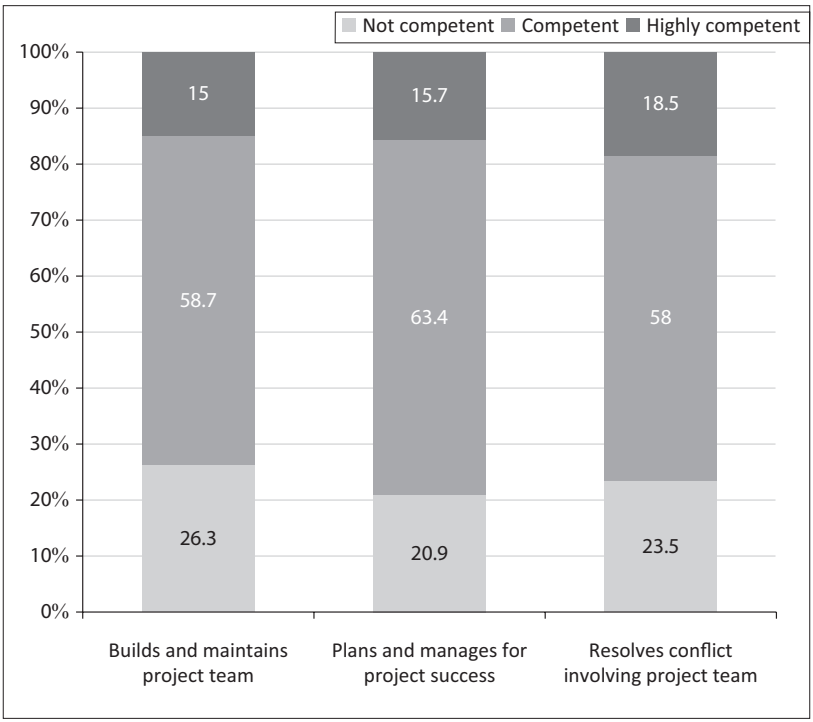

FIGURE 68: Unit of competence: Managing.

maintaining project teams. Figure 69 indicates that IT project managers on average are competent in building and maintaining project teams. Each of the components scored an average of around four implying that the IT project managers perceive themselves as competent.

The first component focuses on the IT project manager's ability to ensure that all team members understand their responsibilities within the project, but also that they understand their importance within the team and also to the project and organisation at large. It is important that team members do not step on each other's toes or territories as this will definitely cause negative conflict. The respondents were competent (58.7%) and highly competent (33.6%) in this component. This implies that the IT project managers themselves understand what is expected from each team member and this should be captured in the WBS as well as the Resource Assignment Matrix (RAM).

Maintaining a positive attitude and effective relationships amongst team members is a competency that IT project managers believe they are competent in. Eighty-nine per

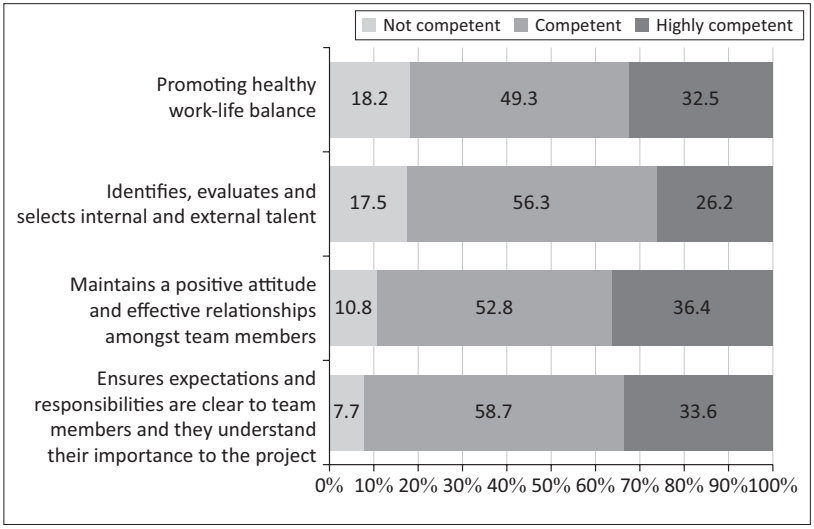

FIGURE 69: Components of building and maintain a project team.

cent of IT project managers believe they are either competent or highly competent. Maintaining a positive attitude can be achieved through genuinely valuing the input and expertise of the team, a willingness to learn from each other and celebrating team work and the achievement of the team.

According to the Government Gazette (2014), IT-related skills are amongst the top 100 required skills in South Africa with ICT systems analysts (#27), software developers (#45), ICT project managers (#66), computer network technician (#79), network analyst (#80) and CIO (#90). This poses a challenge to IT project managers to identify, evaluate and select the necessary talent for an IT project. Given these realities, it is questionable how IT project managers can perceive themselves as competent.

The final component focuses on how competent IT project managers are in promoting a healthy work-life balance not only for themselves but for the team members as well. As discussed earlier, a healthy work-life balance is important for a team to prosper. IT project managers are confident that they are promoting a healthy work-life balance with 49.3% stating they are competent and 32.5% stating that they are highly competent. When the results between the IT project managers' competence with regard to their own work-life balance and their competence with regard to the team members' work-life balance are compared, then no correlation can be found as per Table 24. This implies that, whilst some IT project managers might look after their own personal work-life balance, they actually ignore the work-life balance of the team members. The reverse is also true.

TABLE 24: Correlation between IT project managers' and team members' work-life balance.

IT project managers' competence – own work-life balance	IT project managers' competence – team work-life balance
Pearson correlation	0.181
Sig. (2-tailed)	0.162

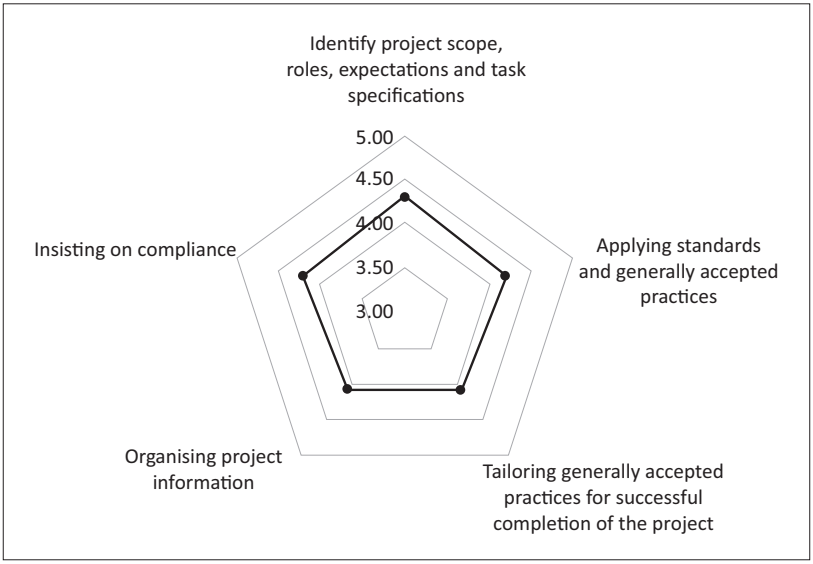

FIGURE 70: Components of plans and manages for project success.

The second sub-competence determines the competence of IT project managers with regard to planning and managing project success. This sub-competence includes five components, and the focus is on whether IT project managers apply best practices and standards to ensure project success. The mean for each of these five components is four, which implies that IT project managers are competent in planning and managing a project to successful delivery. The results are portrayed in Figure 70.

The first component measures whether IT project managers work with other stakeholders to clearly identify the project scope, roles, expectations and task specifications. The IT project managers indicated that they were competent (52.8%) or highly competent (41.3%) in this competency. A mere 5.9% state that they are somewhat competent. The involvement of all the stakeholders to determine the scope, roles, expectations and task specifications ensures buy-in into the project as well as the deliverability of the project.

Everyone involved in the project understands what will be delivered, how it will be delivered and who should deliver what in the project.

The second component focuses on standards and whether IT project managers apply these standards. Standards might be international standards or organisational standards. Various regulatory standards also have an impact on the success of a project. The following standards and legislation need to be considered during the implementation of an IT project:

- **FICA**: The Financial Intelligence Centre Act (38 of 2001) was introduced to fight financial crime. This act brings South Africa in line with similar legislation in other countries designed to reveal the movement of monies derived from unlawful activities and thereby curbing money laundering and other criminal activities.
- **RICA**: The Regulation of Interception of Communications and Provision of Communication-Related Information Act (70 of 2002) prohibits the interception and monitoring of direct and indirect communications.
- **ECT**: The Electronic Communications and Transactions Act of 2002 forms the basis for the facilitation and regulation of electronic communications and transactions.
- **Cyber security**: The protection of information systems from theft or damage to hardware, software and the information on these entities as well as the protection from the disruption of the services these entities provide.
- **POPI**: The Protection of Personal Information Act (4 of 2013) promotes the protection of personal information by public and private bodies.
- **ISO/IEC 27002**: This standard provides recommendations on how information security should be managed during the initiation, implementation and maintenance of information systems.
- **International financial reporting standards**: The aim of IFRS is to develop a single set of high quality, understandable, enforceable and globally accepted financial reporting standards based upon clearly articulated principles.

Apart from standards that need to be adhered to, IT project managers must also ensure that they are adhering to industry and discipline specific best practices. Best practices that come to mind include the following:

- **BABOK® Guide**: The Guide to the Business Analysis Body of Knowledge® presents the most widely accepted business analysis practices.
- **SWEBOK**: The Guide to the Software Engineering Body of Knowledge (SWEBOK Guide) describes generally accepted knowledge about software engineering.
- **COBIT**: Control Objectives for Information and Related Technology (COBIT) focuses on the daily management and governance of IT.
- **ITIL**: Information Technology Infrastructure Library is a set of practices for ITSM where the focus is on the alignment of IT services with organisational needs.

It is debatable whether IT project managers really apply all these standards, legislation and best practices but the results indicate that they are either competent (54.5%) or highly competent (35.0%) in this regard. Projects have a better chance of success if these standards, legislation and best practices are incorporated, as the final project deliverables will adhere to these.

The third component links into the previous component. Best practices cannot be blindly applied in some instances and need to be tailored to the needs of the organisation and even the project itself. An example is, for instance, where international standards developed by ISO are adapted specifically for the South African market by the South African Bureau of Standards (SABS). On average, IT project managers perceive themselves as competent in this regard with 59.1% indicating that they are competent and 28.7% indicating that they are highly competent.

The fourth component focuses on whether standards and/or methodologies are used in projects, meetings are minuted, status reports and updates are provided and whether a repository for project artefacts exists. Erasmus and Marnewick (2014b) audited 717 IT projects and found that a quarter of the IT project managers actually do not provide status reports, never mind updating them. These results are in stark contrast to the perception of the IT project managers that they are competent in this regard. Even more concerning is that 25% of IT project managers do not follow a formal project management methodology or best practices (Marnewick & Erasmus 2014). Eighty-six per cent of the respondents indicated that they are either competent or highly competent in this regard, posing the question whether IT project managers are not maybe inflating their own capabilities and therefore competencies.

The fifth and final component focuses on whether IT project managers insist on compliance with processes, procedures and policies. IT project managers scored the second highest in this component with a mean of 4.2, which indicates that they are perceived as competent. Close to forty-eight per cent (47.6%) believe they are competent, whilst 41.6% believe they are highly competent. When a correlation is done between components two and five, a strong positive correlation is depicted as per Table 25. Whilst IT project managers are adhering to standards and best practices, they also expect team members to comply with industry standards and best practices.

TABLE 25: Correlation between adhering to best practices and enforcing compliance.

Applying organisation or industry standards and generally accepted practices to the project	Insisting on compliance with processes, procedures, and policies
Pearson correlation	0.477**
Sig. (2-tailed)	0.000

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

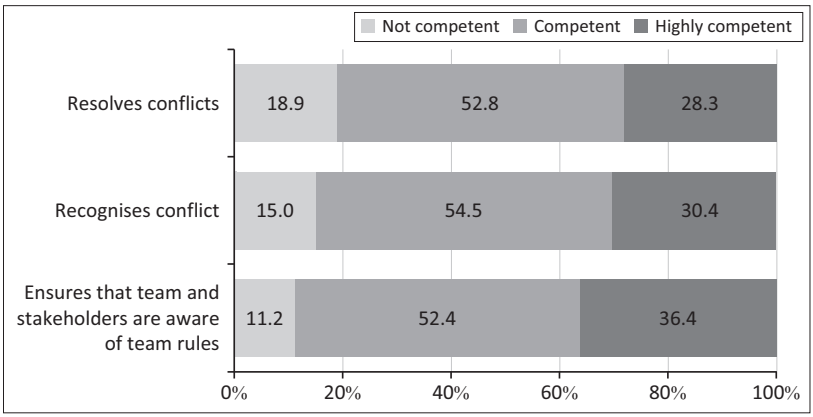

FIGURE 71: Components of resolves conflict involving project team or stakeholders.

Conflict, and how it is addressed within the team, is the focus of the third sub-competence. The results are displayed in Figure 71.

Looking at the results portrayed in Figure 71, the perception is that IT project managers are not that competent in dealing with conflict. First of all, 15% of them are not competent in recognising conflict within the team. This implies that they are not aware of any underlying problems within the project and amongst the various team members. This will definitely have a negative impact on the overall performance of the team members and, ultimately, on the success of the project. An even more worrying concern is that the results portray that close to 19% of IT managers do not resolve conflicts or that conflicts are not resolved to the satisfaction of the parties concerned.

The impact of conflict on project performance cannot be negated. Research has found that team conflict causes decreased individual satisfaction, reduced creativity, risk-taking, and decreased team performance (Chiocchio *et al.* 2011). Randeree and Faramawy (2011:28) stated that although conflict can be negative, it '… can thus become a foundation for positive change, and can lead to the voicing of concerns to increase awareness which is important to avoid stagnation'. It is evident that the IT project managers who took part in this research are missing out on two opportunities. The first opportunity is to alleviate team conflict that causes the team to underperform and, secondly, conflict can result in positive change.

When all the responses are collated into either competent or not competent, it is clear that IT project managers are competent in managing the project and the team. As per the Project Management Institute (2007), it implies that they can '... effectively administer a project through the appropriate deployment and use of human, financial, material, intellectual, and intangible resources'.

Cognitive ability

The Project Management Institute (2007) defines cognitive ability as the application of an appropriate depth of perception, discernment and judgment to effectively direct a project in a changing and evolving environment. Cognitive abilities are brain-based skills IT project managers need to carry out any task from the simplest to the most complex. Cognitive abilities have more to do with the mechanisms of how IT project managers learn, remember, do problem-solving and pay attention rather than with any actual knowledge.

The cognitive ability competence area consists of four sub-competencies as displayed in Figure 72. The first sub-competence focuses on whether IT project managers take a holistic view of the project. The second sub-competence focuses on how effective IT project managers resolve issues that stem from the project. IT project managers must also be able to use the appropriate tools at the appropriate times. That is the third sub-competence within the cognitive ability competence. The fourth and last sub-competence focuses on how competent IT project managers are in seeking opportunities to improve the outcome of a project.

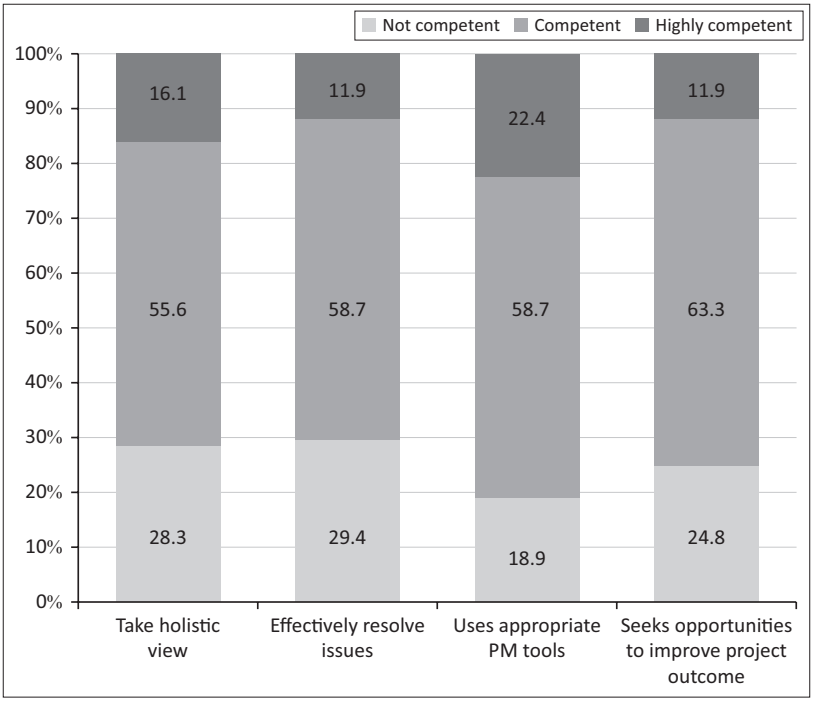

FIGURE 72: Unit of competence: Cognitive ability.

It is evident from the results in Figure 72 that IT project managers believe that they are competent with the majority of the results leaning towards competent or highly competent. The next sections investigate in detail the competence levels of IT project managers.

The results in Figure 72 provide the detailed responses from IT project managers as they pertain to them taking a holistic view of the project. Projects within organisations are not implemented individually and within silos. Projects, and especially IT projects, form an integral part of the organisation, that is, the project informs the organisation and the organisation informs the project. It is, therefore, important for IT project managers to have this holistic view of each of the projects that they manage. They need to see where each project fits into the organisational puzzle.

The first step is to understand the impact that stakeholders have within the project and its ultimate success. The results indicate that IT project managers are either competent (55.6%) or highly competent (37.1%) in understanding the needs of the stakeholders. When correlations take place between the various components that focus on stakeholders, it is evident that there is a strong positive correlation between these components. This illustrates that the IT project managers understand the importance of stakeholders and the importance of the various stakeholder components. This is then also underlined in the competence that the IT project managers portray in the various sub-competencies, as indicated in Table 26.

A second competency that IT project managers should possess is understanding how each of the projects that they manage impact other projects or even the organisational or IT strategies. This competency is of special importance if the project forms part of a programme. The results portray that IT project managers are 87% either competent or highly competent in understanding how their projects impact the organisation at large.

Various organisational structures exist:

- **Functional organisations**: Projects that exist within a single functional division generate no particular organisational issues, but projects that cut across functional

TABLE 26: Correlation between various stakeholder components.

Understanding project stakeholders' needs, interests, and influence	Engaging stakeholders proactively	Building trust and confidence	Creating an environment that encourages openness, respect and consideration of stakeholders	Applying appropriate influencing technique to each stakeholder
Pearson correlation	0.522**	0.424**	0.397**	0.471**
Sig. (2-tailed)	0.000	0.000	0.000	0.000

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

divisions can be challenging. Projects that extend across functional divisions are demanding to manage because the project manager has no direct functional authority and must obtain continuous cooperation and support from functional managers of other divisions in order to meet project objectives.

- **Matrix organisations**: Matrix structures give authority to both project managers and functional managers, and the goal is to provide a more seamless division of labour and ultimately to build a stronger team culture. However, the potential for conflict between functional managers and project managers still exists because there is still resource conflict. Everyone who is on a project team still has two bosses – the functional manager and the project manager.
- **Projectised organisations**: In a projectised organisation authority is centralised. Because projects are removed from functional divisions the lines of communication are shortened. Both these factors enhance the ability to make swift decisions. Project teams develop a strong sense of identity, which in turn creates a high level of commitment from team members. Due to their involvement in consecutive projects of a similar nature, projectised organisations can develop and maintain a long-term body of experience and skills in specific areas (Di Vincenzo & Mascia 2012).

Given these scenarios, IT project managers are confident in their ability to understand how the organisational structure impacts their project. They are also confident in their ability to manage a project within the constraint of the organisational structure.

The results in Table 27 indicate these high confidence levels.

The fourth component focuses on the organisational politics and how this impacts the project team and the ultimate success of the project. Organisational politics can be defined as the pursuit of individual agendas and self-interest in an organisation without

TABLE 27: Components of takes a holistic view of the project.

Level of Competence	Understands project stakeholders' needs, interests and influence for project success	Understands how project actions impact other areas of the project, other projects and organisational environment	Understands both the formal and informal structure of organisations	Understands organisational politics	Uses emotional intelligence to understand and explain others' past actions and current attitudes, and anticipates future behaviour
Not competent	7.3	12.9	14.3	16.4	16.8
Competent	55.6	53.8	51.7	50.7	51.7
Highly competent	37.1	33.2	33.9	32.9	31.5

regard to their effect on the organisation's efforts to achieve its goals.[3] Each and every stakeholder will have their own personal political agenda and this has a direct influence on the outcome of the project. The IT project managers indicated that they were competent (50.7%) or highly competent (32.9%) in understanding the politics within an organisation. It must be noted that although they might be competent in understanding organisational politics, they might not be able to influence these political agendas of the stakeholders.

The last component is focusing on the way and manner that IT project managers use emotional intelligence to understand and explain the various stakeholders' behaviour. Emotional intelligence (EI) is the ability of project managers to recognise their own and stakeholders' emotions and to use emotional information to guide thinking and future behaviour (Clarke & Howell 2010). The research by Clarke and Howell (2010) indicates that there is a positive correlation between a project manager's emotional intelligence and the performance of the team itself. The results illustrated that the IT project managers are sufficiently competent in using their emotional intelligence to guide the thinking and future behaviour of all the relevant stakeholders.

During the life cycle of a project, IT project managers have to deal with various issues and problems. These issues and problems might be originated internally or externally to the project. Irrespective of the origin of these issues and problems, IT project managers need to deal in an efficient and effective way with these issues and problems. Table 28 highlights how competent IT project managers are in dealing with issues and problems on a daily basis. To effectively resolve issues and solve problems, IT project managers must be competent in five components as displayed in Table 28.

TABLE 28: Components of effectively resolves issues and solves problems.

Level of Competence	Simplifies complexities for a complete and accurate analysis	Applies complex concepts or tools when needed	Applies lessons learned to resolve current project issues	Aggregates multiple related issues to understand the complete picture	Observes discrepancies, trends and inter-relationships in project data
Not competent	12.6	20.3	8.0	19.2	18.2
Competent	60.5	54.5	56.6	52.1	55.9
Highly competent	26.9	25.2	35.3	28.7	25.9

3. http://www.businessdictionary.com/definition/organizational-politics.html#ixzz3qhE93fl0

The first component focuses on how competent IT project managers are in simplifying project complexities in order for the team to accurately analyse issues and problems. One technique that can be implemented is to visually represent project issues and interdependencies through lists, diagrams and mind maps (Project Management Institute 2007:32). Close to 13% of the respondents indicate that they are not too competent in simplifying complexities, but 60.5% are competent and 26.9% are highly competent.

The second component focuses on the application of complex concepts to simplify complexities within the project. These complex concepts include, amongst others, root-cause analysis as well as portfolio analysis. Twenty per cent of the IT project managers indicated that they were not competent in using complex concepts. It raises the question what tools or concepts are they then using to simplify the issues or problems faced by the project.

Carrillo, Ruikar and Fuller (2013) highlighted that project managers need to improve lessons learned and practices and to make use of knowledge management systems to assist them. They define lessons learned as (Carrillo *et al.* 2013):

> [*A*] knowledge or understanding gained by experience. The experience may be positive, as in a successful test or mission, or negative, as in a mishap or failure. Successes are also considered sources of lessons learned. A lesson must be significant in that it has a real or assumed impact on operations; valid in that is factually and technically correct; and applicable in that it identifies a specific design, process, or decision that reduces or eliminates the potential for failures and mishaps, or reinforces a positive result. (n.p.)

The IT project managers are competent (56.6%) and highly competent (35.3%) in applying previous project knowledge to new projects. This raises the concern that if this is true, why are IT projects still failing at an alarming rate as per research by Joseph *et al.* (2014) and the Standish Report 2015.[4]

Figure 72 highlights that IT project managers are more than competent in seeing their projects holistically. This sub-competence comes into play where they should be able to aggregate multiple related issues to understand the complete picture. Some issues are related, and it is the duty of the IT project manager to determine first of all whether such dependencies exist and what the impact is on the project at large. Some issues might be obvious but others might not seem related; that is where this sub-competence comes into play. Close to 81% of the IT project managers indicated that they were able to aggregate multiple related issues to understand the complete picture.

4. http://www.infoq.com/articles/standish-chaos-2015

The last component focuses on the IT project managers' competence in analysing project data. They should be able to determine trends and possible discrepancies. This is only possible if a data analysis application is used by these project managers. A fifth (18.2%) of the IT project managers indicated that they were not competent in analysing project data to determine trends and discrepancies. It is almost impossible to determine trends and discrepancies within a project without using a specialised application to assist with the analysis.

In conclusion, the perception is created by the IT project managers that they are competent in resolving issues and solving problems. In all of the components, the IT project managers indicated that they were either competent or highly competent in dealing with the day-to-day issues and problems of a project.

According to Mnkandla and Marnewick (2011), project management involves the application of knowledge and skills, tools and techniques. Projects can, therefore, not be managed without sound knowledge of applicable tools and techniques.

The results in Figure 73 tell the story with regard to IT project managers' competence in using the appropriate tools and techniques. They are in most cases competent in understanding which tool and technique to choose, which tool or technique is the best in a certain situation and also how to apply the selected tool and technique.

Tools and techniques vary from project phase to project phase as well as the process that the project manager is engaged in at a specific point in time. Tools and techniques include scheduling techniques, reporting tools, estimation techniques and collaboration tools (Mnkandla & Marnewick 2011).

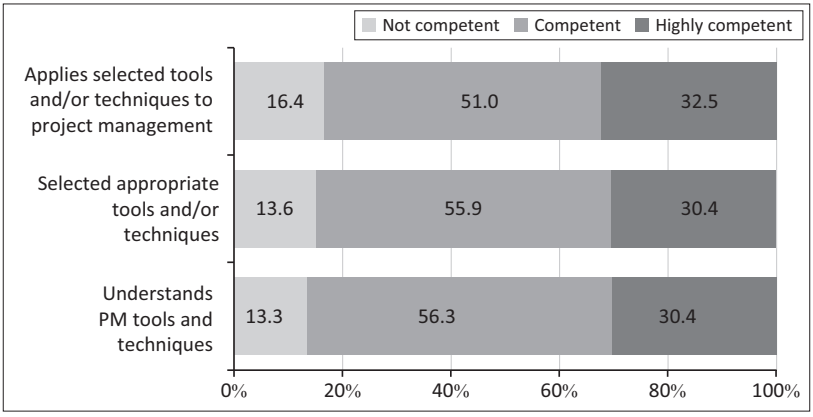

FIGURE 73: Components of sub-competence: Uses appropriate project management tools and techniques.

During the audit of 717 IT projects, Marnewick and Erasmus (2014) determined that IT project managers are not applying best practices relating to scheduling, risk management and human resource management. It was found that, in most instances, only 60% to 70% of the IT project managers apply the necessary tools and techniques as stipulated by project management best practices and standards. This is more or less in line with the results depicted in Figure 73 where 13% to 16% of the respondents are not competent in understanding the various tools and techniques, how to select these tools and techniques and also how to apply them during the life cycle of the project.

Project opportunity is the possibility that the project may go better than planned. It is therefore imperative that IT project managers must exploit project opportunities to increase the success rate of projects they are managing. This competency also speaks directly to the way and manner that IT project managers manage risks and issues within their respective projects.

This competence consists of four components, and the purpose of these four components is to maximise the impact of the opportunities. The results displayed in Table 29 indicate that IT project managers are perceiving themselves in general as competent in seeking opportunities to improve the outcome of the project.

What is interesting is that there are some of these IT project managers who do not feel competent. On average, 14.5% of IT project managers are not feeling competent in seeking opportunities to improve the outcome of the project.

The second last unit of competence within the personal competence grouping is effectiveness. Effectiveness focuses on '... producing the desired results by using appropriate resources, tools and techniques in all project management activities' (Project Management Institute 2007:34).

TABLE 29: Components of seeks opportunities to Improve project outcome.

Level of Competence	Provides a framework to address opportunities and concerns	Looks for opportunities to improve project value or execution	Seizes relevant opportunities as they emerge	Consolidates opportunities and passes them to the organisation
Not competent	17.1	13.3	14.0	13.6
Competent	59.1	57.7	52.8	61.2
Highly competent	23.8	29.0	33.2	25.2

Effectiveness

Effectiveness comprises of four sub-competencies as depicted in Figure 74. It is evident from this figure that all the IT project managers believe that they are competent in the four sub-competencies.

The effectiveness unit of competence comprises of four sub-competencies as discussed in the next sections.

The first sub-competency focuses on how effective IT project managers are in resolving project outcomes. The results in Figure 75 highlight IT project managers' competency levels.

IT project managers are competent (56.6%) or highly competent (30.1%) in employing the appropriate problem-solving techniques. These techniques include, amongst others, the documentation of needs analysis, the documentation of feedback from the various stakeholders of problem-solving techniques, the documentation of the use of proper

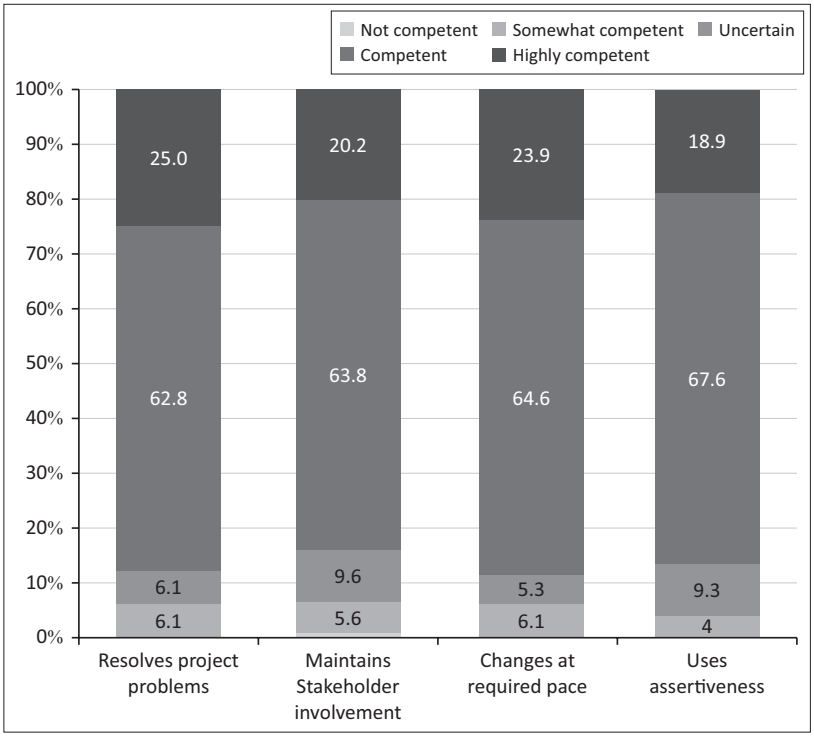

FIGURE 74: Unit of competence – effectiveness.

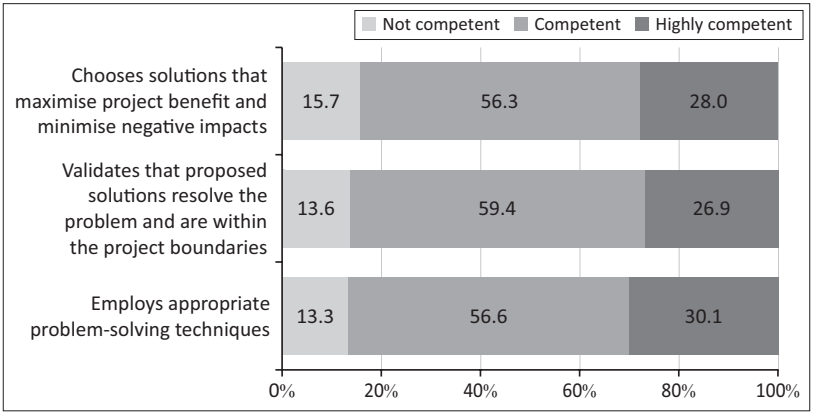

FIGURE 75: Components of sub-competence: Resolves project outcomes.

knowledge management tools, and an issue log with resolution documentation. These results are in line with the results portrayed where the IT project managers indicated that they were competent in dealing with the day-to-day issues and problems of a project.

Apart from employing appropriate problem-solving techniques, these techniques must also resolve the problem. The implication is that IT project managers cannot just willy-nilly apply a technique; the solutions resulting from the applied technique must also be validated. Given the results in Figure 75, the IT project managers are more or less equally competent in validating the proposed solution and in employing the proposed solution. The perception is created that IT project managers analyse the proposed solution to determine whether it was the correct solution and if the appropriate outcome was achieved.

With regard to choosing a solution to maximise the benefits and to minimise the negative impacts, IT project managers are competent (56.3%) or highly competent (28%). Close to a fifth of IT project managers (15.7%) are, however, not confident in their competence.

The second sub-competency focuses on maintaining the involvement, motivation and support of project stakeholders. This sub-competency focuses on four components and relates to the other competencies that involve stakeholder management.

As mentioned earlier, communication is one of the 10 knowledge areas within the PMBOK® Guide as well as stakeholder management (Project Management Institute 2013b). IT project managers must make use of communication tools and techniques to keep the stakeholders motivated. This is irrespective of the status of the project. It is even more important to keep the stakeholders motivated when the project is experiencing

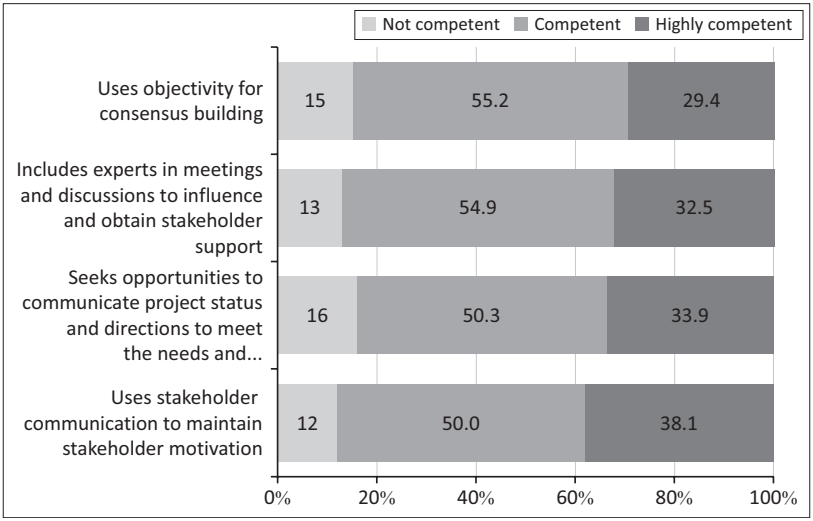

FIGURE 76: Components of sub-competence: Maintains project stakeholder involvement, motivation and support.

problems and is under-performing. The results in Figure 76 indicate that IT project managers are competent (50%) or highly competent (38.1%) in using the communication plan and updating the stakeholder register to maintain stakeholder motivation.

When it comes to seeking informal opportunities to communicate the project status, IT project managers indicate that they are in totality competent (84.2%). Within a business environment, informal communication is observed in conversations, electronic mails, text messages and phone calls between socialising employees. IT project managers need to seek every available opportunity to disseminate the project status, issues and any other relevant information to the stakeholders. This can be carried out in an informal manner. Various advantages of informal communication exist, such as improved relationships, increased efficiency, providing of recommendations and flexibility. It must be noted that disadvantages also exist, which include the spreading of rumours.

IT project managers are not the experts in the project team but the various team members are. It is sometimes necessary to include the expertise of experts in meetings. An expert might, for instance, be in risk management or in Scrum as a software development methodology. These experts are incorporated to influence and obtain stakeholder support. IT project managers are competent (54.9%) or highly competent (32.5%) in involving experts in the day-to-day management of their projects.

TABLE 30: Correlation between stakeholder management in the two competence domains.

Maintains stakeholder involvement	Stakeholders identified	Stakeholder expectations managed	Stakeholder perceptions measured
Pearson correlation	0.498**	0.647**	0.528**
Sig. (2-tailed)	0.000	0.000	0.000

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

Consensus means overwhelming agreement. It is important that consensus be the product of a good-faith effort that meets the interests of all stakeholders. The key indicator of whether or not a consensus has been reached is that everyone agrees they can live with the final proposal. Thus, consensus requires that the IT project manager frames a proposal after listening carefully to everyone's interests. Interests are not the same as positions or demands. Demands and positions are what people say they must have, but interests are the underlying needs or reasons that explain why they take the positions that they do.[5] Fifty-five per cent of the IT project managers stated that they were competent in consensus building and impartial when it comes to consensus building. A further 29.4% of the IT project managers declared themselves as highly competent in this regard.

A correlation between maintaining stakeholder involvement which is within the personal competence domain and the three competencies within the performance domain that deals with stakeholders has been carried out. The results are displayed in Table 30.

The correlations are consistent with the IT project managers' competence levels as per Chapter 4. The correlations indicate that the personal competence of maintaining stakeholder involvement is applied in the performance competencies of identifying stakeholders, managing their expectations and in measuring their perceptions at the project closure.

Change within a project environment is a given fact. Projects instil change by nature, but the environment within which a project is managed also changes during the project life cycle. According to Zhang (2013), changes within a project have been conventionally associated with a negative impact on project completion and change should not happen if planning was carried out properly. The better IT project managers can handle and manage change, the better the changes for success.

The results in Figure 77 demonstrate IT project managers' commitment towards change. In all of the components, IT project managers are either competent or highly

5. http://web.mit.edu/publicdisputes/practice/cbh_ch1.html

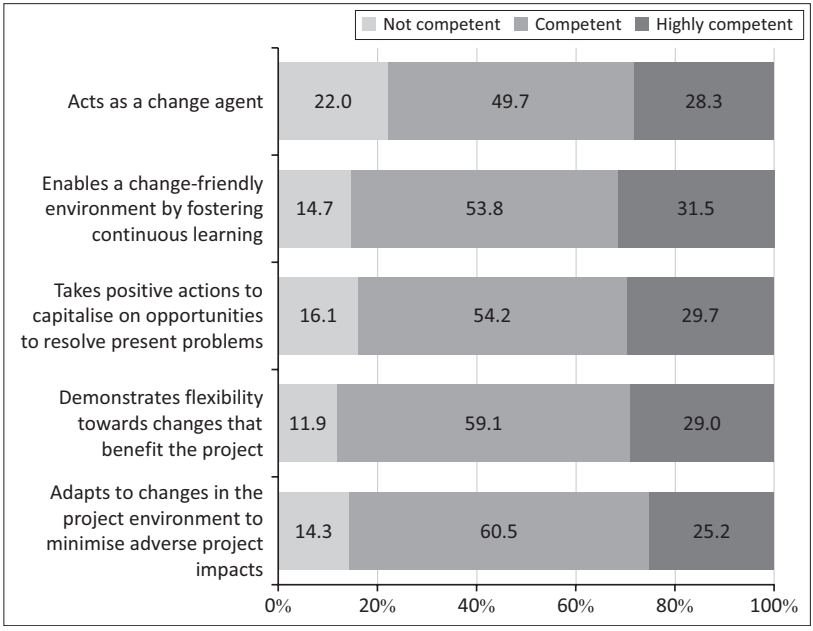

FIGURE 77: Components of sub-competence: Changes at the required pace to meet project needs.

TABLE 31: Correlation between managing project change and changing at the required pace.

Changes at the required pace	Project change is managed
Pearson correlation	0.520**
Sig. (2-tailed)	0.000

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

competent. On average, IT project managers are 55.5% competent or 28.7% highly competent in managing change within the project.

A strong positive correlation exists between the change competencies within the performance and personal domains as per Table 31.

This correlation indicates that change is managed throughout the project's life cycle, and also that the personal competence has a positive impact on how change is managed throughout the project.

When IT project managers are assertive, it implies that they are being self-assured and confident without being aggressive. Assertiveness is a skill that can be learned and is a mode of communication with the team members. This specific sub-competence is

divided into four components, where the first one focuses on the IT project manager's ability to keep an issues log with documented resolutions and issues escalation reports that indicate that a timely decision path was followed. In this regard, IT project managers are competent (59.4%) or highly competent (29.7%). The implication is that IT project managers take the necessary initiative when it is needed and that they keep the project's end result in mind when they make these decisions.

Decision-making is exactly what it says. IT project managers must make a decision and no issue, conflict or risk can be addressed without a conclusive and constructive decision. As per the results in Figure 78, IT project managers feel confident in their ability to prevent inconclusive discussion, making a decision and taking appropriate action based on the decisions.

The problem with decision-making is that some stakeholders will not be satisfied with the decision itself and the possible outcomes of the decision. It is, therefore, crucial for any manager when a decision is made that the decision is followed through and that the decision is not reversed based on emotions and whims of the day. The IT project managers in the survey are competent (54.2%) and highly competent (35.7%) in showing persistence and consistency in the decisions that were made. Although IT project managers are showing this persistence and consistency, they must be careful not to be too rigid. Decisions can be overturned once new evidence comes to the fore, and they should then live with the consequences of their decisions, whether the consequences are positive or negative.

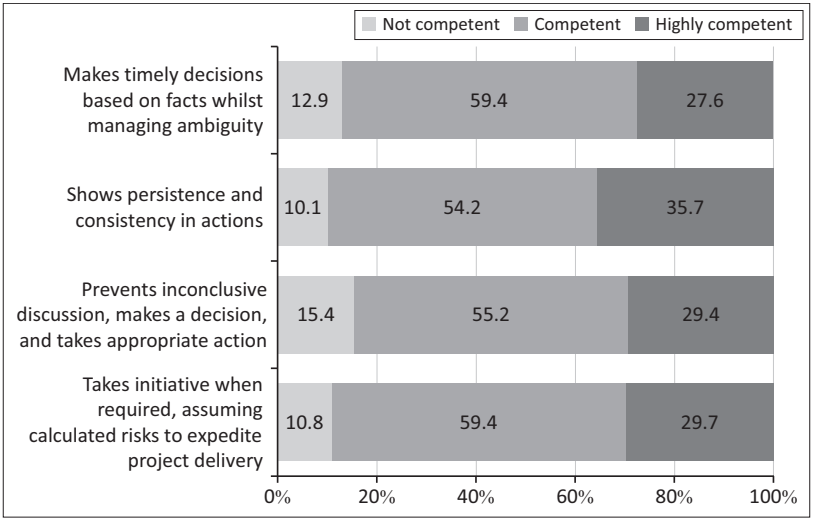

FIGURE 78: Components of sub-competence: Uses assertiveness when necessary.

The last component links with the previous component and focuses on the manner in which IT project managers make timely decisions based on facts and not emotions whilst they are managing ambiguity. Evidence that would support IT project managers' competence levels includes, amongst others, an issue log that highlights the time from decision recording to decision resolution and an issues escalation report showing a timely decision path. The results in Figure 78 indicate, once again, that IT project managers are either competent (59.4%) or highly competent (27.6%) in making timely decisions.

Professionalism

The last unit of competence focuses on the professionalism of IT project managers. According to Konstantinou (2015), there is a serious need for professional project managers.

Professional project managers (Konstantinou 2015):

> [*G*]uarantee quality, competence, and integrity and a level of ethical concern on behalf of not only their clients, employers, or shareholders, but also for the individual and society as a whole. (p. 22)

That raises the question what is professionalism and whether project management and project managers per se can be classified as a profession.

According to the US Department of Labour professionalism does not mean wearing a suit or carrying a briefcase. Professionalism means '... conducting oneself with responsibility, integrity, accountability, and excellence. It means communicating effectively and appropriately and always finding a way to be productive'.[6] The Project Management Institute (2007) defines professionalism as '... conform[*ing*] to an ethical behaviour governed by responsibility, respect, fairness, and honesty in the practice of project management'. An interesting point to raise is that the IPMA does not define profession in ICB4 but mentions many times that project managers must act in a professional manner. Marnewick and Labuschagne (2009) dispute the fact that project management is a profession. According to them, two major components are missing, namely, legislation and licensing. Project management is not recognised or constituted through legislation and project managers cannot be licensed as practicing project managers. In the case of construction projects, project managers are held liable as certified engineers and not project managers. In the case of IT, it is even worse. IT practitioners cannot be licensed and IT-related work cannot be certified. The situation has not changed since 2009 within South Africa.

6. https://www.dol.gov/odep/topics/youth/softskills/Professionalism.pdf

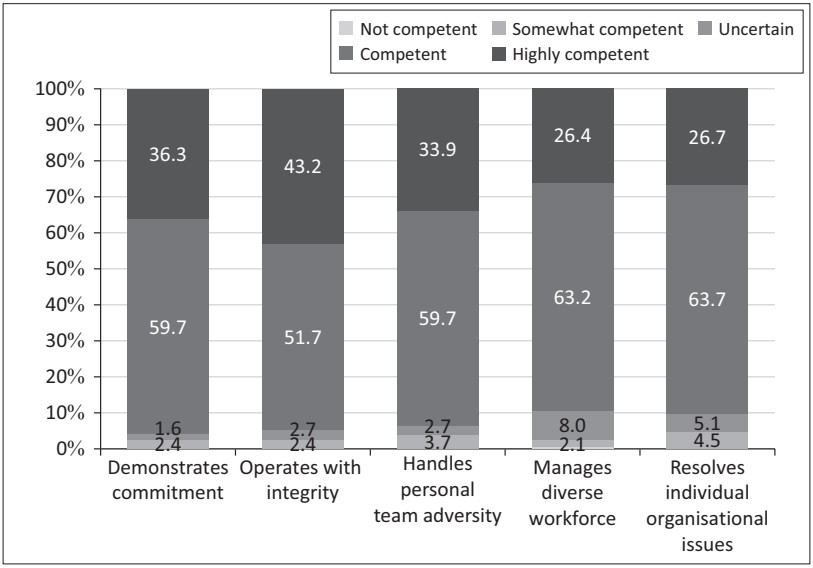

FIGURE 79: Unit of competence: Professionalism.

The results in Figure 79 indicate that IT project managers are under the impression that they are acting professionally during the lifespan of a project and that they treat all project stakeholders in a professional manner.

Professionalism consists of five sub-competencies and each of these competencies are analysed and discussed in the following sections.

One of the sub-competencies that an IT project manager must exhibit is commitment to the project. Commitment is perceived as the state or quality of being dedicated to a cause or activity. IT project managers should perceive their projects as causes to change the organisation for the better. Figure 80 highlights the sub-competencies that form part of demonstrating commitment to a project.

The first component focuses on whether the IT project manager understands and actively supports the project as well as the organisation's mission and goals. The implication is that the project's mission and goals are aligned with the mission and goals of the organisation. It is required of IT project managers to provided '... documented alignment of project goals and objective with organization's missions and strategy' (Project Management Institute 2007:36). The results in Figure 80 illustrate that IT project managers are competent (55.9%) or highly competent (39.9%) in this component. Only 4.2% of the respondents stated that they were not competent in this regard.

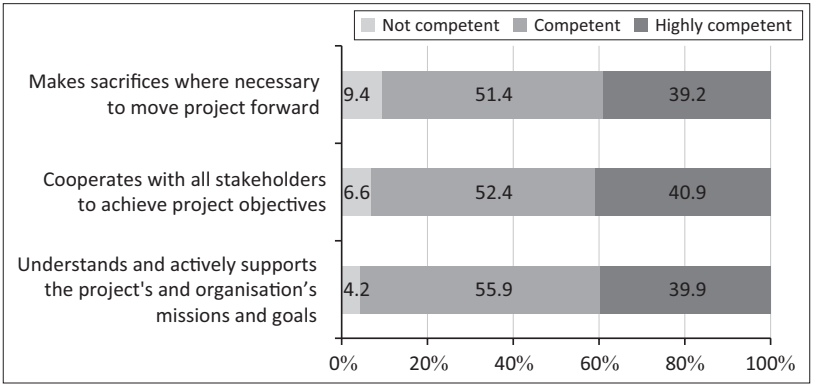

FIGURE 80: Components of sub-competence: Demonstrates commitment to the project.

These results imply that most IT projects are aligned with the vision and strategies of the organisation and that IT project managers actively manage this process even when misalignment occurs.

The second component focuses on whether IT project managers cooperate with all the identified stakeholders to achieve the project objectives. There might be some stakeholders who are against the project and what the project sets out to achieve. It is expected of an IT project manager to engage with all stakeholders – even those who are negative towards to the project – to ensure that the project objectives are achieved. This ties in with the first component where the achievement of the project objectives will contribute to the realisation of the project's mission and goals, and ultimately the organisation's mission and goals. As the results indicate, only 6.6% of the respondents are not competent in cooperating with all the stakeholders to achieve the objectives of the project. Aspects that the IT project manager should be competent in include, amongst others, specific cooperative efforts amongst all the stakeholders to achieve the project's objectives, and the use of team-building techniques to foster cooperation.

The third component focuses on whether IT project managers make sacrifices where necessary to move a project forward. These sacrifices might be of a personal nature or require sacrifices from the team members as well as the stakeholders. IT project managers should demonstrate that prior options were taken into account for the effective execution of a project whilst personal benefits are given a lower priority. IT project managers should also demonstrate a positive attitude whilst dealing with project challenges. Close to 10% of the respondents feel that they are not competent in making personal sacrifices in order for a project to move forward. It might be that these respondents are still young and inexperienced and do not necessarily see the bigger picture. The positive side is that

51.4% and 39.2% respectively feel either competent or highly competent in making sacrifices for the benefit of the project.

In conclusion, the results indicate that an overwhelming percentage of IT project managers demonstrate commitment to the projects that they are managing.

Integrity forms part of the professionalism unit of competence and consists of five components as illustrated in Figure 81. 'Integrity relates to the perception that the other party adheres to a set of principles and values that the trustor finds acceptable, such as delivering on promises' (Shazi, Gillespie & Steen 2015:82). This definition implies that IT project managers must operate in such a way and manner that the stakeholders and the team members find it acceptable behaviour.

The first component focuses on whether IT project managers adhere to all the legal requirements. This component runs hand in hand with the managing sub-competence component that focuses on standards and whether IT project managers apply these standards. A Pearson correlation between these two competencies indicates a weak positive correlation ($p = 0.273$, $r = 0$, $n = 376$). As the results portray in Figure 16, 45.1% of the IT project managers are competent in adhering to all the legal requirements whilst a further 47.2% perceive themselves as highly competent. IT project managers should be able to deliver the following documents to prove their competence – feedback from stakeholders that all the legal requirements were met, and a documented log of legal requirements applied to the project with written stakeholder approval.

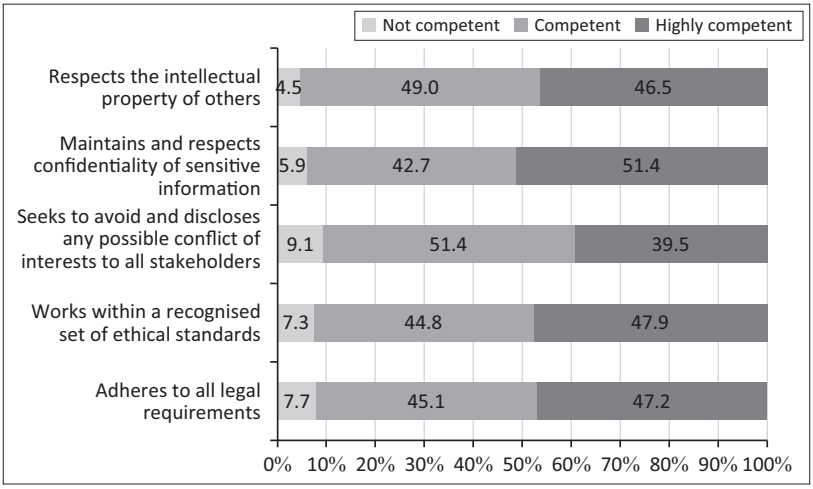

FIGURE 81: Components of sub-competence: Operates with integrity.

The second component focuses on whether IT project managers work within a recognised set of ethical standards. In a country like South Africa where bribery is a common element within a project (Dobie 2015), documented feedback must be supplied by the stakeholders indicating that the IT project manager neither offered nor accepted inappropriate payments or other items from any stakeholder. Only a small percentage (7.3%) of the respondents indicate that they are not competent working within a recognised set of ethical standards. It must be noted that IT project managers that are PMP® certified must sign PMI's Code of Ethics and Professional Conduct.[7] Various professional project management bodies such as PMSA[8] and IPMA[9] have their own codes of ethics and professional conduct.

The third component focuses on conflict of interest. Conflict of interest is defined as a situation that has the potential to undermine the impartiality of a person because of the possibility of a clash between the person's self-interest and professional interest or public interest.[10] IT project managers should make sure that all potential conflicts of interest are truthfully reported. Fifty-one per cent of the respondents are competent that they do manage conflict of interest, whereas 39.5% of the respondents are highly competent in managing conflict of interest. It must be noted that conflict of interest must be managed from the perspectives of the IT project managers, stakeholders and team members.

IT projects like any other type of project, consist of sensitive information. It is the IT projects, manager's fiduciary obligation to maintain and respect the confidentiality of sensitive information. This protection of sensitive information is related to the POPI Act as discussed earlier where IT project managers must adhere to all the legal requirements. An overwhelming 94.1% of the respondents indicate that they are either competent or highly competent in this sub-competency.

The last component focuses on whether IT project managers are competent in respecting the intellectual property of others. In the project environment, intellectual property might include formulas, knowledge, registered designs and software. The problem that IT project managers face is whether project deliverables are just part of the project or are they the intellectual property of the individual project team member. When patents, trademarks, or copyrights are used within the project, IT project managers should ensure

7. http://www.pmi.org/About-Us/~/media/PDF/Ethics/PMI-Code-of-Ethics-and-Professional-Conduct.ashx

8. http://c.ymcdn.com/sites/www.projectmanagement.org.za/resource/collection/58F0AE21-4DDC-4376-BF3F-E768CAEB79F5/PMSA_Code_of_Ethics.pdf

9. http://www.ipma.world/ipma-code-of-ethics-and-professional-conduct-2/

10. http://www.businessdictionary.com/definition/conflict-of-interest.html

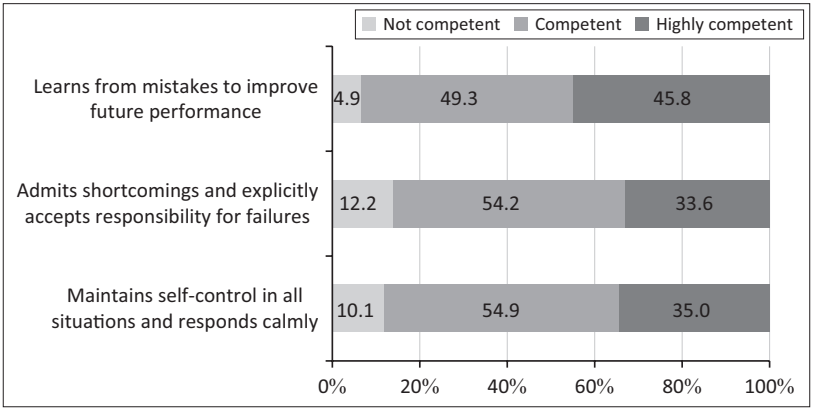

FIGURE 82: Components of sub-competence: Handles personal and team adversity in a suitable manner.

that the intellectual property is protected and that recognition is provided to the rightful owner. Only 4.5% of the respondents indicate that they are incompetent in this regard and that they do not respect the intellectual property of others. This component relates to whether these IT project managers work within a recognised set of ethical standards.

This sub-competence consists of three components as per Figure 82. The results clearly indicate that IT project managers are either competent or highly competent in handling personal and team adversity in a suitable manner.

The first component focuses on the IT project manager's ability to maintain self-control in all situations and to respond calmly. IT project managers must be able to control strong emotions (such as anger or extreme frustration) and apply stress-management techniques to control responses, prevent burnout and deal with ongoing stress. Thirty-five per cent of the respondents are highly competent and 54.9% of the respondents are competent in maintaining self-control. Only 10.1% of the respondents are not competent in maintaining self-control. This might be contributed to the age of the IT project manager or to the emotional intelligence of the IT project manager. The results depicted in Table 32 indicate that younger IT project managers are not competent in maintaining self-control. They represent 71% of the population that are not competent in maintaining self-control.

Admitting one's shortcomings and explicitly accepting responsibility for one's failures is difficult for any person. This might be even more difficult for IT project managers as the success of a project is largely dependent on the success of the project manager. Once the IT project manager starts to fail, then the project is bound to fail as well. It takes a mature IT project manager to admit to his or her own shortcomings and then to take

TABLE 32: Cross-tabulation between age and maintaining self-control.

Age	Maintaining self-control in all situations and responds calmly			Total
	Not competent	Competent	Highly competent	
Prefer not to say	4	5	3	**12**
20 – 29	17	39	24	**80**
30 – 39	13	95	42	**150**
40 – 49	5	51	28	**84**
50 – 59	2	23	16	**41**
60 or older	1	1	5	**7**
Total	**42**	**214**	**118**	**374**

full responsibility for failures as a result of these shortcomings. IT project managers should provide documented feedback to the stakeholders where the individual actively listened to constructive feedback and acted on it. The results in Figure 82 indicate that 12.2% of the respondents are not competent in admitting their own shortcomings and explicitly accept responsibility for their failures. The majority of the respondents (54.2%) are competent, and the remainder of the respondents (33.6%) are highly competent.

Learning from one's mistakes is an important competence that IT project managers should exhibit. It was previously discussed how competent IT project managers are in applying lessons learned to solve project-related issues. Ninety-two per cent of the IT project managers indicated that they were either competent or highly competent in applying lessons learned. The question is whether IT project managers can apply the same principle and learn from their own mistakes? Almost 95% of the respondents indicated that they can learn from their own mistakes and that it should improve their future performance.

South Africa is known as the rainbow nation. This is a true reflection as South Africa consists of black, white, mixed race and Indian and/or Asian people. The country has 11 official languages and many different cultures. Managing such a diverse workforce is a competence that is highly recommended for IT project managers. The results depicted in Figure 83 illustrate that IT project managers are, in general, either competent or highly competent in managing a diverse workforce. The results also show that a larger percentage of the respondents, in relation to the other competencies and sub-competencies, are deemed not competent. This is fairly obvious if one takes into consideration the complexities in managing a diverse workforce.

IT project managers should display an awareness of, respect for, and willingness to accommodate cultural differences (Project Management Institute 2007:37). This leads to

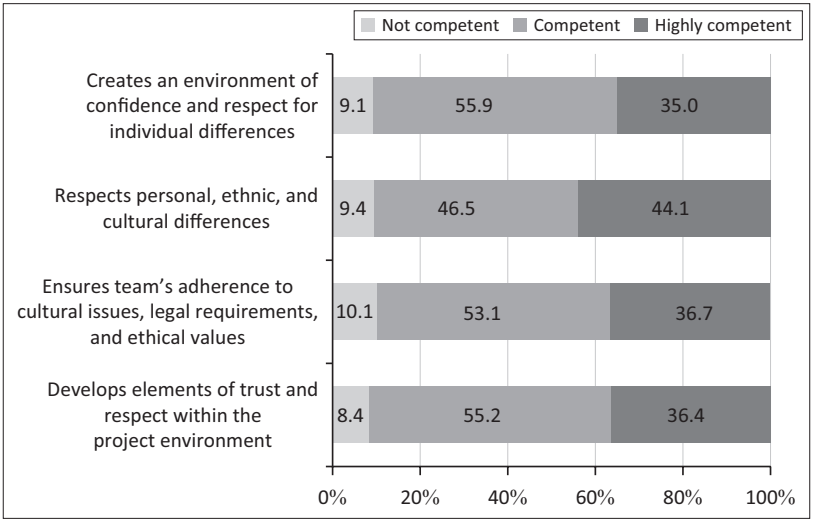

FIGURE 83: Components of sub-competence: Manages a diverse workforce.

the development of trust and respect in the project environment. Team members start to understand each culture and this understanding creates trust. The results depicted in Figure 83 highlight that IT project managers are competent (55.2%) or highly competent (36.4%) in developing trust and respect.

IT project managers are competent (53.1%) or highly competent (36.7%) in ensuring the team's adherence to cultural issues, legal requirements and ethical values. IT project managers are also competent (46.5%) or highly competent (44.1%) with regard to respecting personal, ethnic and cultural differences. Creating an environment of confidence and respect for individual differences seems not to be a problem for IT project managers. The results indicate that they are competent (55.9%) or highly competent (35%) in this regard.

Liang *et al.* (2012) confirm that diversity can lead '... to both desirable task conflict as well as undesirable relationship conflict'. Thus, IT project managers must consider placing team members with diverse value perspectives on the team to contribute to task accomplishment and be prepared to control resulting relationship conflict that may arise.

The last sub-competence under the professionalism unit of competence focuses on how IT project managers resolve individual and organisational issues without

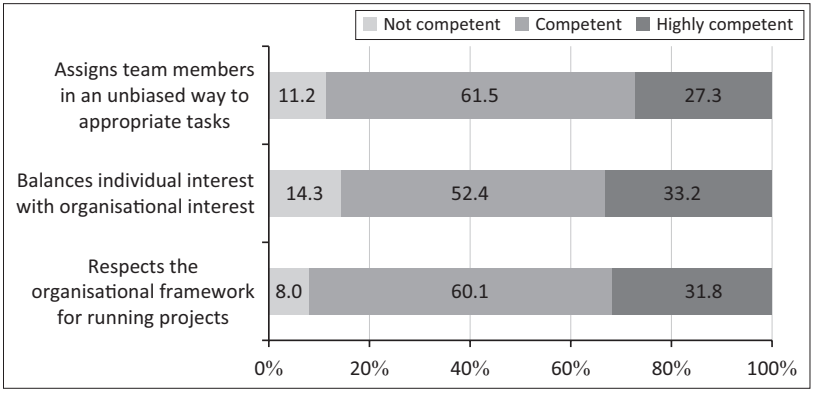

FIGURE 84: Components of sub-competence: Resolves individual and organisational issues with objectivity.

losing objectivity. This sub-competence consists of three components as illustrated in Figure 84.

The first component focuses on whether IT project managers respect the organisational framework when they manage projects. It implies that IT project managers should collaborate and report within programmes or portfolios and not manage their projects like islands. This competence runs together with understanding and actively supporting the project's and organisation's mission and goals. IT project managers are competent in aligning projects with the organisational vision and strategies, and the results depicted in Figure 84 indicate that they are competent (60.1%) or highly competent (31.8%) in respecting the organisational framework.

The second component focuses on balancing individual interests with organisational interests. A fairly large percentage (14.3%) of IT project managers indicated that they were not competent with this balancing act. IT project managers must see clear distinctions between their individual and organisational interests. This component should be analysed together with the component that focuses on the disclosure of any possible conflict of interests to all stakeholders.

Favouritism and special treatment is classified as an ethical dilemma by Walker and Lloyd-Walker (2014). According to Walker and Lloyd-Walker (2014), favouritism and compromised choices can be minimised through sound governance in terms of an accepted workplace culture. It is easy for IT project managers to assign favourite team members to nicer tasks and responsibilities. IT project managers must exhibit professionalism and assign team members in an unbiased way. The results indicate that IT project managers are competent (61.5%) or highly competent (27.3%) in doing so.

A cross-tabulation between age and the assignment of team members indicates, once again, that the younger IT project managers battle with this competence, and they contribute to the 11.2% of IT project managers that are not competent.

Conclusion

The personal competency domain focuses on a project manager's ability to manage a project through the phases of initiation to closure. The focus is on project managers' personal behaviour, attitudes and personality characteristics. This domain consists of six major competencies and 25 sub-competencies. The results indicate that the respondents are all either competent or highly competent in all 25 sub-competencies.

Figure 85 provides an overview of the units of personal competence. From the figure, it is clear that IT project managers perceive themselves as competent in all six competencies.

The competence that IT project managers are the least competent in is the competence of cognitive ability. Cognitive ability focuses on the application of an appropriate depth of perception, discernment and judgment to effectively direct a project in a changing and evolving environment. Close to 20% of the respondents feel that they are incompetent in this regard. This is worrying as IT projects are executed in a fast-changing and evolving environment. It is, therefore, highly recommended that organisational structures such as

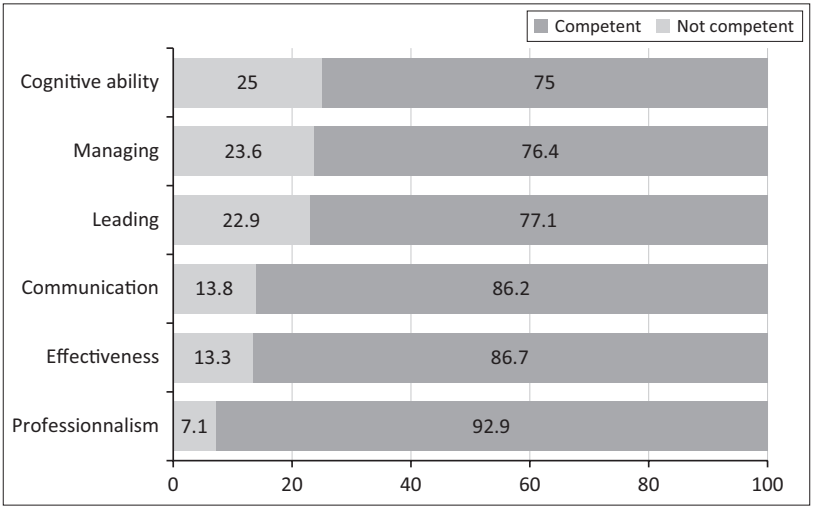

FIGURE 85: Overview of units of personal competence.

PMOs address this lack of competence and provide IT project managers with the necessary training.

Effectiveness focuses on '... producing the desired results by using appropriate resources, tools and techniques in all project management activities' (Project Management Institute 2007:34). Thirteen per cent of IT project managers are not competent in producing the desired results. This is also evident in various studies that indicate that IT projects still have a large failure rate. Again, this can be addressed through appropriate training and the upskilling of IT project managers.

Managing and leading competencies are in the middle, and IT project managers are feeling competent (76.4% and 77.1% respectively) in managing a project and leading a project team. The competency that IT project managers are feeling the most comfortable with is professionalism.

A more detailed analysis is provided in Table 33. The results clearly indicate that the top sub-competencies are from the professionalism competency, whereas three of

TABLE 33: Top-ranked personal sub-competencies.

Competence	Sub-competence	%
Professionalism	Demonstrates commitment	96.0
Professionalism	Operates with integrity	94.9
Professionalism	Handles personal team adversity	93.6
Professionalism	Resolves individual organisational issues	90.4
Professionalism	Manages diverse workforce	89.6
Communicating	Actively listens	88.6
Effectiveness	Changes at required pace	88.6
Effectiveness	Resolves project problems	87.8
Communicating	Maintains lines of communication	86.9
Effectiveness	Uses assertiveness	86.5
Communicating	Tailors communication to audience	86.2
Leading	Takes accountability for delivering project	85.8
Leading	Builds & maintains effective relationships	84.4
Effectiveness	Maintains stakeholder involvement	84.0
Communicating	Ensures quality of information	83.4
Cognitive ability	Uses appropriate PM tools	81.1
Managing	Plans & manages for project success	79.1
Leading	Creates team environment	78.2
Leading	Uses influencing skills required	77.1
Managing	Resolves conflict involving project team	76.5
Leading	Motivates and mentors project team members	76.4
Cognitive ability	Seeks opportunities to improve project outcome	75.2
Managing	Builds & maintains project team	73.7
Cognitive ability	Takes holistic view	71.7
Cognitive ability	Effectively resolves issues	70.6

the bottom five sub-competencies are from the cognitive ability competency. The low ranking of the cognitive ability sub-competencies might be an indicator of why IT projects fail.

From an organisational perspective, it is evident that training and upskilling of IT project managers should focus on their cognitive abilities as well as their leading and management competencies.

Chapter 6

Factors and models for competence units

This chapter seeks to extract and examine factors that are contributing to the notion of project management competence. Firstly, the factors for performance and personal competencies are discussed and analysed through the use of EFA. Thereafter a model seeking to validate these factors is attempted through the use of SEM.

Exploratory factor analysis is a quantitative research technique that seeks to discover statistically significant factors that are exhibited by the data (Zikmund *et al.* 2013). These factors are underlying phenomenon into which the identified variables can be divided. Of course, there are various methods of conducting EFA and the researchers must choose a valid approach in doing so.

The underlying structure of the variables concerning performance and personal competencies is determined by how each variable correlates to a particular factor. Principle axis factoring is used as the method of factor extraction (Field 2013). This method is appropriate in datasets where variables are skewed positively or negatively. As the mode of the responses in this dataset is four out of five possible answers, the dataset is negatively skewed. This method of extraction is therefore appropriate to the dataset.

Not all factors are equally important. To determine which factors are statistically relevant, the Guttman-Kaiser rule is enforced. This rule uses Eigen-values to determine

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which factors are to be considered. Variables with Eigen-values of 1 and above are preferred (Rietveld & Van Hout 1993).

In order to name the extracted factors, the data need to be transformed through rotation. Various methods of rotation exist. As it is assumed, and proven, that most of the variables are related in some manner, promax rotation is used as an oblique rotation method.

To determine that these initial factors are valid and statistically relevant, a measure of sampling needs to be determined. The Kaiser-Meyer-Olken (KMO) Measure of Sampling Adequacy is used. All units of competence exhibited a KMO value of above 0.8 and were, therefore, an indication that the dataset could be used in factor analysis. Additionally, Bartlett's Test of Sphericity is a measure to further validate the dataset for fitness to be used in factor analysis. All units of competence in this dataset exhibit the required Sig value of 0.000 (Field 2013). Therefore, the researchers have confidence that EFA is an appropriate tool for use in this instance.

EFA forms the foundation of developing a SEM. This multivariate technique is the combination of path analysis and factor analysis (Jöreskog 1973). The use and integration of multiple statistical techniques works towards providing more robust and accurate results (Kline 2011). SEMs comprise of two key elements, namely, a measurement model, and a structural model (Kao, Stewart & Lee 2009). The measurement model focuses on how well the latent (hidden) variables are represented by the observed variables (Foster, Barkus & Yavorsky 2006). On the other hand, the structural model uses multiple regression and path analysis to reveal relationships between latent variables (Blunch 2013).

SEMs are developed for performance and personal competencies. Table 34 below illustrates the graphical terminology used when developing the various SEMs. A SEM cannot merely be developed without validation (Joseph 2013). Various model fit measures are used to develop the SEMs to ensure the result implications are valid and justifiable.

TABLE 34: SEM graphical terminology (Joseph 2013).

SEM graphical terminology	Description
	Observed variable
	Latent variable
	Error term
	Predictive relationship
	Covariance/correlation/association

An important note is that a valid SEM could not be developed for certain units of competence as the model fit measures were not acceptable. In cases where a SEM was not developed, extensive discussion is carried out on the EFA results. Alternatively, where a valid SEM was developed, extensive discussion is carried out in an SEM implications section.

Performance competencies

In order to increase the chance of success of a project, a project manager needs to be proficient in several technical aspects of project management. These technical aspects, as referred in to Chapter 4, are termed performance competencies. These are derived from PMIs PMCDF and, therefore, the project manager should be able to apply and perform these competencies adequately in order to increase chances of project success.

The various performance competencies are arranged according to when they take place in the project life cycle. Therefore the units of competence are:

- Initiating a project.
- Planning a project.
- Executing a project.
- Monitoring and controlling a project.
- Closing a project.

Chapter 4 examined how competent project managers consider themselves in performing these activities. It was found that project managers are supremely confident in their abilities and mostly rate themselves as competent or highly competent.

The following discussion focuses on each unit of competence as it relates to performance competencies and examines the groupings of sub-competencies to determine which are valid and of real concern and which are not.

Unit of competence: Initiating a project

This initial phase of a project attempts to establish the project in the eyes of the organisation. In some cases, the project manager is not yet appointed at the start of this phase; however, as soon as the project is selected, a project manager is appointed. Literature indicated project managers should be proficient in:

- Aligning the project with organisational objectives and customer needs.
- Ensuring the preliminary scope statement reflects stakeholder needs and expectations.
- Ensuring high level risks, assumptions and constraints are understood.
- Identifying stakeholders and ensuring their needs are understood.
- Gaining approval of the project charter.

The following section investigates the sub-competencies and subsequent components of the communicating unit of competence as per Table 35.

This may indicate that all the activities a project manager needs to be competent in, when viewed holistically, revolve around stakeholder engagement. These stakeholders include the permanent organisation, the temporary organisation (the project) as well as customers and other parties who have an interest in the project's successful delivery. Clearly, results like this have been the impetus for project management organisations to view stakeholder engagement as vital. An example of this would be the PMI which

TABLE 35: Initiating a project sub-competency component groupings.

Variable name	Sub-competency components	Stakeholder engagement
		1
q0008_0002	Establishing the project's key milestones and deliverables	**0.808**
q0004_0001	Understanding the alignment of the project	**0.803**
q0006_0002	Identifying, qualifying and quantifying the project's high-level risks	**0.792**
q0005_0002	Understanding the preliminary scope of the project	**0.78**
q0004_0002	Achieving agreement on project alignment with project sponsor	**0.772**
q0008_0001	Developing a high-level project strategy	**0.77**
q0005_0003	Framing a high-level project scope ensuring alignment with organisation and customer needs and expectations	**0.752**
q0006_0001	Establishing the project's high-level assumptions and constraints	**0.749**
q0008_0005	Using governance processes to obtain sponsor approval and commitment	**0.731**
q0007_0002	Conducting stakeholder analysis to gain buy-in and identifying the needs for the project	**0.727**
q0008_0004	Supporting the project charter preparation	**0.718**
q0007_0003	Identifying high-level communication requirements	**0.712**
q0004_0004	Determining the characteristics of the product or service	**0.68**
q0004_0003	Establishing the needs and expectations of key stakeholders	**0.677**
q0007_0001	Identifying project stakeholders	**0.675**
q0008_0003	Developing a summary budget	**0.667**
q0005_0001	Selecting and using a suitable project management methodology or process	**0.656**

adapted its body of knowledge to include stakeholder management as a 10th knowledge area (Project Management Institute 2013b).

Although some components might not seem to be directly related to stakeholder engagement on face value, all of these deliberations take place because of the direct and close customer contact during the initiation phase. These sub-components, such as developing a summary budget and establishing key milestones and deliverables, are discussed and formulated with direct stakeholder input.

The following four components are not associated with any factor in the dataset:

- Establishing the needs and expectations of key stakeholders.
- Determining the characteristics of the product or service.
- Identifying project stakeholders.
- Developing a summary budget.

It therefore seems that these components do not have to contribute to the initiation phase of a project as far as the competence of project managers is concerned. Unfortunately, this statement could not be validated as no model could be produced from the factors as identified. Therefore the validity of the identified factors, as well as the discarded ones, is in question.

Further research is required to determine what factors are really contained in the initiation unit of competence. Therefore the current literature should be adhered to until such time as research is able to uncover the true factors that pertain to the initiation unit of competence.

This result does not diminish the results from Chapter 4. It may be that stakeholder engagement remains the key in order to successfully initiate a project with competent project managers.

Unit of competence: Planning a project

The planning phase of a project has been seen to be the greatest and most involved unit of competence. This is justified given the importance of planning a project as it related to project success (Cooke-Davies 2002; Erasmus & Marnewick 2014a; Marnewick 2012). Therefore there are many components a project manager needs to be competent in.

Chapter 4 indicated the following required sub-competencies:

- Gaining approval of the project scope.
- Gaining approval of the project schedule.
- Gaining approval of the cost budget.
- Identifying the project team and allocating roles and responsibilities.

- Gaining approval for the communication plan.
- Establishing quality management processes.
- Gaining approval for the risk response plan.
- Defining integrated change control processes.
- Gaining approval for the procurement plan.
- Gaining approval for the project plan.

The components of these sub-competencies are arranged into factors as per Table 36. The bold factor loadings in the highlighted cells indicate that the specified variables are associated with a specific factor. Where these factor loadings appear high, they are grouped together. These groupings were achieved through the process of exploratory factor analysis where four factors were revealed.

The groupings can be identified, as specific factors can be represented in the following way in Figure 86.

The first factor addressed all the aspects of budget and cost planning such as cost estimation and developing a project budget. Communicating the planned budget to stakeholders was excluded.

The second factor is concerned with project plan approval, but only included components seeking approval from key stakeholders, establishing project baselines, communicating the approved plan to all stakeholders and conducting a kick-off meeting. Integrating the planning activities into one coherent project plan, reviewing organisational assets and reviewing enterprise environment factors were excluded as components to these factors.

The third factor grouped components associated with procurement planning. All the components identified in the literature were included in establishing this factor.

The fourth factor relates all components associated with quality management. The same is true of the fifth factor associated with project team identification. And finally, the sixth factor included components associated with project scope planning. This factor excluded implementing scope management as a component.

Structural equation model for planning a project unit of competence

The data from Table 36 were used to generate the following measurement model (Figure 87).

This model is confirmed as valid as per attributes in Table 37.

Therefore the model can be populated with the regression values and correlations to indicate their relationships (Figure 88).

TABLE 36: Planning a project sub-competency component groupings.

Variable name	Sub-competency components	Factor					
		1	2	3	4	5	6
q0011_0003	Developing the project budget	**0.948**	0.036	0.007	−0.031	−0.061	−0.115
q0011_0001	Estimating costs for each activity	**0.802**	−0.12	0.099	−0.006	−0.009	0.127
q0011_0004	Developing a cost management plan	**0.738**	0.088	−0.061	0.104	0.107	−0.079
q0011_0002	Estimating all other project costs	**0.665**	−0.139	0.118	−0.062	0.052	0.202
q0011_0005	Gaining approval for the planned project budget	**0.596**	0.291	−0.024	−0.007	0.024	0.058
q0018_0006	Communicating approved plan to key stakeholders	0.056	**0.937**	−0.045	0.005	−0.025	−0.037
q0018_0004	Seeking approval by key stakeholders	0.019	**0.877**	−0.055	−0.02	0.046	−0.056
q0018_0007	Conducting kick-off meeting	−0.097	**0.674**	0.083	−0.092	0.14	0.063
q0018_0005	Establishing project baselines	0.034	**0.603**	0.024	0.169	0.008	0.045
q0017_0003	Planning external labour procurement	0.106	−0.072	**0.86**	−0.029	0.063	−0.119
q0017_0002	Planning purchases and acquisitions	0.129	−0.135	**0.839**	−0.003	0.126	−0.103
q0017_0004	Planning contract administration	0.055	0.063	**0.767**	0.151	−0.277	0.058
q0017_0001	Analysing material requirements	−0.075	0.024	**0.652**	−0.131	0.224	0.135
q0017_0005	Obtaining plan approval	−0.164	0.413	**0.646**	0.033	−0.074	0.032
q0014_0003	Establishing project quality metrics for deliverables, processes and project management performance	−0.029	−0.026	−0.091	**0.911**	0.117	−0.043
q0014_0004	Developing a project quality management plan	0.108	0.042	0.032	**0.864**	−0.115	−0.128
q0014_0001	Establishing quality standards to be used within the project that aligns with organisational quality policy	−0.03	−0.024	0.043	**0.738**	0.032	0.106
q0014_0002	Defining processes to be used to deliver the project deliverables	−0.106	0.002	0.079	**0.669**	0.102	0.161
q0012_0001	Identifying specific resources	0.033	−0.078	−0.066	0.082	**0.837**	0.037
q0012_0002	Defining roles and responsibilities	−0.074	0.132	−0.011	0.035	**0.703**	0.052
q0012_0004	Planning resource ramp-up and team building	0.11	0.099	0.06	−0.05	**0.68**	−0.139
q0012_0003	Reaching agreement with the organisation for access to suitable resources	−0.006	0.083	0.071	0.032	**0.646**	0
q0009_0001	Defining the project deliverables using a work breakdown structure (WBS)	−0.065	−0.008	−0.013	−0.067	−0.014	**1.069**
q0009_0002	Obtaining agreement for the scope defined by the WBS	0.133	0.267	−0.122	−0.008	−0.005	**0.619**
q0010_0002	Estimating time for completion of each activity	0.144	−0.141	0.028	0.139	−0.021	**0.601**

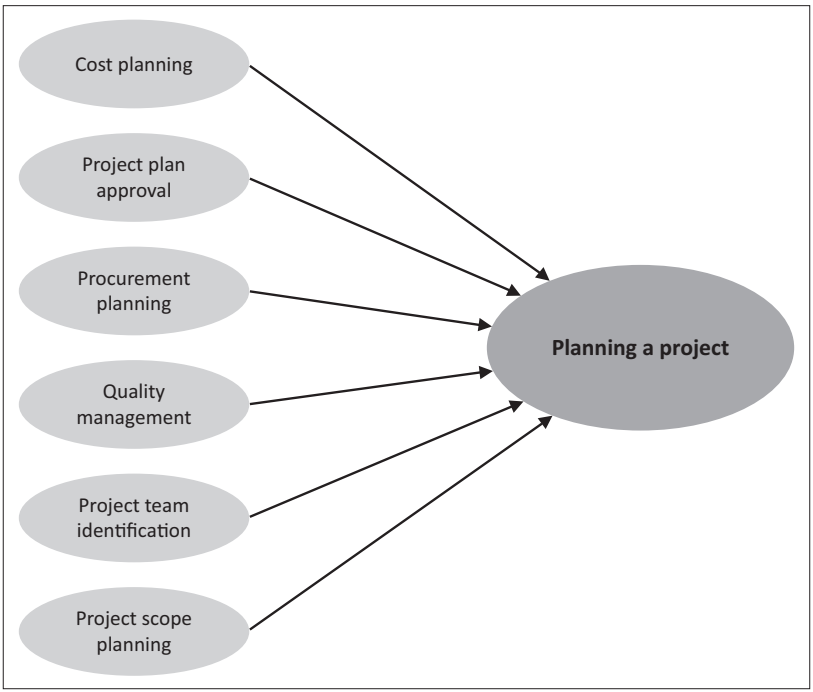

FIGURE 86: Sub-competencies of planning unit of competence.

All the associated components are very strong indicators of their associated factors and it is confirmed that these components definitely fit in this model. These regression values range between 0.82 and 0.92. All components not contained in this model do not contribute to the unit of competence of planning.

Planning a project: SEM implications

This discussion initially deals with the factors that are contained in the model and, secondly, examines certain aspects that are excluded by the model.

For cost planning, the model only validated the components of estimating costs for each activity and estimating all other project costs. Developing a budget, a cost management plan and communicating this plan does not contribute to the factor of cost planning. As previously discussed, this may be supported by the fact that a project accountant may be involved, or that some project managers are simply not required to manage a budget by themselves. Although IT project managers do feel confident in their abilities in this regard, they may simply not be called upon to conduct such

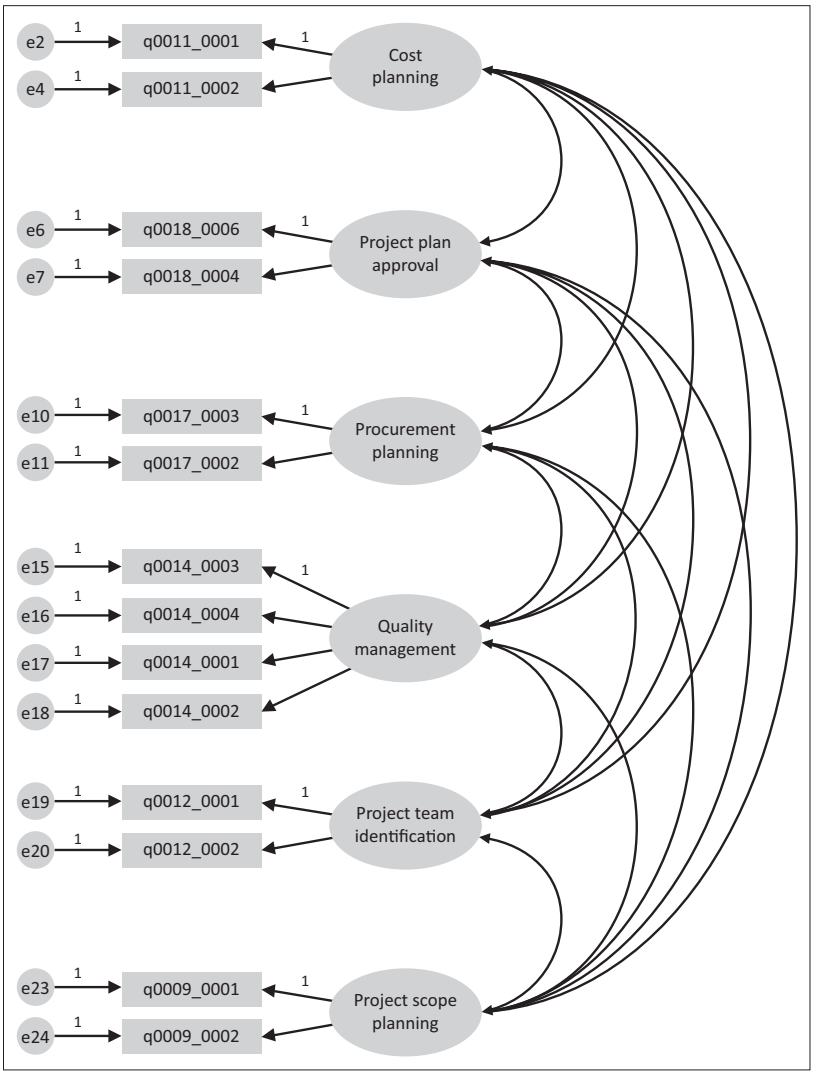

FIGURE 87: Planning a project sub-competency and components measurement model.

activities, or they do not deem them as vital to the success of the project. It seems that the cost constraint is not a measure of success that influences the activities in planning a project a great deal.

The factor of cost planning has medium strength relations with all the other factors except with project plan approval, ranging in correlation between 0.44 and 0.64. Here

TABLE 37: Model fit measures and results for planning a project SEM.

Model fit measures	Structural Equation Modelling	Cut-off levels employed	Results	Reference
Absolute fit measures	CMIN/DF (Chi-squared/Degrees of freedom)	≤ 5	2.20	Gaskin (2013); Marsh and Hocevar (1985); McKinney, Yoon and Zahedi (2002); Roh, Ahn and Han (2005); Ullman (1996:709–812); Yatim (2008)
	RMR (Root Mean Square Residual)	≤ 0.05	0.03	Roh *et al.* (2005); Tabachnick and Fidell (1996:752)
	GFI (Goodness-of-Fit Index)	≥ 0.9	0.92	Doloi, Iyer and Sawhney (2011); Kim *et al.* (2009); Roh *et al.* (2005); Tabachnick and Fidell (1996:750)
Relative fit measures	NFI (Normal Fit Index)	≥ 0.9	0.91	Doloi *et al.* (2011); Stahl (2008); Tabachnick and Fidell (1996:749); Yatim (2008)
	TLI (Tucker-Lewis Index)	≥ 0.9	0.93	Doloi *et al.* (2011); Hair *et al.* (2006:753); Stahl (2008); Yatim (2008)
	CFI (Comparative Fit Index)	≥ 0.95	0.95	Anglim (2007); Doloi *et al.* (2011); Gaskin (2013); Hair *et al.* (2006:753); Roh *et al.* (2005); Stahl (2008); Tabachnick and Fidell (1996:749–750); Yatim (2008)
Fit measures based on the non-central chi-square distributions	RMSEA (Root Mean Square Error of Approximation)	≤ 0.08	0.07	Hoyle (2011:48); Marsh, Hau and Wen (2004); McQuitty and Wolf (2013); Nunkoo and Ramkissoon (2012); Reisinger and Mavondo (2007)

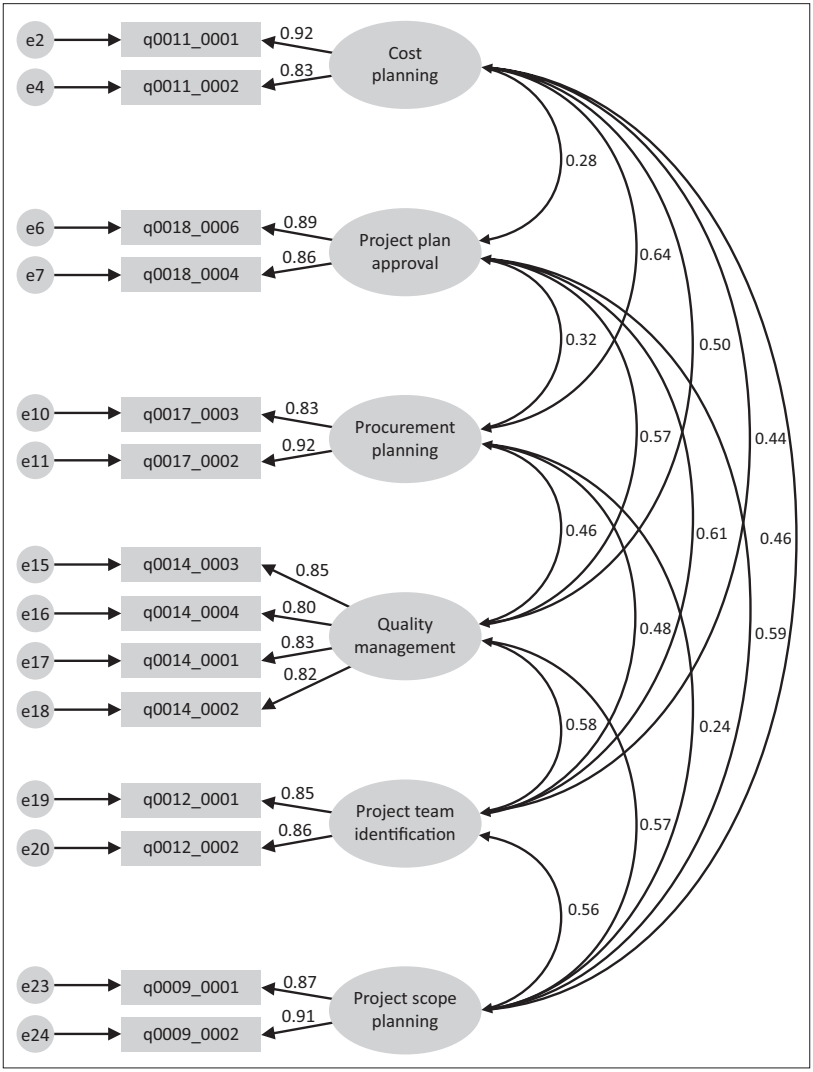

FIGURE 88: Validated SEM for planning a project unit of competence.

there is a weak relationship with project plan approval. This supports the notion that a project plan can be approved without cognisance of the cost plan being approved. In projects where cost is not a project constraint, this can be plausible. Traditionally however, many projects are measured to be a success or failure on the basis of projects being over-budget. This does not seem to be the case.

Only two components were validated as contributing to the factor of project plan approval. These are seeking approval from stakeholders and then communicating the plan to stakeholders. Reviewing the project baselines and conducting a kick-off meeting is further excluded in addition to those excluded by the factor analysis. It may be that IT project managers regard that all the other activities have already been included and, therefore, do not consider them again in the course of approving the project plan again.

Project plan approval has a medium strength relationship with the factors of quality management (0.57), project team identification (0.61) and project scope planning (0.59). This is somewhat gratifying, although the correlations were envisaged to be stronger. It may seem that project plan approval is not strongly associated with these three factors. This may be that approval for these factors is sought in its own right and this is then communicated again through project plan approval.

Project plan approval has weak relationships with cost planning (0.28) and quality management (0.32). Chapter 4 indicated that IT project managers are somewhat less confident in planning for quality and the measurement thereof. These results further strengthen the trend that quality management is an area of concern. Quality management is also not a major factor in the approval of a project plan.

The SEM validated only two aspects of procurement planning. These are planning for purchases and acquisitions (0.92) as well as planning for external labour procurement (0.83). These are the two main items to procurement. It is, however, worrying that analysing material requirements, planning for contract administration and obtaining procurement plan approval do not contribute to the planning unit of competence. Opportunities for irregular or inefficient spending may arise. As noted in Chapter 4, it may also be that IT project managers do not involve themselves in contract management as a result of the perceived lack of skills in analysing legal contracts. This may be left up to organisational legal experts, and their feedback is used by the IT project manager.

Procurement planning's strongest relationship is with cost planning (0.64). This is unsurprising because, when external procurement takes place, financial considerations are important when estimating task costs. Procurement planning has a weak relationship with project scope planning (0.24). This may be as the scope may not specifically indicate procurement is to be carried out; however, it could very well be implied. It seems that not all assumptions and constraints may be made explicit by the project scope. The same could, again, be said about procurement planning's weak relationship with project plan approval (0.32). Procurement then has medium strength relationships with the other factors, namely, project quality management (0.46) and project team identification (0.48). Once again these relationships could conceivable be higher because quality management must have some control over procurement activities to determine if the contract is being delivered according to agreed levels. Similarly, a team member needs to be identified to be responsible for procurement activities. This does not seem to be the case in all instances.

All of the quality management components are accepted in the model. The regression values range between 0.82 and 0.89, indicating that these are very strong indicators of quality management as a factor in the planning unit of competence. This is gratifying to see; however, when taken into context with the results of Chapter 4, a slightly murky picture emerges. In Chapter 4, IT project managers perceived themselves to be less competent in planning and managing quality. It was also seen that existence of a quality plan does not imply it is being used to manage quality. Clearly, plann ing for quality seems to be an important consideration in the planning unit of competence for IT project managers and they continue to grapple with this issue.

The factor of quality management co-exists in medium strength relationships with the other five factors in this model. Given the importance of quality and related stakeholder requirements, ideally this relationship ought to be stronger on all fronts. The correlation values range between 0.46 and 0.64.

Project team identification is the fifth factor to emerge and was only accepted into the model with 2 components. These components are defining roles and responsibilities and identifying specific resources. These exhibited regression values of 0.86 and 0.85 respectively. This is an indication that these components are the sole contributors to the planning unit of competence as it relates to project team composition. No consideration is given to reaching agreement with the organisation for these resources or planning for a resource ramp-up when determining the competence of IT project managers.

The project team identification factor also relates to the other factors in a medium strength relationship. These correlation values range between 0.44 and 0.61. They exhibit the strongest relationship with project plan approval, presumably because stakeholder approval is also sought. Project team identification as a factor has the weakest relationship with project cost planning. This could be because of the fact that the IT project manager may not realise, or include, the cost of internal resources.

Project scope planning as the final factor was included in the model. This factor was only accepted as valid with two related components. These are defining the project deliverables using a WBS and obtaining agreement for the scope defined by the WBS. The regression values for these two components were especially high at 0.87 and 0.91 respectively. This is another perplexing observation as there was also very little relationship between these two components as demonstrated in Chapter 4. It is, however, gratifying to observe that the WBS is deemed important when gauging the competence of IT project managers in the planning unit of competence.

Project scope planning as a factor exhibits a weak relationship to project procurement planning at a correlation value of 0.24. The possible reasons for this have been discussed earlier. Project scope planning exhibits medium strength relationships to the other factors

with correlation values between 0.46 and 0.59. This is disconcerting as all the identified factors have reason to inform the scope of the project. However, the ability to do so does not seem to be very important in determining the competence of IT project managers in the planning unit of competence.

Having discussed the factors that were present on the validated model, we now turn our attention to what is missing. The following aspects do not contribute to the model in the perceived competence of project managers in the planning unit of competence:

- Agreeing on communication activities.
- Gaining approval of a risk response plan.
- Defining integrated change control processes.

There are vast bodies of literature indicating that these three sections are great determinants of project success (Andersen 2004; Bannerman 2008; Cooke-Davies 2002; Cooke-Davies & Arzymanow 2003; De Bakker, Boonstra & Wortmann 2010; Diallo & Thuillier 2004; Erasmus & Marnewick 2014a; Erasmus *et al.* 2014; Lavagnon, Amadou, & Denis 2011; Marnewick 2012, 2013b; Marnewick & Labuschagne 2012; Schwalbe 2013). Yet, somehow, they do not form part of any model that should consider the competence of project managers. Could it be that communication activities, risk response plans and change control processes are not required in IT projects? That can hardly be accepted. Could it rather be that, although IT project managers perceive themselves as competent, they are not actually competent in these practices and simply neglect to implement them properly? This might be closer to the truth. Future research is required urgently to determine why risk, communication and change control planning does not form part of a model to determine IT project manager competence.

Unit of competence: Executing a project

The execution phase of the project puts all the plans made in the planning phase into practice. Deficiencies in planning will be propagated in this phase of the project, thereby increasing the risk of deviations from the customer's requirements and therefore increasing the risk of failure.

This unit of competence comprises of five sub-competencies:

- Achieving project scope.
- Managing stakeholders' expectations.
- Managing human resources.
- Managing quality as planned.
- Managing material resources.

The EFA revealed four factors as detailed in Table 38.

TABLE 38: Execution sub-competency component groupings.

Variable name	Sub-competency component	Factor			
		1	2	3	4
q0020_0001	Reviewing stakeholder expectations throughout the project to ensure they are being met within the project scope	**0.793**	−0.037	0.067	−0.045
q0019_0004	Managing phase transitions	**0.765**	0.1X33	−0.079	−0.051
q0019_0002	Closing identified performance gaps	**0.755**	−0.071	0.056	0.060
q0019_0001	Verifying task completion as defined in the project plan	**0.745**	−0.100	−0.111	0.229
q0020_0002	Interacting with stakeholders to ensure support for the project	**0.722**	0.031	0.069	−0.067
q0019_0003	Executing risk management plan	**0.675**	0.081	0.028	−0.008
q0023_0002	Selecting suitable sellers	−0.032	**0.948**	−0.005	−0.019
q0023_0001	Requesting seller information	−0.035	**0.904**	0.018	−0.016
q0023_0003	Executing procurement tasks against schedule commitment	0.041	**0.903**	−0.003	−0.045
q0023_0004	Acquiring internally supplied resources	0.089	**0.624**	0.012	0.185
q0021_0002	Building project team	0.145	−0.030	**0.875**	−0.107
q0021_0003	Developing project team members	0.005	0.031	**0.683**	−0.015
q0021_0001	Acquiring human resources per staff management plan	−0.150	0.031	**0.619**	0.272
q0022_0002	Ensuring compliance with quality standards and processes	0.053	0.017	−0.043	**0.910**
q0022_0001	Executing quality assurance activities	0.024	0.003	0.090	**0.779**

The first factor seems to associate components with monitoring and managing progress. Activities such as managing phase transitions and closing performance gaps are typically associated with monitoring and managing the activities of human resources. Whilst it seems these should rather be associated with the monitoring and controlling competency, we should bear in mind that execution and monitoring and controlling phases happen concurrently.

Executing the risk management plan also forms part of this phase. This is quite perplexing as the risk planning sub-competency and components do not feature as a factor in the planning unit of competency. Also recall that a moderate relationship exists between planning for risk and executing a risk management plan. This inconsistency needs to be addressed through further research.

The second factor identified is associated with managing material resources or contracts, and the third factor identified is human resource management. The final factor is the governance of quality. The components of ensuring compliance with quality standards and processes, coupled with executing quality assurance activities, go beyond mere management of quality. The governance aspect indicates that the processes that are put in place are monitored and not just the product's quality as being delivered. It is gratifying to note this aspect because planning for quality is a confirmed factor in the planning unit of competence.

A graphical representation of these factors is detailed in Figure 89.

These factors could not be confirmed via a valid SEM. This may, in part, be as a result of the weak to moderate relationships between certain planning components and certain

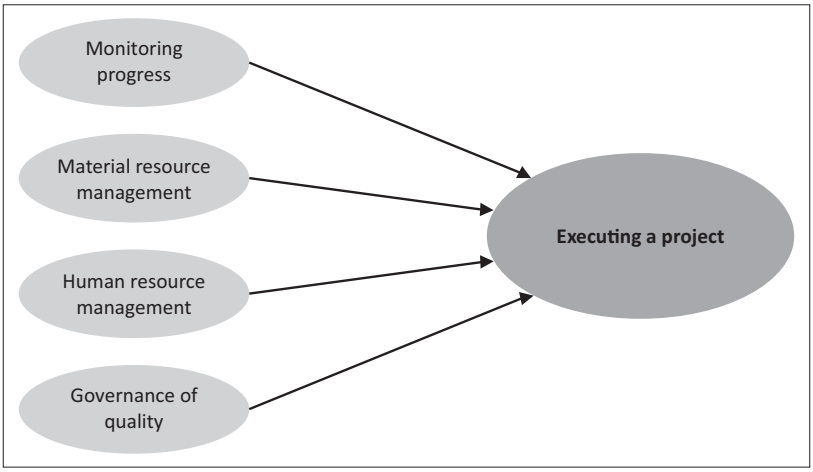

FIGURE 89: Sub-competencies of execution unit of competence.

execution components as detailed in Chapter 4. Whatever the case may be, this unit of competence will also benefit from in-depth future research to uncover what the true factors are. Until that is performed, it is recommended that practitioners adhere to current literature and methodologies on the matter and pursue higher level of actual competence.

Unit of competence: Monitoring and controlling a project

During the monitoring and controlling phase of a project, the project manager has to measure the project performance from the execution phase against the agreed to plans delivered from the planning phase.

This unit of competence focused on six sub-competencies:

- Communicating project status to stakeholders.
- Managing project change.
- Monitoring and controlling quality.
- Monitoring and controlling risk.
- Managing the project team.
- Administering contracts.

The EFA yielded four factors in this unit of competence. The groupings are detailed in Table 39.

The first factor seems to be associated with project progress control and communication. Components like following the change management process after identifying changes and their impact are included here, as well as communicating project status to stakeholders. This is astounding as the only other model where project change management is completely omitted is in the planning unit of competency.

The second factor appears to be contract management. IT project managers regard contract management as an important matter in which they are competent. This factor includes two audit functions, namely, contract audit and quality audit. It seems that quality audits are to be undertaken where external resources are supplied to produce a deliverable. IT project managers do not necessarily think that quality audits apply to in-house deliverables.

The third factor pertains to human resource management, specifically related to the project team. This seems to refer to team well-being. The fourth factor relates to risk and quality management, although there seems to be some overlap with components that could also fit with the human resources factor, as the results imply. However, components such as collecting project and product metrics, monitoring deviations from the project baseline and recommending corrective actions are logically more compatible with a factor relating to risk and quality management. These components, if not addressed, increase the risk of project failure. It is, however, very interesting that these three aspects do not seem to be associated with the project progress control factor.

TABLE 39: Monitoring and controlling a project sub-competency component groupings.

Variable name	Sub-competency components	Factor			
		1	2	3	4
q0025_0001	Identifying changes to baseline project plans	**0.820**	0.066	-0.121	0.012
q0024_0001	Executing the process for capturing project information	**0.801**	-0.054	-0.018	0.005
q0024_0003	Ensuring action plans are put in place to address any variations to plan	**0.795**	-0.080	0.004	0.027
q0025_0002	Identifying the impact of the changes to the project plan	**0.764**	0.015	-0.291	0.261
q0025_0003	Following the change management process to manage and record changes	**0.719**	0.044	-0.176	0.104
q0025_0004	Communicating changes to project stakeholders	**0.708**	0.033	0.230	-0.204
q0024_0002	Communicating status to stakeholders	**0.631**	-0.146	0.241	-0.027
q0025_0005	Executing configuration management process	**0.513**	0.307	0.087	-0.137
q0029_0002	Collecting seller performance metrics	0.107	**0.846**	0.081	-0.134
q0029_0004	Facilitating contract audits	-0.091	**0.827**	-0.118	0.237
q0029_0001	Ensuring seller contracts are effectively managed	0.008	**0.826**	0.240	-0.222
q0029_0003	Ensuring sellers are part of the project team culture	-0.066	**0.692**	0.069	0.065
q0026_0005	Facilitating quality audits	0.018	**0.559**	-0.136	0.404
q0028_0004	Providing feedback on team and individual member performance	0.040	0.048	**0.837**	-0.080
q0028_0001	Holding regular team meetings	-0.087	-0.088	**0.828**	0.101
q0028_0003	Monitoring team satisfaction	0.073	0.082	**0.712**	0.010
q0028_0002	Conducting team building activities	-0.193	0.055	**0.709**	0.056
q0026_0002	Collecting project and product metrics	-0.024	0.130	0.411	**0.380**
q0026_0003	Monitoring deviation from project baselines	0.101	0.164	0.329	**0.311**
q0026_0004	Recommending corrective and preventative actions	0.138	0.253	0.323	**0.243**
q0027_0002	Recognising when unknown risks occur	0.042	0.047	-0.052	**0.786**
q0027_0004	Recognising new risk	-0.060	0.015	0.164	**0.738**
q0027_0003	Establishing workarounds for previously unknown risks	0.058	0.100	0.170	**0.582**
q0027_0006	Facilitating risk audits	-0.064	0.506	-0.183	**0.570**
q0027_0001	Updating risk response plan	0.265	-0.116	0.205	**0.558**
q0027_0005	Reviewing risk response strategies	0.238	-0.109	0.303	**0.495**
q0026_0001	Recording acceptance of completed deliverables	0.027	-0.012	0.395	**0.450**

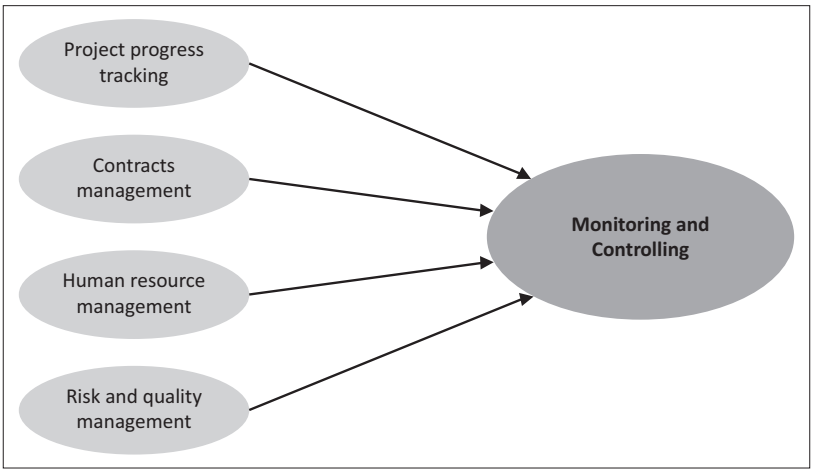

FIGURE 90: Sub-competencies of monitoring and controlling unit of competence.

It is also interesting that, just as in the case with project change management, risk management is a factor to consider in the monitoring and controlling competency but not in the planning competency. Quality management has also emerged as a factor, in conjunction with risk management, and has been a concern during the planning phase.

This state of affairs is detailed in the Figure 90.

The SEM process also did not yield a validated model for the monitoring and controlling unit of competence. Therefore the identified factors' relationship to one another cannot be confirmed. It is recommended that current literature and practice be adhered to by practitioners until such time that further research into this unit of competence reveals greater insights.

Unit of competence: Closing a project

The process of closing a project allows the organisation to reassign resources to operations or to other projects. It also serves as a point in time where a project is completely done away with, and operations now assume responsibility for the use of the product. This entails that stakeholders approve the result of the project and accept the deliverables.

In closing a project, project managers ought to be competent in the following four sub-competencies:

- Gaining acceptance of project outcomes.
- Releasing project resources.

- Measuring and analysing stakeholder perceptions.
- Formally closing the project.

The EFA process revealed that this unit of competence is dependent on two factors, namely, administrative closure and stakeholder management. Figure 91 indicates this graphically.

The components are divided into these two factors in Table 40.

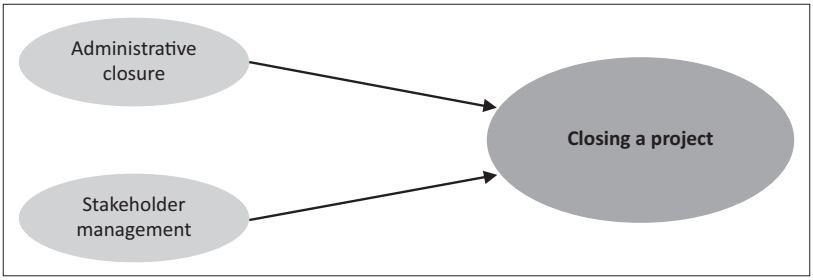

FIGURE 91: Sub-competencies for the closing unit of competence.

TABLE 40: Closing a project sub-competency component groupings.

Variable name	Sub-competency component	Factor	
		1	2
q0033_0004	Closing all project contracts	**0.802**	–0.044
q0031_0003	Providing feedback to the organisation regarding team members' performance	**0.799**	–0.094
q0031_0002	Providing performance feedback to project team members	**0.776**	–0.128
q0033_0003	Notifying stakeholders formally of project closure	**0.737**	0.060
q0031_0001	Executing organisational processes for releasing project resources	**0.649**	0.112
q0033_0001	Executing closure activities for the project	**0.636**	0.219
q0033_0005	Documenting and publishing project learning	**0.543**	0.098
q0033_0006	Updating organisational process assets	**0.499**	0.208
q0033_0002	Closing all financial activities associated with the project	**0.473**	0.274
q0032_0002	Analysing result of feedback	–0.189	**1.024**
q0032_0001	Surveying project stakeholders	–0.048	**0.875**
q0030_0002	Meeting all contractual requirements where required	0.109	**0.635**
q0030_0003	Transitioning all deliverables to operations	0.254	**0.538**
q0030_0001	Obtaining final acceptance	0.292	**0.509**

Administrative closure seems to be associated with components like closing contracts, providing performance feedback, closing all financial activities, documenting and publishing project learning and so forth. These are all administrative activities that are all too often left to the very last before completion of a project. In many cases, these do not get completed (Clements & Gido 2012; Marchewka 2012; Schwalbe 2013).

Activities such as surveying stakeholders for feedback, obtaining final acceptance, meeting other contractual requirements seem to relate closely to stakeholder management. Clearly, this is a continuation of an important theme. In the mind of IT project managers, closing a project is concerned with finalisation of the last administrative duties and closing the relationship with the relevant stakeholders.

Structural equation model for closing a project unit of competence

The results from Table 40 are translated into the following measurement model (Figure 92).

As demonstrated by Figure 92, the components executing closure activities for a project formally notifying stakeholders of closure of the project and closing all project contracts for part of administrative closure are grouped into administrative duties. Surveying stakeholders and analysing the results from the survey form part of stakeholder management.

This model is validated against the various measures of fitness. Table 41 details how these measures were passed.

Therefore the proposed model is valid for the current dataset and can be represented in Figure 93.

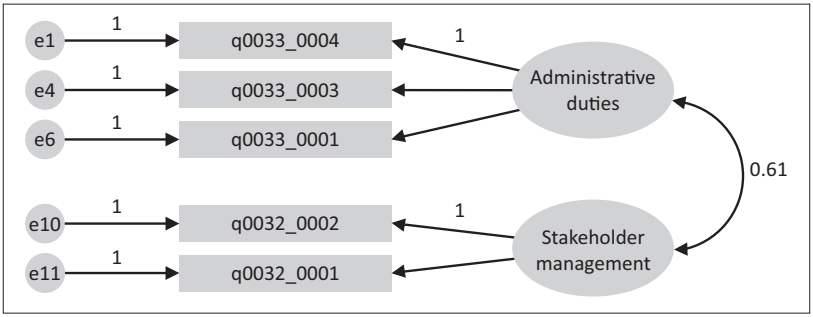

FIGURE 92: Closing a project sub-competency and components measurement model.

TABLE 41: Model fit measures and results for closing a project SEM.

Model fit measures	Structural Equation Modelling	Cut-off levels employed	Results	Reference
Absolute fit measures	CMIN/DF (Chi-squared/Degrees of freedom)	≤ 5	2.07	Gaskin (2013); Marsh and Hocevar (1985); McKinney *et al.* (2002); Roh *et al.* (2005); Ullman (1996:709–812); Yatim (2008)
	RMR (Root Mean Square Residual)	≤ 0.05	0.02	Roh *et al.* (2005); Tabachnick and Fidell (1996:752)
	GFI (Goodness-of-Fit Index)	≥ 0.9	0.98	Doloi *et al.* (2011); Kim *et al.* (2009); Roh *et al.* (2005); Tabachnick and Fidell (1996:750)
Relative fit measures	NFI (Normal Fit Index)	≥ 0.9	0.98	Doloi *et al.* (2011); Stahl (2008); Tabachnick and Fidell (1996:749); Yatim (2008)
	TLI (Tucker-Lewis Index)	≥ 0.9	0.98	Doloi *et al.* (2011); Hair *et al.* (2006:753); Stahl (2008); Yatim (2008)
	CFI (Comparative Fit Index)	≥ 0.95	0.99	Anglim (2007); Doloi *et al.* (2011); Gaskin (2013); Hair *et al.* (2006:753); Roh *et al.* (2005); Stahl (2008); Tabachnick and Fidell (1996:749–750); Yatim (2008)
Fit measures based on the non-central chi-square distributions	RMSEA (Root Mean Square Error of Approximation)	≤ 0.08	0.07	Hoyle (2011:48); Marsh *et al.* (2004); McQuitty and Wolf (2013); Nunkoo and Ramkissoon (2012); Reisinger and Mavondo (2007)

There is a medium strength correlation between the two factors of stakeholder management and performing administrative duties with a correlation value of 0.61. The components associated with administrative duties are strong with regression values between 0.75 and 0.83. For stakeholder management, the regression values are even

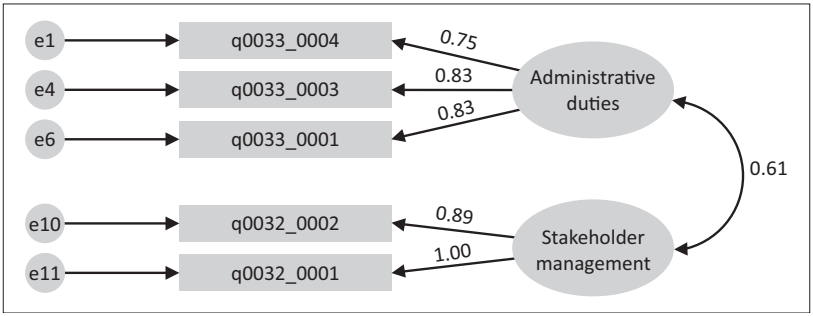

FIGURE 93: Validated SEM for closing a project unit of competence.

higher for the components at 0.89 for analysing feedback of stakeholders, and a perfect relationship of 1 for surveying stakeholders for feedback.

Closing a project: SEM implications

The components associated with administrative duties for closing a project seem to be 'catch all' activities that encompass project closure, especially the component named executing closure activities for the project. This could imply that IT project managers do not necessarily understand or undertake all the required activities for formally closing a project. These neglected activities include providing internal feedback, documenting lessons learnt and finalising financial activities. These components do not seem to have an influence or do not contribute to closing a project in the mind of IT project managers.

Similarly, the only component that contributes to closing a project from the external stakeholder perspective is surveying stakeholders and analysing this information. The component of surveying stakeholders is perfectly associated with stakeholder management in the closing phase of a project. These activities are clearly vitally important in the minds of IT project managers as they relate to closing a project. However, meeting contractual requirements, transitioning the project to operations and obtaining final acceptance is not associated with any factor in the closing unit of competence.

Evidently, IT project managers do not think it important that the project's deliverable be transferred to operations and may be under the impression that this is an activity that does not influence the closure of a project. It may even imply that IT project managers do not regard this component as being related to projects at all. The same could be said for meeting all contractual requirements.

What is perplexing is that IT project managers do not regard obtaining final acceptance as a matter of importance during project closure. Surely a project cannot be considered complete or closed if final acceptance has not been obtained. Perhaps IT

project managers are under the impression that this component is implied by the component labelled executing closure activities for the project. Whatever the case may be, it is important that stakeholders accept the project outcome, as well, in order for the project to be closed.

There is a medium-strength relationship between administrative duties to close a project and stakeholder management in closing a project. Clearly literature addressed activities that the organisation needs to complete internally in order to administratively close the project. This cannot happen without the consent of, and communication with, the stakeholder for which the project is being undertaken. It is, therefore, important that both these factors be addressed. The data however show that this is not always the case. In this dataset it could be conceived that a project can be closed in some cases with only one of the two factors being adequately addressed.

Personal competencies form part of the second part of the competencies that IT project managers must exhibit. The next section analyses the various competencies and sub-competencies based on EFA and SEM.

Personal competencies

Project managers' ability to manage projects is heavily influenced by their behaviour, attitude and core personality traits. In Chapter 3, these characteristics are pointed out as more pivotal to managing a project than previously credited. Personal characteristics play a fundamental role in knowledge generation and skill acquisition when assessing the relationship between the three project competency dimensions of skills, knowledge and personal characteristics (Figure 23). This research refers to personal characteristics as personal competencies as there are a number of fundamental units of competence which underpin personal competencies.

The six units of personal competence are 'communicating', 'leading', 'managing', 'cognitive ability', 'effectiveness' and 'professionalism'. These units of competence and their subsequent sub-competencies were examined in detail in Chapter 5. This section investigates whether the sub-competencies are correctly identified within the PMCDF. Similar to the performance competencies section, EFA is used to establish the sub-competencies based on the responses given by the respondents, the IT project managers. The notion is to investigate whether the sub-competencies and components can be aggregated and simplified to create a clearer picture of the competencies required for IT project managers to deliver successful IT projects. Also comparable to the performance competencies, SEM is used to validate the EFA findings and develop models which show the predictors of each sub-competencies, as well as the relationships between sub-competencies.

The following section investigates the sub-competencies and subsequent components of the communicating unit of competence.

Unit of competence: Communicating

Communicating is arguably the most important competency required by project managers regardless of project type and industry. Research has revealed that the communication knowledge area within the PMBOK® Guide is the knowledge area with the highest maturity level (Marnewick 2013a, 2013b). The PMCDF states that communicating consists of four sub-competencies (Project Management Institute 2007), namely, actively listens, maintains lines of communication, ensures quality of information, and tailors communication to audience. EFA was conducted on the sub-competencies and components thereof. Table 42 shows the results of sub-competency component EFA groupings.

Three sub-competencies were identified and categorised from the EFA, namely, communication methods, communication intangibles and information access. IT project managers cannot rely on one communication method when communicating with team members and stakeholders. It is important to note that the four initial sub-competencies of communicating were reduced to three underlying concepts which aid in simplifying what

TABLE 42: Communicating sub-competency component groupings.

Variable name	Sub-competency components	Sub-competencies		
		1	2	3
q0037_0001	Providing relevant information	**0.808**	–0.107	0.056
q0037_0002	Using suitable communication method for the audience	**0.763**	0.044	–0.056
q0037_0003	Aligning communication with environment or setting	**0.751**	–0.155	0.107
q0035_0001	Engaging stakeholders proactively	**0.638**	0.113	–0.017
q0035_0003	Maintaining formal and informal communication	**0.627**	0.218	–0.073
q0035_0002	Disseminating information effectively	**0.523**	0.208	0.055
q0034_0001	Listening actively	0.033	**0.817**	–0.092
q0034_0003	Responding to and acting upon expectations, concerns and issues	–0.082	**0.791**	0.124
q0034_0002	Understanding explicit and implicit content of communication	0.03	**0.699**	0.023
q0036_0002	Providing accurate and factual information	–0.023	–0.052	**0.957**
q0036_0003	Seeking validation of information	0.073	0.064	**0.525**
q0036_0001	Using appropriate information sources	0.1	0.239	**0.356**

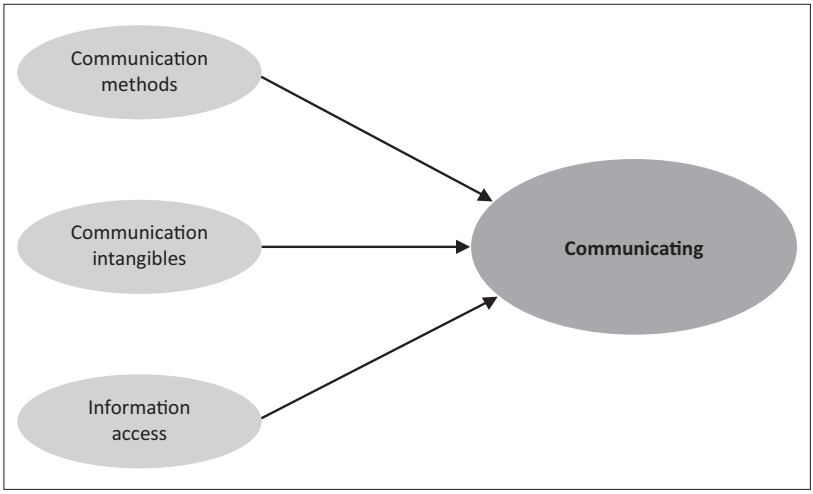

FIGURE 94: Sub-competencies of communicating unit of competence.

competencies are required for IT project managers. The communication method must be appropriate and adequate for the target audience (Brière *et al.* 2015; Project Management Institute 2013b). IT project managers are, therefore, required to select and use the correct method where applicable. Communication intangibles relate to the IT project manager's ability to listen, use instinct as well as develop and maintain social constructs such as relationships and trust (Smyth *et al.* 2010). IT project managers, teams and stakeholders require access to pivotal information throughout the duration of a project. Information must be factual, accurate and valid for the IT project manager, team and stakeholders to make informed decisions and perform their tasks as effectively as possible to deliver successful IT projects. Information must be available from various sources where information integrity is maintained. The IT project manager, team and stakeholders must have access to these sources to ensure there is transparency and the project delivers as initially established (Kerzner 2009). A visual summary of the sub-competencies is depicted in Figure 94.

The following section further analyses the components and sub-competencies of the communicating unit of competence by using the multivariate statistical technique of structural equation modelling.

Structural equation model for communicating unit of competence

The results of Table 42 are used as the basis to develop a SEM for the communicating unit of competence. The measurement model in Figure 95 is generated from the results

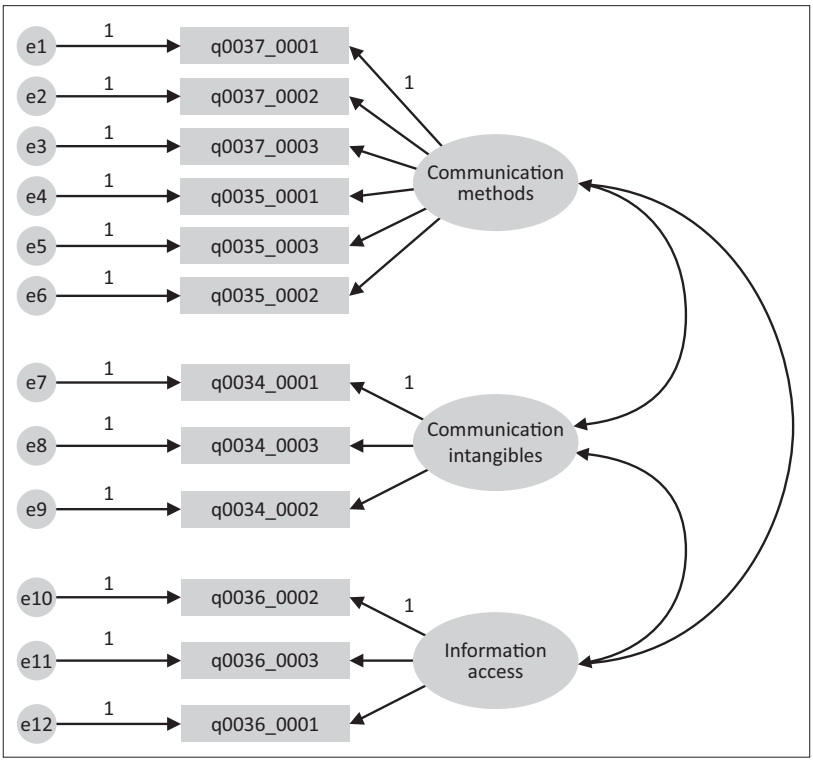

FIGURE 95: Communicating sub-competency and components measurement model.

of Table 42. The measurement model is required prior to developing the SEM. Variables q0037_0001, q0037_0002, q0037_0003, q0035_0001, q0035_0003 and q0035_0002 are the components of the communication methods sub-competency. Furthermore, variables q0034_0001, q0034_0003 and q0034_0002 are the components of communication intangibles and variables q0036_0002, q0036_0003 and q0036_0001 are the components of information access. Error terms are designated as before and are represented by e1-12.

Various model fit measures are used to validate the model. The model fit measures and results are shown in Table 43.

The validated SEM is depicted in Figure 96. The initial impression of the communicating SEM reveals that one component was removed from the information access sub-competency, namely q0036_0001 (using appropriate information sources). The implication is that using appropriate information sources is not a relevant or required sub-competency component for IT project managers. Furthermore, more emphasis should be placed on providing accurate and factual information (q0036_0002)

TABLE 43: Model fit measures and results for communicating SEM.

Model fit measures	Structural Equation Modelling	Cut-off levels employed	Results	Reference
Absolute fit measures	CMIN/DF (Chi-squared/Degrees of freedom)	≤ 5	2.20	Gaskin (2013); Marsh and Hocevar (1985); McKinney *et al.* (2002); Roh *et al.* (2005); Ullman (1996:709–812); Yatim (2008)
	RMR (Root Mean Square Residual)	≤ 0.05	0.02	Roh *et al.* (2005); Tabachnick and Fidell (1996:752)
	GFI (Goodness-of-Fit Index)	≥ 0.9	0.92	Doloi *et al.* (2011); Kim *et al.* (2009); Roh *et al.* (2005); Tabachnick and Fidell (1996:750)
Relative fit measures	NFI (Normal Fit Index)	≥ 0.9	0.91	Doloi *et al.* (2011); Stahl (2008); Tabachnick and Fidell (1996:749); Yatim (2008)
	TLI (Tucker-Lewis Index)	≥ 0.9	0.93	Doloi *et al.* (2011); Hair *et al.* (2006:753); Stahl (2008); Yatim (2008)
	CFI (Comparative Fit Index)	≥ 0.95	0.95	Anglim (2007); Doloi *et al.* (2011); Gaskin (2013); Hair *et al.* (2006:753); Roh *et al.* (2005); Stahl (2008); Tabachnick and Fidell (1996:749–750); Yatim (2008)
Fit measures based on the non-central chi-square distributions	RMSEA (Root Mean Square Error of Approximation)	≤ 0.08	0.07	Hoyle (2011:48); Marsh *et al.* (2004); McQuitty and Wolf (2013); Nunkoo and Ramkissoon (2012); Reisinger and Mavondo (2007)

and seeking validation of information (q0036_0003) with regard to the information access sub-competency.

A number of components are associated with each of the three identified sub-competencies. Communication methods variables q0037_0001, q0037_0002, q0037_0003, q0035_0001, q0035_0003 and q0035_0002 have regression weightings of 0.74, 0.74, 0.67, 0.72, 0.76 and 0.74 respectively. Communication intangibles variables q0034_0001, q0034_0003 and q0034_0002 have regression weightings of 0.77, 0.80 and 0.75 respectively. Furthermore, the variables for information access, q0036_0002 and q0036_0003 have regression weightings of 0.79 and 0.68 respectively. On the other hand, there are associations

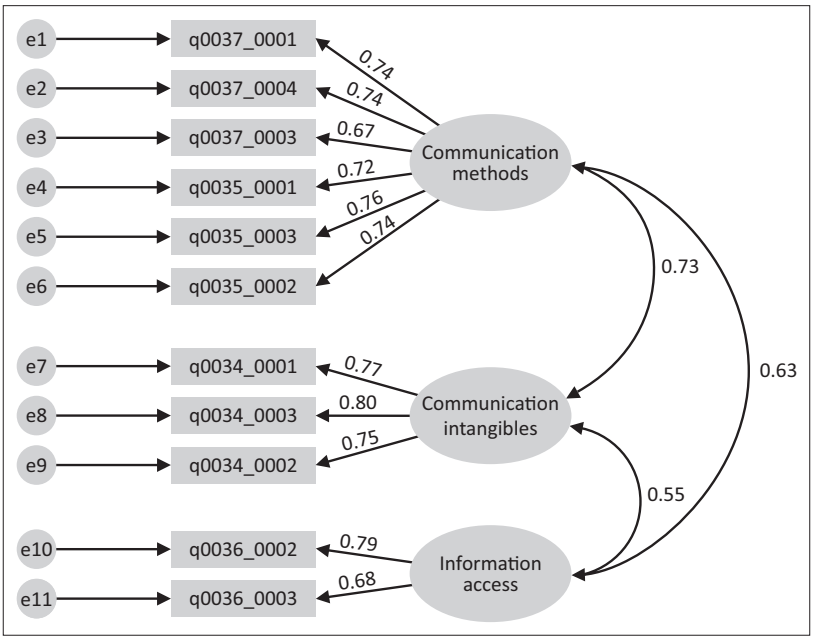

FIGURE 96: Validated SEM for communicating unit of competence.

amongst the sub-competencies themselves as well. Firstly, the correlation between communication methods and communication intangibles is 0.73. Secondly, the correlation between communication methods and information access is 0.63. Finally, the correlation between communication intangibles and information access is 0.55.

Communicating: SEM implications

A number of implications arise when analysing the results of the communicating SEM. The first implication revolves around the predictors of the communication methods sub-competency. The following components play a strong influencing role with regard to methods of communication:

- Providing relevant information.
- Using suitable communication method for the audience.
- Aligning communication with environment or setting.
- Engaging stakeholders proactively.
- Maintaining formal and informal communication.
- Disseminating information effectively.

The implication is that these six components are the real predictors of how IT project managers enable their communication methods competency. IT project managers must ensure relevant information is provided at all times as this, in turn, results in transparency within the project where all relevant parties have a common understanding about the project. Furthermore, IT project managers cannot simply rely on one method to communicate with all involved parties, as some methods are more conducive than others. For example, instant messaging and online forums would be more useful to the team, whilst face-to-face interaction and telephone calls are more useful to stakeholders who provide information or require it. This aligns with the fact that stakeholders must be engaged on a proactive level to ensure effective communication, and that communication must be relevant within the project's environment as different environments require different communication methods. The role of formal and informal communication methods was discussed in Chapter 5, and the same message can be transferred here. The overall message was that formal methods involve the utilisation of the formal communication channels, whilst informal methods exists outside the formal channels. Informal methods assist with developing trust and good working relationships. Chapter 5 also discussed three ways of disseminating information as well as the AA-BB-CC model that can be used to facilitate dissemination.

The second implication focuses on the predictors of communication intangibles. The following components play a strong influencing role: listening actively, responding to and acting upon expectations, concerns and issues and understanding explicit and implicit content of communication. The implication, therefore, is that these three components are the real predictors of communication intangibles. These results align directly to the findings in Chapter 5. IT project managers must be able to understand and articulate stakeholder communications regardless of method used and transfer the message to the project team and other stakeholders whilst maintaining the same meaning. This requires the IT project manager to listen actively and understand explicit and implicit content to avoid any level of confusion. Furthermore, this enables the IT project manager to respond and act within expectations of the stakeholder whilst ensuring concerns and issues are addressed accordingly.

The third implication concerns the predictors of information access. Only two components were identified as playing a strong influencing role, namely, providing accurate and factual information and seeking validation of information. It is important to note that a component was removed from the information access sub-competency, namely, using appropriate information sources. This component is therefore not required as a sub-competency component for IT project managers. IT project managers are required to validate information more vigorously as they use so many different information sources and do not depend on a select few. Furthermore, with no emphasis placed on information source, the IT project manager can focus on providing the best possible information when required. This also allows IT project managers to focus on interacting more with the project team and stakeholders rather than on administrative work.

The fourth implication revolves around the relationship between communication methods and communication intangibles. The SEM (Figure 96) shows that the correlation between the two sub-competencies is 0.73, which implies that there is a strong positive relationship between the two. Although logic dictates that this relationship is common sense, the results of the SEM confirm this to be empirically true. The methods employed have a direct and positive relationship with the intangible nature of communication. In other words, the more suitable the method the better the explicit and implicit understanding of the content and the better the message is conveyed to all relevant parties.

The relationship between communication methods and information access is the fifth implication of the communicating SEM. The correlation between the two sub-competencies is 0.63, implying that there is moderate to strong positive relationship between the two. Accessing information is facilitated by the communication methods used. For example, certain information can be disseminated electronically as text or diagrams, whilst other information is best disseminated via direct, fact-to-face interaction to effectively convey the message. The method of communication also provides guidelines regarding how information is accessed and validated. As discussed previously, the IT project manager must ensure the method is conducive and appropriate for each of the involved parties.

The sixth and final implication is that of the relationship between communication intangibles and information access. Although this is the weakest result, there is a moderate positive relationship between the two sub-competencies as the correlation is 0.55. The intangible aspects of communication are dependent on the IT project managers as they are required to interpret facial expressions, body language, gestures, postures or vocal qualities. These interpretations are used to validate information for accuracy and factuality and thus facilitate information access. Based on this reasoning, the relationship between the two sub-components is logically sound.

As mentioned previously, communication management is one of the 10 knowledge areas within PMBOK® Guide (Project Management Institute 2013b). The Project Management Institute (2013a:5) explicitly states that IT project managers '... have difficulty communicating with the appropriate levels of clarity and detail'. Furthermore, research amongst global leaders has revealed frequent and open communication as the sixth ranked competency as it not only creates transparency but also a sense of social belonging amongst all involved parties (Giles 2016). It, therefore, makes logical sense that communication is not taken lightly as IT project managers are also required to establish effective levels of communication amongst team members and stakeholders (internal and external).

The following section investigates and discusses the sub-competencies and components of the leading unit of competence.

Unit of competence: Leading

The leading unit of competence states that a project manager '... guides, inspires and motivates team members and other project stakeholders to manage and overcome issues to effectively achieve project objectives' (Project Management Institute 2007). The PMCDF recognises the following sub-competencies for leading:

- Creates a team environment that promotes high performance.
- Builds and maintains effective relationships.
- Motivates and mentors project team members.
- Takes accountability for delivering project.
- Uses influencing skills when required.

The EFA results in Table 44 reduce the five sub-competencies into two key sub-competencies.

The two identified sub-competencies are project team support and project team encouragement. The IT project manager is merely a single person who cannot realise project success unless his or her team performs accordingly. It is the responsibility of the IT project manager to ensure the team is supported wherever possible as this enables them to do their job and deliver on agreed upon expectations. Limited or mediocre support is unacceptable as the team must feel as though they have a sense of belonging and purpose (Giles 2016). IT project managers must also encourage and motivate the team to push beyond their limits and comfort zones, as this will not only benefit the project but also their personal development. The team must also be recognised for the effort expended and role they played when delivering a project regardless of project outcome. Project team encouragement is essential to ensure turnover of personnel is not high and that key skill sets are kept within the organisation. This is especially true in the South African context where organisations suffer significant IT skill shortages (CNBC Africa 2014). Figure 97 illustrates the sub-competencies of the leading unit of competence.

Structural equation model for leading unit of competence

The measurement model in Figure 98 is created from the results in Table 44. Variables q0039_0001, q0041_0002, q0042_0001, q0040_0003, q0042_0002, q0041_0003, q0039_0002 and q0040_0002 are the components of project team support. Variables q0040_0001, q0038_0002, q0038_0004, q0039_0003, q0041_0001, q0038_0001 and q0038_0003 are the components of project team encouragement. The error terms are denoted by e1-15.

The model fit measures and results for the leading SEM are shown in Table 45.

The final and validated SEM is depicted in Figure 99. A comparison of Figures 98 and 99 shows that a number of components are omitted to develop a valid SEM for leading.

TABLE 44: Leading sub-competency component groupings.

Variable name	Sub-competency components	Sub-competencies	
		1	2
q0039_0001	Confining relationships to work-related matters appropriate to the project and local culture	**0.81**	–0.1
q0041_0002	Aligning personal activities and priorities toward increasing likelihood of achieving project goals	**0.749**	–0.11
q0042_0001	Applying appropriate influencing technique to each stakeholder	**0.731**	0.069
q0040_0003	Establishing mentoring relationships for team members' development	**0.639**	0.061
q0042_0002	Using experts or third parties to persuade others	**0.621**	–0.102
q0041_0003	Supporting and promoting team's actions and decisions	**0.57**	0.228
q0039_0002	Building trust and confidence with stakeholders	**0.56**	0.278
q0040_0002	Rewarding performance according to organisation guidelines	**0.46**	0.274
q0040_0001	Establishing and communicating to the team the project vision, mission statement and strategic value	–0.196	**0.954**
q0038_0002	Promoting team learning and advocating professional and personal development	–0.178	**0.931**
q0038_0004	Demanding and modelling high performance	0.155	**0.522**
q0039_0003	Creating an environment that encourages openness, respect and consideration of stakeholders	0.358	**0.493**
q0041_0001	Demonstrating ownership of, accountability for, and commitment to the project	0.294	**0.447**
q0038_0001	Expressing positive expectations of team	0.278	**0.428**
q0038_0003	Encouraging teamwork consistently	0.318	**0.424**

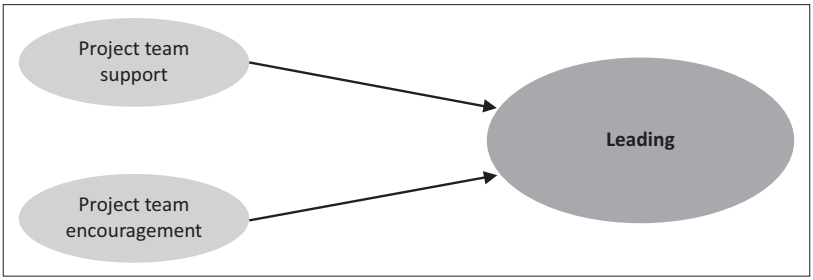

FIGURE 97: Sub-competencies of leading unit of competence.

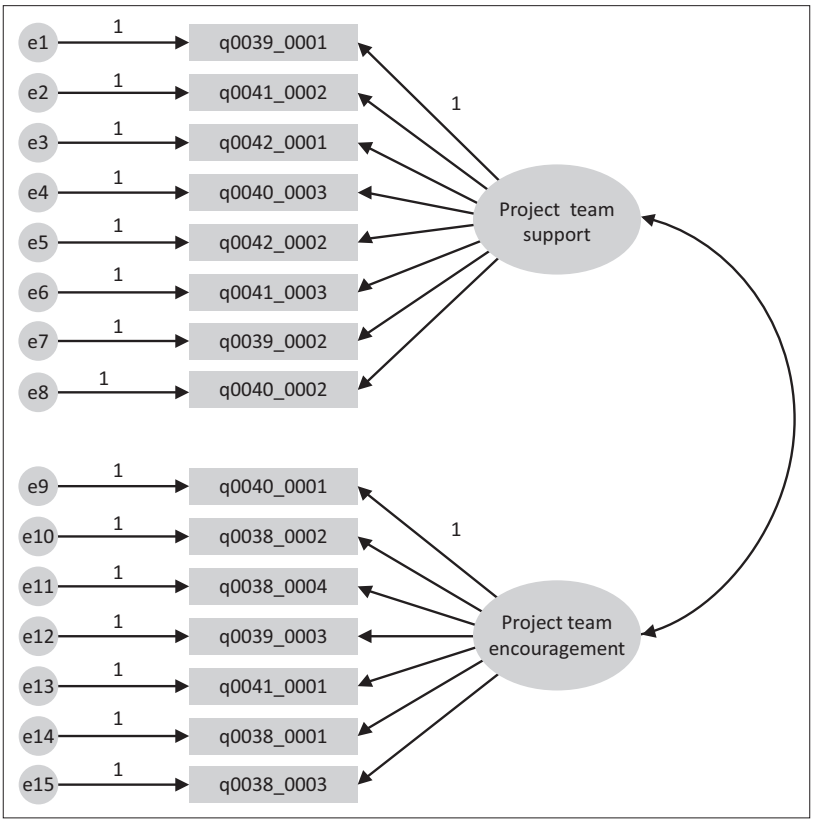

FIGURE 98: Leading sub-competency and components measurement model.

These omissions are discussed in more detail in the implications section. Project team support variables q0039_0001, q0042_0001, q0041_0003, q0039_0002 and q0040_0002 have regression weightings 0.68, 0.76, 0.78, 0.82 and 0.68 respectively. Project team encourage variables q0040_0001, q0039_0003, q0041_0001, q0038_0001 and q0038_0003 have regression weightings 0.68, 0.80, 0.76, 0.67 and 0.69 respectively. There is a correlation between the two sub-competencies of 0.95.

Leading: SEM implications

There are a number of implications associated with the Leading SEM (Figure 99). The first implication focuses on the predictors of project team support:

TABLE 45: Model fit measures and results for leading SEM.

Model fit measures	Structural Equation Modelling	Cut-off levels employed	Results	Reference
Absolute fit measures	CMIN/DF (Chi-squared/ Degrees of freedom)	≤ 5	2.00	Gaskin (2013); Marsh and Hocevar (1985); McKinney *et al.* (2002); Roh *et al.* (2005); Ullman (1996:709–812); Yatim (2008)
	RMR (Root Mean Square Residual)	≤ 0.05	0.02	Roh *et al.* (2005); Tabachnick and Fidell (1996:752)
	GFI (Goodness-of-Fit Index)	≥ 0.9	0.93	Doloi *et al.* (2011); Kim *et al.* (2009); Roh *et al.* (2005); Tabachnick and Fidell (1996:750)
Relative fit measures	NFI (Normal Fit Index)	≥ 0.9	0.93	Doloi *et al.* (2011); Stahl (2008); Tabachnick and Fidell (1996:749); Yatim (2008)
	TLI (Tucker-Lewis Index)	≥ 0.9	0.95	Doloi *et al.* (2011); Hair *et al.* (2006:753); Stahl (2008); Yatim (2008)
	CFI (Comparative Fit Index)	≥ 0.95	0.96	Anglim (2007); Doloi *et al.* (2011); Gaskin (2013); Hair *et al.* (2006:753); Roh *et al.* (2005); Stahl (2008); Tabachnick and Fidell (1996:749–750); Yatim (2008)
Fit measures based on the non-central chi-square distributions	RMSEA (Root Mean Square Error of Approximation)	≤ 0.08	0.07	Hoyle (2011:48); Marsh *et al.* (2004); McQuitty and Wolf (2013); Nunkoo and Ramkissoon (2012); Reisinger and Mavondo (2007)

- Confining relationships to work-related matters appropriate to the project and local culture.
- Applying an appropriate influencing technique to each stakeholder.
- Supporting and promoting the team's actions and decisions.
- Building trust and confidence with stakeholders.
- Rewarding performance according to the organisation's guidelines.

As discussed in Chapter 5, IT project managers are expected to remain professional at all times and ensure that their personal issues do not interfere with the project. Although it is imperative to build trust and confidence with stakeholders, the IT project manager

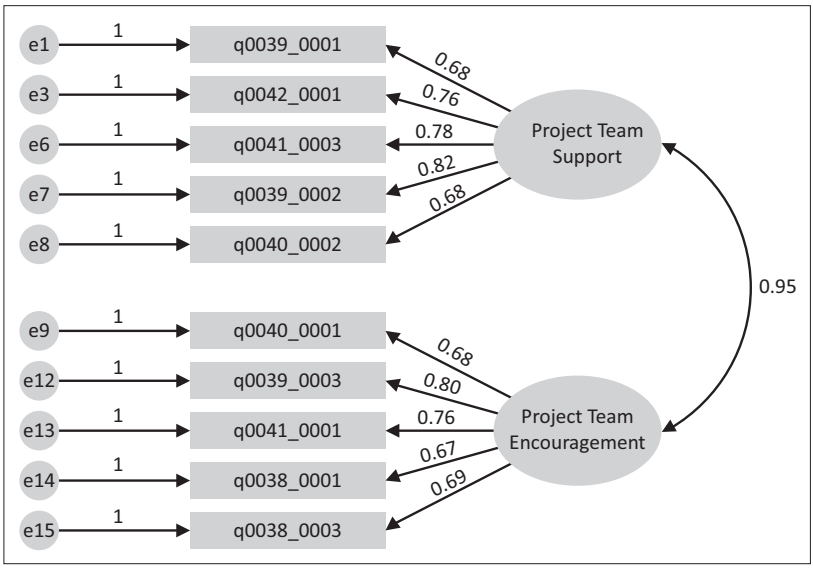

FIGURE 99: Validated SEM for leading unit of competence.

must be wary of the relationship staying within the project's boundaries. Personal relationships can obstruct the IT project manager's ability to make rational decisions. Personal relationships should not be used as an influencing technique. IT project managers should rather use the appropriate techniques for the project at hand. Confining relationships to project-related matters and using the correct influencing techniques will enhance the IT project manager's ability to build trust and confidence amongst stakeholders. On the other hand, the actions and decisions of the team should be supported and promoted wherever possible as this improves the morale amongst the team and motivates them. Furthermore, team morale and motivation can be achieved by rewarding their performance in line with organisational policies and guidelines. IT project managers should therefore incentivise the project team and reward them accordingly as this translates to improved project performance.

Continuing with the implications around project team upport, three components are removed, namely, aligning personal activities and priorities toward increasing likelihood of achieving project goals, establishing mentoring relationships for team members' development and using experts or third parties to persuade others. Interestingly, the omission of using experts or third parties to persuade others aligns to the omission of including experts in meetings and discussions to influence and obtain stakeholder support sub-competency component in the effectiveness SEM. This arguably validates that the use of expert opinion is not paramount for IT project managers and IT projects. On the

other hand, the omission of establishing mentoring relationships for team members' development is surprising as IT project managers are expected to assist with team members' development to ensure the team stay abreast of new technologies and trends. Aligning personal activities and priorities toward increasing likelihood of achieving project goals relates to the balancing individual interest and organisational interest component of the professionalism unit of competence. However, the omission of the former implies that it is not important for IT project managers to align the personal activities and priorities to project goals. Furthermore, the implication is that the other omissions are also irrelevant to IT project managers.

The second implication revolves around the predictors of project team encouragement:

- Establishing and communicating to the team the project vision, mission statement and strategic value.
- Creating an environment that encourages openness, respect and consideration of stakeholders.
- Demonstrating ownership of, accountability for, and commitment to the project.
- Expressing positive expectations of the team.
- Encouraging teamwork consistently.

An IT project manager must ensure the team understands the project vision, mission and value as this ensures they understand their role within the project. The more the team understand their roles, the more likely the team will perform well and, in turn, the project. An environment which encourages openness, respect and regard for stakeholders must be created by IT project managers. The best way to achieve this is to lead by example and create the environment amongst the project team. The team will draw on this and apply it to stakeholders as well. Demonstrating ownership of, accountability for, and commitment to the project are key components IT project managers must exhibit as they should not 'pass the buck'. Key leadership traits are providing safety for trial and error, as well as being open to new ideas and approaches (Giles 2016). These traits are prerequisites for expressing positive expectations of the team and encouraging teamwork consistently. Teamwork can be encouraged through open communication and allowing team members to provide input during project conversations (Peterson 2007). Furthermore, team building and celebratory activities work towards improving teamwork. IT project managers must maintain positivity throughout as team members draw from this and use it as motivation as well. The team should not be overly criticised, and constructive criticism should be provided so that they can learn and better themselves during the project and for future projects.

Two components were removed from project team encouragement to validate the model, namely, promoting team learning and advocating professional and personal development, and demanding and modelling high performance. The omission of promoting team learning and advocating professional and personal development aligns to

the omission of establishing mentoring relationships for team members' development from project team support. It is therefore not necessary for IT project managers to facilitate team learning, professional and personal development. IT project team members are possibly taking it upon themselves to learn and develop further. IT project managers also do not demand high performance. It is possible that high performance does not need to be demanded as it is achieved as a by-product of other competencies and sub-competencies.

The third and final implication focuses on the relationship between project team support and project team encouragement. There is a correlation of 0.95 which implies there is a very strong positive correlation between them. The project team should be supported as much as they are encouraged and vice versa. The very strong correlation suggests that the two work in tandem more than any other sub-competencies and the IT project manager must ensure team support and encouragement is maintained throughout the project. Furthermore, support and encouragement should arguably go beyond the project as this will facilitate improved team and personal performance within the organisation. The most important requirement that the IT project manager leads by example during good and bad periods (Kirkpatrick & Locke 1991).

Effective leadership is paramount to any project (Müller & Turner 2010). The discussion above clarifies the various sub-competencies and components required for IT project managers to lead IT projects successfully. A clear balance has to be struck between each sub-competence and components. Furthermore, certain components are deemed not necessary for IT project managers, which further simplifies the competencies required to this specific project management domain.

The managing unit of competence is discussed in the following section.

Unit of competence: Managing

The ability to manage IT projects '... through the appropriate deployment and use of human, financial, material, intellectual, and intangible resources' is crucial to IT project managers (Project Management Institute 2007:30). The PMCDF states that the managing unit of competence consists of three sub-components (Project Management Institute 2007), namely, builds and maintains the project team, plans and manages for project success in an organised manner, and resolves conflict involving project team or stakeholders. If the IT project manager is not proficient at these, the project is inevitably going to perform poorly. The EFA results in Table 46 contest the sub-competencies of the PMCDF and assert that managing consists of two sub-competencies for IT project managers.

The two identified sub-competencies are practice adaptation and team dynamics. Practice adaptation revolves around the IT project manager's ability to tailor the various practices, processes, procedures and policies for the IT project at hand. There are various

TABLE 46: Managing sub-competency component groupings.

Variable names	Sub-competency components	Sub-competencies	
		1	2
q0044_0003	Tailoring generally accepted practices for successful completion of the project	**0.838**	–0.12
q0044_0004	Organising project information, emphasizing appropriate levels of detail	**0.775**	–0.013
q0044_0005	Insisting on compliance with processes, procedures and policies	**0.732**	0
q0044_0002	Applying organisation or industry standards and generally accepted practices to the project	**0.655**	0.119
q0044_0001	Working with others to clearly identify project scope, roles, expectations and task specifications	**0.639**	0.127
q0045_0001	Ensuring that the team and stakeholders are fully aware of team rules	**0.496**	0.316
q0045_0002	Recognising conflict	–0.081	**0.8**
q0045_0003	Resolving conflicts	0.059	**0.745**
q0043_0002	Maintaining a positive attitude and effective relationships amongst team members	0.006	**0.715**
q0043_0001	Ensuring expectations and responsibilities are clear to team members and they understand their importance to the project	0.118	**0.637**
q0043_0003	Identifying, evaluating and selecting internal and external talent	–0.027	**0.598**
q0043_0004	Promoting healthy work-life balance	0.143	**0.386**

complexities and types of IT projects implemented which in turn require varying processes, procedures and policies (Chin 2004). Although certain projects may be analogous to previous projects, there are always subtle differences between them which require new and different approaches (Schwalbe 2013). Furthermore, the team and stakeholders should be kept updated on a continuous basis with regard to the approaches used as well as the rules which govern the project. As discussed previously, IT projects are deployed and implemented in a wide range of industries which make use of industry standards that must be applied and complied with. For example, many industries employ the ISO 9000 Quality Management standard which '... provides guidelines and tools for companies and organisations who want to ensure that their products and services consistently meet customer's requirements, and that quality is consistently improved' (International Organization for Standardization 2016). On the other hand, it was discovered in Chapter 5 that whilst IT project managers are adhering to standards and best practices, they also expect team members to comply with industry standards and best practices.

Team dynamics have been documented in research as a cause of derailing projects (Pinto 2014). Furthermore, team dynamics are a large contributing factor to an IT project team's success and, in turn, the IT project's success (Gelbard & Carmeli 2009). IT project teams consist of various individuals with the skill sets required to perform certain tasks and responsibilities during the project. These individuals must be correctly identified to ensure the correct talent is acquired for the IT project at hand. IT project managers are therefore responsible for identifying, evaluating and selecting the required talent from internal and external sources. Recognising and resolving conflicts during a project are two sub-competency components IT project managers require. Similar to other projects, conflict and bureaucratic issues plague IT projects and subsequently adversely affect them (Gelbard & Carmeli 2009). IT project managers cannot simply stand back and expect conflicts to resolve themselves but must take the initiative and address them as soon as possible. Moreover, IT project managers should have a proactive stance and mitigate conflicts before they occur as best as possible. Randeree and Faramawy (2011) do, however, assert that the flipside of conflict is that it can foster positive change and increase awareness of areas of concern and facilitate improvement. Maintaining a positive attitude and relationships amongst team members is paramount for IT project managers as the team must stay motivated throughout a project's duration. Connecting and belonging is a top five leadership competency according to various global organisation leaders (Giles 2016). A positive team functions at a much higher level than a discontented and demotivated team. It is, therefore, important for IT project managers to promote a healthy work-life balance. Analysis of the relationship between IT project manager's and team members' work-life balance in Chapter 5, however, revealed a disturbing reality. IT project managers only look after their own personal work-life balance and ignore the work-life balance of the team members and vice versa. A visual representation of managing sub-competencies is illustrated in Figure 100.

The following section discusses the cognitive ability unit of competence.

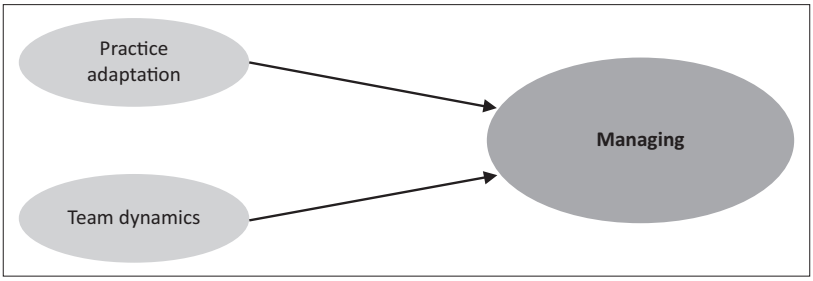

FIGURE 100: Sub-competencies of managing unit of competence.

Unit of competence: Cognitive ability

As per Chapter 5, cognitive abilities centre around an IT project manager's brain-based skills required to carry out any task, from the simplest to the most complex. The focus is on mechanisms of how IT project managers learn, remember, do problem-solving and pay attention rather than on any actual knowledge. The PMCDF states that cognitive ability consists of four sub-competencies:

- Takes a holistic view of project.
- Effectively resolves issues and solves problems.
- Uses appropriate project management tools and techniques.
- Seeks opportunities to improve project outcome.

EFA was conducted on the sub-competencies and components thereof. Table 47 shows the results of sub-competency component EFA groupings.

Three sub-competencies were identified and categorised from the EFA, namely, analytical ability, environmental understanding, and tools and techniques usage. The four initial sub-competencies were reduced to three underlying concepts, and aid the simplification of what competencies are required for IT project managers. IT project managers are continuously faced with problems and issues throughout an IT project and thus require the ability to analyse and assess situations in order to apply corrective measures (Keil *et al.* 2013). This concept is encapsulated within the first identified sub-competency of analytical ability. Furthermore, a holistic view of the environment and understanding thereof is essential for IT project managers to analyse and address problems (El-Sabaa 2001). IT project managers do not only implement IT projects in IT organisations but also in a wide range of organisation and industries (Marnewick 2013b). Organisations and industries vary tremendously, and IT project managers must have the relevant knowledge and understanding to ensure they implement the IT project correctly. Analytical ability and environmental understanding is facilitated by the usage of various tools and techniques (Seabra & Almeida 2015). A wide range of tools and techniques, such as WBS and network diagrams, is available to IT project managers and assists in effectively and efficiently managing an IT project to completion (Schwalbe 2013). Similar to methods of communication, it is pivotal that IT project managers use the appropriate tools and techniques for the task at hand as incorrect usage could have adverse effects on the project's performance. Figure 101 provides a visual representation of the identified sub-competencies of cognitive ability.

The following section further analyses the components and sub-competencies of the cognitive ability unit of competence by using structural equation modelling.

TABLE 47: Cognitive ability sub-competency component groupings.

Variable name	Sub-competency components	Sub-competencies		
		1	2	3
q0047_0004	Aggregating multiple related issues to understand the complete picture	**1.036**	–0.102	–0.254
q0047_0005	Observing discrepancies, trends and interrelationships in project data	**0.721**	–0.055	0.058
q0047_0001	Simplifying complexities for a complete and accurate analysis	**0.583**	0.144	–0.003
q0049_0001	Providing a framework to address opportunities and concerns	**0.544**	0.039	0.155
q0047_0002	Applying complex concepts or tools when needed	**0.542**	–0.045	0.287
q0049_0002	Looking for opportunities to improve project value or execution	**0.531**	0.065	0.204
q0047_0003	Applying lessons learned to resolve current project issues	**0.4**	0.36	–0.107
q0049_0003	Seizing relevant opportunities as they emerge	**0.319**	0.297	0.217
q0046_0002	Understanding how project actions impact other areas of the project, other projects and organisational environment	0.066	**0.824**	–0.125
q0046_0001	Understanding project stakeholders needs, interests and influence for project success	0.012	**0.797**	–0.06
q0046_0003	Understanding both the formal and informal structure of organisations	–0.08	**0.778**	0.052
q0046_0004	Understanding organisational politics	–0.098	**0.745**	0.081
q0049_0004	Consolidating opportunities and passing them to the organisation	0.333	**0.351**	0.151
q0046_0005	Using emotional intelligence to understand and explain others' past actions and current attitudes, and anticipate future behaviour	0.274	**0.295**	0.185
q0048_0002	Selecting appropriate tools and/or techniques	–0.183	0.023	**1.012**
q0048_0001	Understanding PM tools and techniques	–0.031	0.044	**0.862**
q0048_0003	Applying selected tools and/or techniques to project management	0.154	–0.128	**0.829**

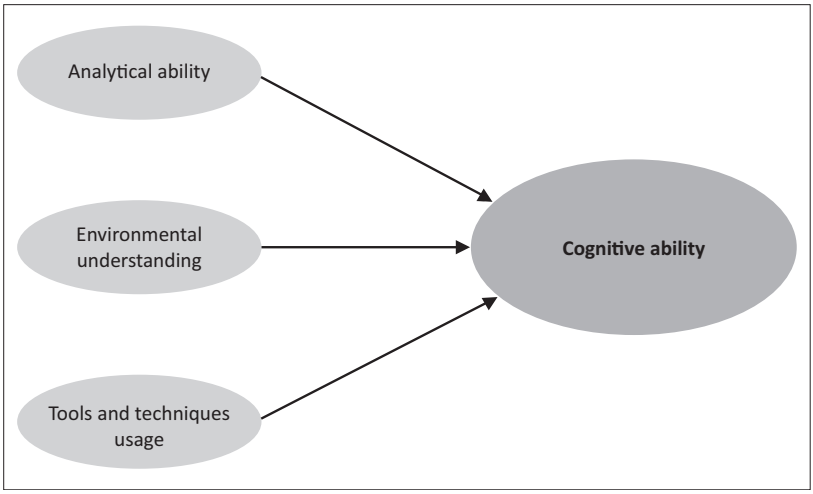

FIGURE 101: Sub-competencies of cognitive ability unit of competence.

Structural equation model for cognitive ability unit of competence

The initial measurement model is depicted in Figure 102 based on the results in Table 47. Firstly, variables q0047_0004, q0047_0005, q0047_0001, q0049_0001, q0047_0002, q0049_0002, q0047_0003 and q0049_0003 are the components of analytical ability. Secondly, the components of environmental understanding are variables q0046_0002, q0046_0001, q0046_0003, q0046_0004, q0049_0004 and q0046_0005. Finally, variables q0048_0002, q0048_0001 and q0048_0003 are the components of tools and techniques usage. Error terms e1 – 17 are also represented within the measure model.

Table 48 shows the model fit measures and results for the cognitive ability SEM.

The validated SEM for cognitive ability is depicted in Figure 103. It is substantially different from Figure 102 as a number of components have been removed to create a valid SEM for cognitive ability. These omissions are discussed as part of the implications section given the number of omissions. Analytical ability consists of q0049_0002 and q0049_0003 with regression weightings of 0.69 and 0.73 respectively. Environmental understanding consists of q0046_0002, q0046_0001, q0046_0003, q0046_0004 and q0049_0004 with regression weightings 0.78, 0.77, 0.76, 0.71 and

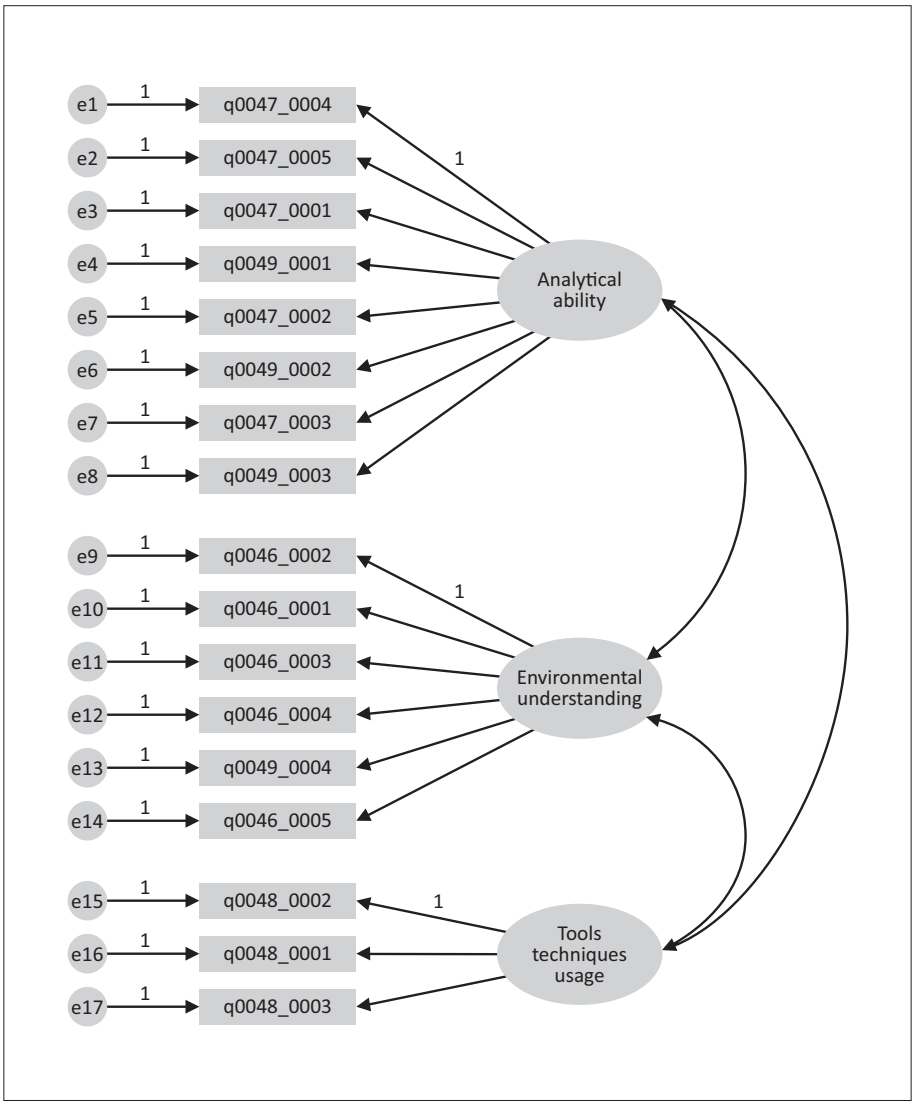

FIGURE 102: Cognitive ability sub-competencies and components measurement model.

TABLE 48: Model fit measures and results for cognitive ability SEM.

Model fit measures	Structural Equation Modelling	Cut-off levels employed	Results	Reference
Absolute fit measures	CMIN/DF (Chi-squared/ Degrees of freedom)	≤ 5	2.21	Gaskin (2013); Marsh and Hocevar (1985); McKinney *et al.* (2002); Roh *et al.* (2005); Ullman (1996:709–812); Yatim (2008)
	RMR (Root Mean Square Residual)	≤ 0.05	0.03	Roh *et al.* (2005); Tabachnick and Fidell (1996:752)
	GFI (Goodness-of-Fit Index)	≥ 0.9	0.93	Doloi *et al.* (2011); Kim *et al.* (2009); Roh *et al.* (2005); Tabachnick and Fidell (1996:750)
Relative fit measures	NFI (Normal Fit Index)	≥ 0.9	0.94	Doloi *et al.* (2011); Stahl (2008)Tabachnick and Fidell (1996:749); Yatim (2008)
	TLI (Tucker-Lewis Index)	≥ 0.9	0.95	Doloi *et al.* (2011); Hair *et al.* (2006:753); Stahl (2008); Yatim (2008)
	CFI (Comparative Fit Index)	≥ 0.95	0.96	Anglim (2007); Doloi *et al.* (2011); Gaskin (2013); Hair *et al.* (2006:753); Roh *et al.* (2005); Stahl (2008); Tabachnick and Fidell (1996:749–750); Yatim (2008)
Fit measures based on the non-central chi-square distributions	RMSEA (Root Mean Square Error of Approximation)	≤ 0.08	0.07	Hoyle (2011:48); Marsh *et al.* (2004); McQuitty and Wolf (2013); Nunkoo and Ramkissoon (2012); Reisinger and Mavondo (2007)

0.68 respectively. Tools and techniques usage consists of q0048_0002, q0048_0001 and q0048_0003 with regression weightings 0.91, 0.89 and 0.83 respectively. The three sub-competencies also have relationships as depicted. Analytical ability and environmental understanding have a correlation of 0.88 whilst analytical ability and tools and techniques usage have a correlation of 0.76. The correlation between environmental understanding and tools and techniques usage is 0.63. Included in the cognitive ability SEM is a correlation (0.43) between error term e8 and e13 implying that there is relationship between the underlying components.

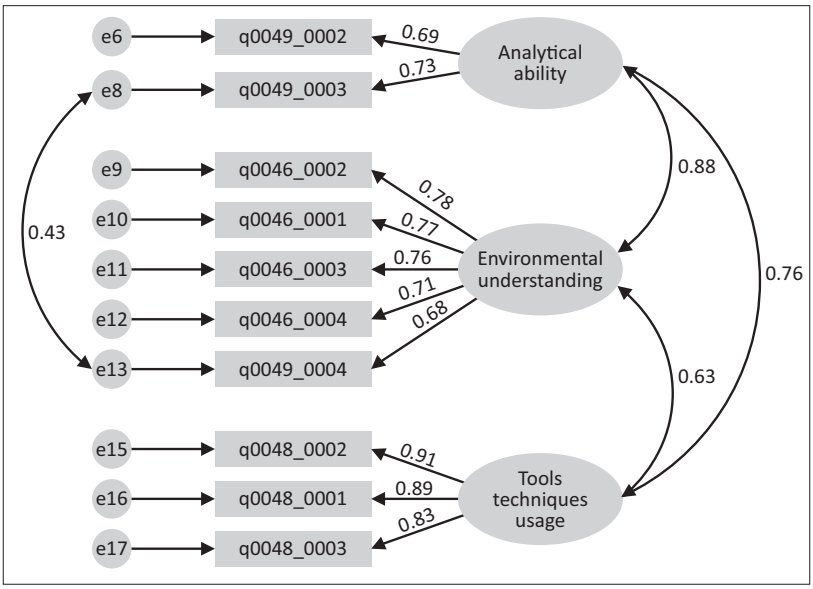

FIGURE 103: Validated SEM for cognitive ability unit of competence.

Cognitive ability: SEM implications

Several implications arise from the cognitive ability SEM. The first implication focuses on the predictors of analytical ability, namely, looking for opportunities to improve project value or execution and seizing relevant opportunities as they emerge. The original EFA results suggested that there are eight components associated with the analytical ability sub-competency. The SEM, however, reveals that only two components are required by IT project managers as six sub-competency components were removed to develop a valid cognitive ability SEM. The following components are omitted:

- Aggregating multiple related issues to understand the complete picture.
- Observing discrepancies, trends and interrelationships in project data.
- Simplifying complexities for a complete and accurate analysis.
- Providing a framework to address opportunities and concerns.
- Applying complex concepts or tools when needed.
- Applying lessons learned to resolve current project issues.

This suggests that these six components are not required for IT project management competency. With regard to analytical ability, IT project managers require the ability to

explore and consider opportunities to improve an IT project's value and execution. IT projects change at an alarming rate compared to other project types and thus require project managers who are able to assess and take opportunities to improve the value proposition of the project, as well as enhance the execution and implementation of the project. This in turn implies that IT project managers must seize appropriate opportunities as they materialise to realise improved value and execution. Challenges arise on a continuous basis thus forcing IT project managers to remain 'on their toes' to address the various challenges.

The second implication revolves around the predictors of environmental understanding:

- Understanding how project actions impact other areas of the project, other projects and organisational environment.
- Understanding project stakeholders needs, interests and influence for project success.
- Understanding both the formal and informal structure of organisations.
- Understanding organisational politics.
- Consolidating opportunities and passing them to the organisation.

One component was omitted from the SEM, namely, using emotional intelligence to understand and explain others' past actions and current attitudes and anticipate future behaviour. IT project managers are, therefore, not required to exhibit this sub-competency component as it is not relevant within the IT project domain. IT projects are not performed in isolation and are often part of a portfolio and programme of IT projects which must be implemented to realise organisational strategies. Having an understanding how IT project actions can influence other organisational areas is therefore imperative as organisational strategy implementation is at stake. Similar to the communicating unit of competence SEM, project stakeholder needs must be managed to ensure they are satisfied and benefit from an IT projects output. Formal and informal structures exist within organisations. A clear understanding of both is essential for IT project managers as this ties in with maintaining formal and informal communication within the communicating SEM. Organisational politics influence IT projects just as much as any other area within an organisation. Politics can often cause issues amongst team members and stakeholders, especially if hidden agendas are at play. These politics could subsequently adversely affect IT project performance and outcome. It is, therefore, the IT project manager's responsibility to ensure the organisational politics are understood and integrated when managing IT projects (Aubry, Hobbs & Thuillier 2009). Looking for opportunities was a component within cognitive ability which IT project managers require. This feeds into the IT project manager's ability to consolidate and transfer the opportunities to higher organisational levels. The notion is to ensure that benefits arise and organisational strategies are realised from the IT project.

The third implication is that the following three components are predictors of tools and techniques usage, namely, selecting appropriate tools and/or techniques, understanding PM tools and techniques, and applying selected tools and/or techniques to project management. No omissions were made for this sub-competency, implying that all three components are indeed required by IT project managers. There are a plethora of tools and techniques available to IT project managers. Critical understanding of the various tools and techniques is therefore required as IT project managers cannot select the correct or best suited one if they do not understand the purpose and value of each tool and technique. For example, there are many tools and techniques for monitoring and controlling an IT project's schedule: activity-on-arrow network diagrams, precedence diagramming method, Gantt charts, critical path method, critical chain scheduling and programme evaluation and review technique (Schwalbe 2013). Each of these needs to be understood, especially with regard to their strengths and weaknesses. Only once the IT project manager understands each tool and technique can he or she make a selection. Furthermore, a clear understanding of the tools and techniques allows the IT project manager to apply the selected ones when and where necessary, as well as analyse and interpret their output.

The relationship between analytical ability and environmental understanding is the fourth implication. The correlation is 0.88 which implies there is a very strong positive relationship between the two sub-competencies. A clear, profound understanding of the five components within environmental understanding allows the IT project manager to seek and seize opportunities to improve IT project value creation and execution. These sub-competencies work in tandem to ensure the IT project delivers the agreed upon benefits and satisfies the various stakeholders. Furthermore, organisational strategy realisation is facilitated when an IT project manager applies these two sub-competencies. The model also indicates that there is an underlying relationship between e8 and e13 as the correlation is 0.43. This implies that seizing relevant opportunities as they emerge and consolidating opportunities and passing them to the organisation have a moderate positive relationship. The relationship seems logical as the IT project manager must consolidate and transfer seized opportunities to the organisation in order to ensure the project performs well and delivers as expected. If opportunities are merely grabbed without considering the 'bigger picture', there is no guarantee that they will translate to stakeholder and organisational benefits. It is, therefore, imperative that the IT project manager takes opportunities that, when consolidated and aggregated, create value on a large scale for stakeholders.

The relationship between analytical ability and tools and techniques usage is the fifth implication. The correlation result (0.76) indicates there is a strong positive relationship between them. This relationship is inevitable, and the SEM has empirically validated it. IT project managers must understand, select and apply the correct tools and techniques

throughout an IT project's life cycle. This in turn allows the IT project manager to seek and seize opportunities. IT projects are renowned for their poor performance and lacklustre value creation (Hastie & Wojewoda 2015; Marnewick 2013b). Opportunities should therefore be taken, whenever possible, to help IT projects stay within the triple constraint of time, cost and scope, as well as to deliver the expected benefits and value to stakeholders and organisation.

The sixth and final implication is the relationship between environmental understanding and tools and techniques usage. Although this is the weakest of all sub-competency correlations, there is a moderate positive relationship between them as the correlation is 0.63. This implies that IT project managers must use the tools and techniques which are best suited for the project and organisational environment. Realising organisational strategies can only be achieved if the correct tools and techniques are used during an IT project's duration. Alignment between these two sub-competencies is key as there are many intricate relationships between the project and stakeholders.

Cognitive ability overlaps the technical and soft skills of the IT project manager. Whilst certain components can be taught through formal programmes and training, others are acquired over time and through experience. It is, therefore, essential that IT project managers under the same project management office share their knowledge and wisdom, especially with younger IT project managers. The world has become a knowledge economy and knowledge sharing is a key prerequisite to enable this type of economy. Learning from more experienced individuals is imperative regardless of industry or discipline as these individuals facilitate knowledge acquisition and indirectly promote self-confidence (Zackariasson 2014) (Figure 103).

The effectiveness unit of competence is analysed and discussed in the next section.

Unit of competence: Effectiveness

Effectiveness focuses on the IT project manager producing '... desired results by using appropriate resources, tools and techniques in all project management activities' (Project Management Institute 2007:34). This unit of competence, therefore, encapsulates the IT project manager's ability to manage resources across the entire IT project's life cycle. The PMCDF states that the effectiveness unit of competence consists of four sub-competencies:

- Resolves project problems.
- Maintains project stakeholder involvement, motivation and support.
- Changes at the required pace to meet project needs.
- Uses assertiveness when necessary.

The EFA results compressed these four sub-competencies in three as per Table 49.

TABLE 49: Effectiveness sub-competency component groupings.

Variable name	Sub-competency components	Sub-competencies		
		1	2	3
q0051_0001	Using stakeholder communication to maintain stakeholder motivation	**0.861**	0.119	–0.217
q0051_0004	Using objectivity for consensus building	**0.781**	0.086	–0.1
q0051_0003	Including experts in meetings and discussions to influence and obtain stakeholder support	**0.776**	–0.278	0.142
q0050_0002	Validating that proposed solutions resolve the problem and are within the project boundaries	**0.633**	0.121	0.064
q0051_0002	Constantly seeking opportunities to communicate project status and directions to meet the needs and expectations of stakeholders	**0.608**	–0.097	0.241
q0050_0001	Employing appropriate problem solving techniques	**0.476**	0.267	0.087
q0050_0003	Choosing solutions that maximise project benefit and minimise negative impacts	**0.408**	0.229	0.193
q0053_0004	Making timely decisions based on facts whilst managing ambiguity	–0.103	**0.853**	–0.002
q0053_0002	Preventing inconclusive discussion, making a decision and taking appropriate action	–0.022	**0.801**	–0.064
q0053_0003	Showing persistence and consistency in actions	0.07	**0.685**	0.043
q0053_0001	Taking initiative when required, assuming calculated risks to expedite project delivery	0.018	**0.57**	0.18
q0052_0004	Enabling a change-friendly environment by fostering continuous learning	–0.058	–0.08	**0.904**
q0052_0003	Taking positive actions to capitalise on opportunities to resolve present problems	0.059	–0.023	**0.789**
q0052_0005	Acting as a change agent	–0.015	0.098	**0.541**
q0052_0001	Adapting to changes in the project environment to minimise adverse project impacts	0.052	0.273	**0.469**
q0052_0002	Demonstrating flexibility towards changes that benefit the project	0.049	0.263	**0.436**

Three sub-competencies are identified for the effectiveness unit of competence, namely, facilitation ability, initiative and change management. IT project managers are often required to act as a facilitator during a project's life cycle (Dupont & Eskerod 2016; Wideman 2002). This includes facilitating stakeholder communication and motivation, consensus building, expert consultation and problem solving. IT project managers liaise and act as the intermediary and mediator during an IT project as they transfer messages between the various stakeholders and team members. Initiative is also essential as timely decisions must be made which will influence the project in a multitude of ways (El-Sabaa 2001). This also relates to the seeking and seizing opportunities to improve project execution and value creation within the analytical ability sub-competence in the cognitive ability unit of competence. Stalling or deciding too late could lead to the project being negatively impacted in areas such as time and cost. Change management is inevitable especially given the unpredictable nature of IT projects (Hornstein 2015; Milis & Mercken 2002). It is, therefore, no surprise that change management was identified as a key sub-competency for the effectiveness unit of competence. Figure 104 provides a visual representation of the sub-competencies for effectiveness.

The following section further analyses the components and sub-competencies of the effectiveness unit of competence by using structural equation modelling.

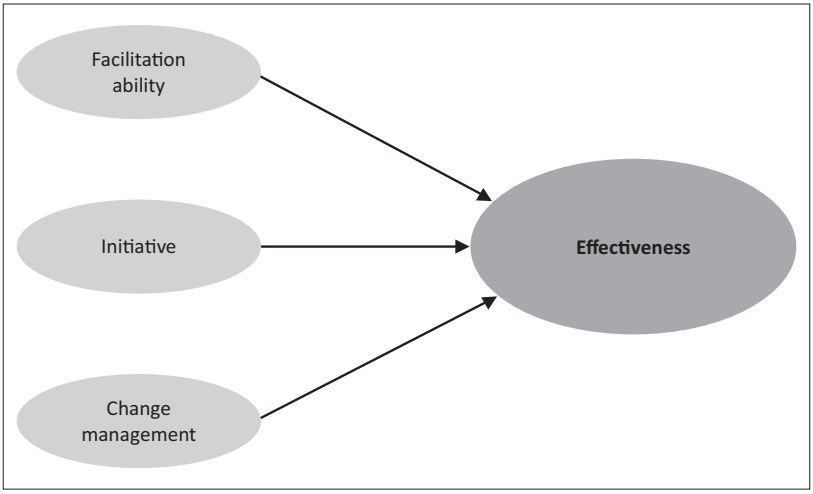

FIGURE 104: Sub-competencies of effectiveness unit of competence.

Structural equation model for effectiveness unit of competence

The initial measurement model is depicted in Figure 105. Firstly, variables q0051_0001, q0051_0004, q0051_0003, q0050_0002, q0051_0002, q0050_0001 and q0050_0003 are the components of facilitation ability. Secondly, variables q0053_0004, q0053_0002, q0053_0003 and q0053_0001 are the components of initiative. Finally, variables q0052_0004, q0052_0003, q0052_0005, q0052_0001 and q0052_0002 are the components of change management. The error terms are denoted by e1-16.

Table 50 shows the model fit measures and results for the effectiveness SEM.

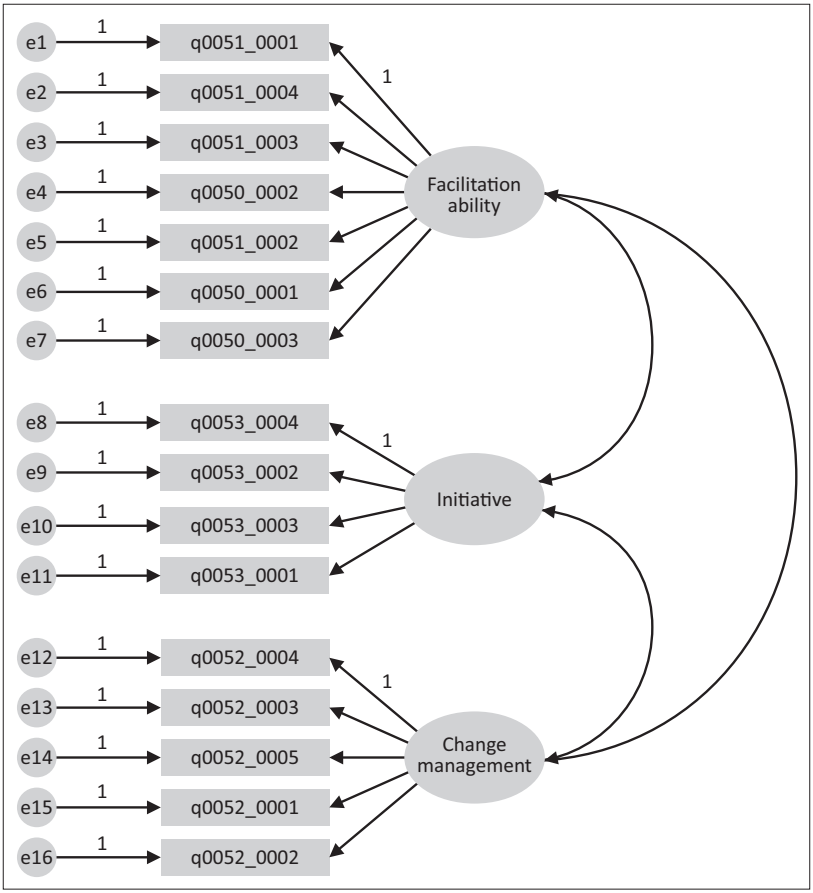

FIGURE 105: Effectiveness sub-competency and components measurement model.

TABLE 50: Model fit measures and results for effectiveness SEM.

Model fit measures	Structural Equation Modelling	Cut-off levels employed	Results	Reference
Absolute fit measures	CMIN/DF (Chi-squared/ Degrees of freedom)	≤ 5	1.97	Gaskin (2013); Marsh and Hocevar (1985); McKinney *et al.* (2002); Roh *et al.* (2005); Ullman (1996:709–812); Yatim (2008)
	RMR (Root Mean Square Residual)	≤ 0.05	0.02	Roh *et al.* (2005); Tabachnick and Fidell (1996:752)
	GFI (Goodness-of-Fit Index)	≥ 0.9	0.91	Doloi *et al.* (2011); Kim *et al.* (2009); Roh *et al.* (2005); Tabachnick and Fidell (1996:750)
Relative fit measures	NFI (Normal Fit Index)	≥ 0.9	0.91	Doloi *et al.* (2011); Stahl (2008); Tabachnick and Fidell (1996:749); Yatim (2008)
	TLI (Tucker-Lewis Index)	≥ 0.9	0.94	Doloi et al. (2011); Hair *et al.* (2006:753); Stahl (2008); Yatim (2008)
	CFI (Comparative Fit Index)	≥ 0.95	0.95	Anglim (2007); Doloi *et al.* (2011); Gaskin (2013); Hair *et al.* (2006:753); Roh *et al.* (2005); Stahl (2008); Tabachnick and Fidell (1996:749–750); Yatim (2008)
Fit measures based on the non-central chi-square distributions	RMSEA (Root Mean Square Error of Approximation)	≤ 0.08	0.07	Hoyle (2011:48); Marsh *et al.* (2004); McQuitty and Wolf (2013); Reisinger and Mavondo (2007); Nunkoo and Ramkissoon (2012)

The validated effectiveness SEM is shown in Figure 106. The initial difference between the measurement model (Figure 105) and the validated SEM is that two components are removed from facilitation ability, and one component is removed from change management. These omissions will be discussed further in the implications to follow. The components for facilitation ability are q0051_0001, q0051_0004, q0050_0002, q0050_0001 and q0050_0003 with regression weightings of 0.71, 0.67, 0.84, 0.84 and 0.81 respectively. The components of initiative are q0053_0004, q0053_0002, q0053_0003 and q0053_0001 with regression weightings of 0.74, 0.72, 0.80 and 0.74 respectively. Change management consists of components q0052_0004, q0052_0003, q0052_0001 and q0052_0002 with regression weightings of 0.73, 0.75, 0.78 and 0.75 respectively.

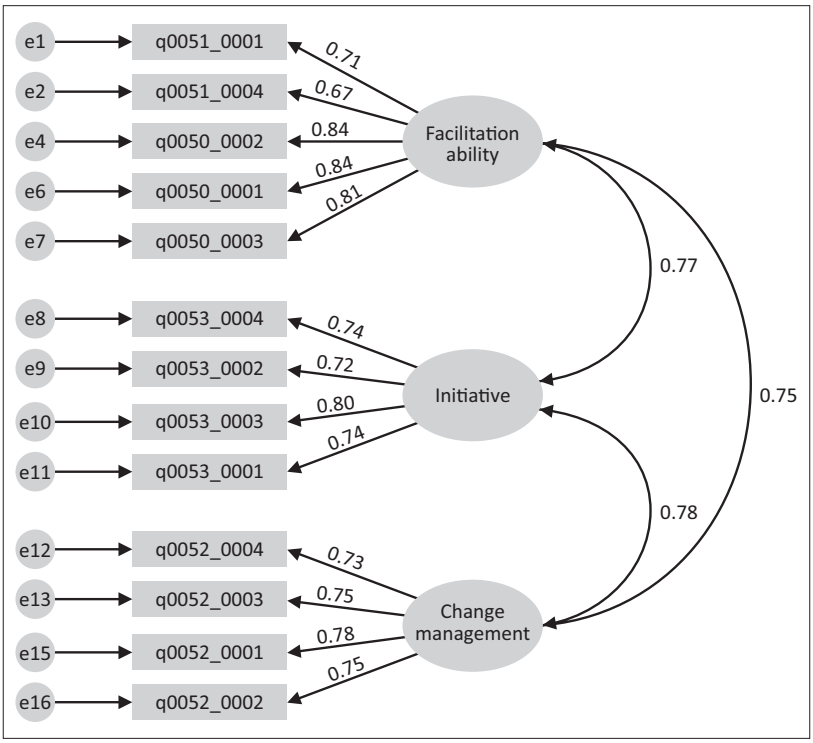

FIGURE 106: Validated SEM for effectiveness unit of competence.

Furthermore, there are relationships between the three sub-competencies as well. Facilitation ability and initiative have a correlation of 0.77 whilst facilitation ability and change management have a correlation of 0.75. Initiative and change management have a correlation of 0.78.

Effectiveness: SEM implications

The final and valid effectiveness SEM model proposes several implications. The first implication is that the following components are the predictors of the facilitation ability sub-competency:

- Using stakeholder communication to maintain stakeholder motivation.
- Using objectivity for consensus building.
- Validating that proposed solutions resolve the problem and are within the project boundaries.

- Employing appropriate problem-solving techniques.
- Choosing solutions that maximise project benefit and minimise negative impacts.

Two components were removed, namely, including experts in meetings and discussions to influence and obtain stakeholder support, and constantly seeking opportunities to communicate project status and directions to meet the needs and expectations of stakeholders. Firstly, the omission of the former aligns to the omission of the using experts or third parties to persuade others sub-competency component in the leading SEM. Secondly, these two omissions are regarded as essential during a project but, yet, are considered invalid based on the final SEM. IT project managers, therefore, do not place emphasis on seeking expert opinion as well as seeking opportunities to communicate project status. The latter is somewhat contradictory given the previous assertions of the communicating SEM. IT project managers rather place emphasis on maintaining stakeholder motivation through constant communication. Furthermore, establishing consensus is essential for validating and choosing solutions which positively maximise IT project benefit. It is, however, the IT project manager's responsibility to select and use the correct problem-solving technique prior to validating and choosing solutions. This was clearly established in the cognitive ability SEM and once again proves the IT project manager often acts as an intermediary throughout a project.

The second implication asserts that the following are predictors of the initiative sub-competency:

- Making timely decisions based on facts whilst managing ambiguity.
- Preventing inconclusive discussion, making a decision and taking appropriate action.
- Showing persistence and consistency in actions.
- Taking initiative when required, assuming calculated risks to expedite project delivery.

The first point to be made is that no components were removed or omitted, implying that the original EFA was correct in identifying the components of the initiative sub-competency. IT projects are very similar to other projects in the sense that they are also plagued by discussions and meetings which result in inconclusive or ambiguous decisions. The IT project managers must, therefore, take initiative and responsibility to make a decision as the time and cost constraints are primarily at stake when procrastinating on decisions. Furthermore, stakeholders often do not want to take responsibility for a decision and thus draw the process out for longer than it should. Commitment and persistence is required by IT project managers when making decisions and in no way should they show any uncertainty to team members and stakeholders when making these decisions, as it could appear that they are not in control. Taking initiative means that IT project managers need to take calculated risks to advance the project. Experience plays a significant role here as more experienced IT project managers should arguably take more

calculated risks than a novice as they have a better understanding of what works or not. On the other hand, certain decisions are made based on facts which should be available to all involved parties. This aligns with the communicating SEM and discussions thereof.

The third implication revolves around the predictors of change management:

- Enabling a change-friendly environment by fostering continuous learning.
- Taking positive actions to capitalise on opportunities to resolve present problems.
- Adapting to changes in the project environment to minimise adverse project impacts.
- Demonstrating flexibility towards changes that benefit the project.

One component was removed from the change management sub-competency, namely, acting as a change agent. Pollack (2014) and Hornstein (2015) contend that there is a blurred line between the roles of a project manager and a change manager. The notion is that, whilst project managers and change managers have varying roles and responsibilities, they should also work together on certain activities (Hornstein 2015; Pollack 2014). It is, therefore, no surprise that acting as a change agent is omitted from the model as change managers should be consulted to assist with managing change throughout the project. For example, change managers should be consulted with regard to best practices for establishing a change-friendly environment. Zhang (2013) asserts that changes within a project are often associated with negatively impacting project completion. Furthermore, as discussed in Chapter 5, the better IT project managers can handle and manage change, the better the chances of success. IT project managers must ensure the IT project's environment is conducive for adapting to change by ensuring various practices, processes and procedures have been developed and available to team members and stakeholders. Furthermore, this facilitates flexibility towards change so that the project benefits. IT project managers are also required to capitalise on opportunities through positive actions when dealing with problems related to change. This sub-competency works particularly closely with the leading unit of competence and its subsequent sub-competencies as the IT project manager must enable the team to function within an ever changing IT project environment. The project team must also be supported and encouraged to ensure they also follow change management practices, processes and procedures.

The relationship between facilitation ability and initiative is the fourth implication of the model. The correlation between the two is 0.77 which implies there is a strong positive relationship between the two. Facilitation ability and initiative, therefore, work hand-in-hand as they rely on each other. For example, the IT project manager must make decisions when other parties are procrastinating or reluctant to take responsibility to ensure adverse effects are avoided or mitigated. The omission of constantly seeking opportunities to communicate project status and directions to meet the needs and expectations of stakeholders from facilitation ability is arguably validated, as the onus is on the IT project manager to act accordingly and make decisions in the best interest of the

project. On the other hand, although consensus building is pivotal, there are situations where the IT project manager must take calculated risks whilst maintaining commitment and dedication. Acting as an intermediary by default implies that the IT project manager must take the initiative to ensure the project remains on track and performs accordingly.

The relationship between facilitation ability and change management is the fifth implication as there is a correlation of 0.75 between the two. This implies that the two sub-competencies have a strong positive relationship and work very closely together. This aligns to previous studies that project managers should facilitate change and work in tandem with change managers throughout a project (Hornstein 2015; Pollack 2014). Change management exists at project and organisational level with constant overlap between the two levels. Rather than an IT project manager acting as a change agent, like in other project types, he or she should work with the change manager as these individuals can provide direction regarding change practices, processes and procedures. A note must, however, be made that this seems to contradict the omission of including experts in meetings and discussions to influence and obtain stakeholder support. A counter argument is that change manager consultation is not required for stakeholder support but, rather, for the improvement of change management integration within an IT project. Nevertheless, IT project managers must be competent in change management and facilitation ability, especially given the strong relation between them.

The sixth and final implication is the relationship between initiative and change management. The correlation is 0.78 which, once again, signifies that there is a strong positive relationship between the two. The inevitable nature of change often requires an IT project manager to make decisions either based on facts, experience or both. Decisions related to change management have a ripple effect across the IT project and organisation. The IT project managers should thus be committed to their decisions and not waiver as this could lead to an overall discouraging attitude amongst team members and stakeholders. Furthermore, the IT project manager must create a change-friendly environment; not committing to decisions could result in team members questioning the project manager's ability to manage and control the project. The more assertive and confident the IT project manager, the more the team will be motivated and encouraged to be flexible towards change.

The effectiveness SEM shows that there are three key sub-competencies IT project managers must exhibit, namely, facilitation ability, initiative and change management. The strong relationships between each clearly show that they are interrelated and work together in creating effectiveness competency. The identified sub-competencies and components are analogous to the skills stipulated in Chapter 3, Table 1, as well as the personal characteristics stipulated in Chapter 3, Table 2. Another finding is that this SEM is comparable to the cognitive ability SEM in many ways as the IT project managers must apply their cognitive ability sub-competencies together with their effectiveness sub-competencies (Figure 106).

The sixth and final unit of competence, professionalism, is discussed in the following section.

Unit of competence: Professionalism

Professionalism focuses on an IT project manager's ability to conform '... to an ethical behaviour governed by responsibility, respect, fairness, and honesty in the practice of project management' (Project Management Institute 2007). The PMCDF states that the following sub-competencies represent the professionalism unit of competence:

- Demonstrates commitment to the project.
- Operates with integrity.
- Handles personal and team adversity in a suitable manner.
- Manages a diverse workforce.
- Resolves individual and organisational issues with objectivity.

The EFA results in Table 51 show that three sub-competencies were identified.

The following three sub-competencies were identified, namely, cultural management, ethical behaviour and lessons learnt. This is a reduction from the five originally recognised in the PMCDF and serves to simplify the professionalism unit of competence for IT project managers. Cultural management is closely linked to the organisational culture of the organisation as the IT project manager draws from this when managing an IT project. Furthermore, Gu *et al.* (2014) reveal that there is a strong relationship between organisational culture and IT project performance. IT project managers must be able to balance their interests and the organisational interests on a continuous basis. This works in parallel with the analytical ability sub-competency within the cognitive ability unit of competence where takes holistic view of project, is an important component. Both parties' interests should be taken into account by the IT project manager. For example, IT project managers are highly sought after in South Africa and more individuals are following this career path (Government Gazette 2014). Therefore, by placing the IT project manager's career interests and organisational interests on the same level, the notion is that both parties will benefit in the long run (Crawford, French & Lloyd-Walker 2013). Alternatively, if equality of interests is maintained, then the IT project manager will continue to respect the organisational framework for running projects.

As discussed in Chapter 5, a common ethical dilemma within any workplace or organisation is that of favouritism and special treatment (Walker & Lloyd-Walker 2014). It is, therefore, imperative that IT project managers have a professional stance, and assign team members in an unbiased way where skills and competency play a key role in selection. This goes a long way towards developing trust and respect within the project environment as team members are at ease knowing the right individual is chosen

TABLE 51: Professionalism sub-competency component groupings.

Variable names	Sub-competency components	Sub-competencies		
		1	2	3
q0058_0002	Balancing individual interest with organisational interest	**0.916**	–0.214	–0.024
q0058_0001	Respecting the organisational framework for running projects	**0.79**	0.18	–0.208
q0058_0003	Assigning team members in an unbiased way to appropriate tasks	**0.764**	–0.23	0.199
q0057_0001	Developing elements of trust and respect within the project environment	**0.738**	0.157	–0.044
q0057_0004	Creating an environment of confidence and respect for individual differences	**0.671**	0.041	0.114
q0057_0002	Ensuring team's adherence to cultural issues, legal requirements and ethical values	**0.63**	0.177	–0.048
q0057_0003	Respecting personal, ethnic and cultural differences	**0.548**	0.306	–0.023
q0056_0001	Maintaining self-control in all situations and responding calmly	**0.484**	0.068	0.057
q0055_0001	Adhering to all legal requirements	–0.07	**0.97**	–0.086
q0055_0005	Respecting the intellectual property of others	0.033	**0.824**	–0.076
q0055_0002	Working within a recognised set of ethical standards	–0.093	**0.745**	0.173
q0055_0004	Maintaining and respecting confidentiality of sensitive information	0.099	**0.696**	0.119
q0055_0003	Seeking to avoid and disclosing any possible conflict of interests to all stakeholders	0.147	**0.635**	0.136
q0054_0003	Making sacrifices where necessary to move project forward	–0.055	–0.032	**0.742**
q0054_0001	Understanding and actively supporting the project's and organisation's missions and goals	–0.162	0.226	**0.692**
q0054_0002	Cooperating with all stakeholders to achieve project objectives	–0.006	0.217	**0.632**
q0056_0002	Admitting shortcomings and explicitly accepting responsibility for failures	0.246	–0.161	**0.588**
q0056_0003	Learning from mistakes to improve future performance	0.349	0.039	**0.475**

for the task. Without trust and respect the IT project managers will have little to no control over their team, which in turn will result in poor project performance and possibly project failure.

The success of an IT project hinges on the performance of the project team. IT project managers must ensure the team considers and adheres to cultural issues, legal requirements and ethical values. There are a multitude of cultures within the South African context and it is especially challenging for IT project managers to manage the various cultures. They need to lead by example with regard to understanding and managing cultural issues as this will guide the team. This will also foster an environment of confidence and respect for individual differences as well as for personal, ethnic and cultural differences. Legal requirements must also be adhered to by the team at all times, as many IT projects are based within industries and organisations where legislation adherence is prerequisite. For example, the financial industry is required to institute the FICA Act as it is used to fight, amongst others, money laundering and terror financing (Financial Intelligence Centre 2001). This is an aid to project the integrity and stability of the South African financial system. Any IT project within the financial industry is therefore required to adhere to this Act. Leaders across the globe declare that the top leadership competence is that of '... high ethical and moral standards' (Giles 2016). Ethical values in South Africa, and Africa in general, are questionable at best as there have been numerous cases where individuals have acted unethically to further themselves rather than the organisation. For example, a director of the South African IT services company, Pinnacle, was charged with corruption and fraud (McLeod 2014). The South African financial services regulator also investigated the director as they were implicated for insider trading (Reuters Africa 2014). The implication is, therefore, that IT project managers must ensure they apply rigorous ethical standards amongst team members.

Ethical behaviour is paramount as previously discussed. Not only must the project team adhere to legal requirements but the IT project manager must as well. This also works towards enabling the team to adhere to legal requirements. IT projects implement solutions and technologies which are often patented. On the other hand, some industries and organisations use proprietary solutions and technologies. It is, therefore, imperative that that IT project managers respect the intellectual property of others when implementing IT solutions. Helgadóttir (2008) asserts that ethical issues, standards and guidelines should be integrated in project management if the discipline is to mature to a professional level. Furthermore, IT project managers must maintain and respect confidentiality of sensitive information and not disclose possible conflicts of interests to stakeholders. The South African government signed the POPI Act in 2013 to protect the personal information by private and public bodies (SAICA 2015). IT project managers in South Africa are now required by law to protect and not disclose any information.

Lessons learnt focus on the IT project manager's ability to gain knowledge and experience from previous and current IT projects as well as from the organisation. The IT project manager must learn, understand and support the project's and organisation's missions and goals as there is strategic alignment between the project and the organisation. This, in turn, facilitates stakeholder cooperation to achieve project objectives. Probably most important of all is that the IT project manager admits to shortcomings and accepts any responsibility for failures. It is possible that failure is caused by another party but the onus is on IT project managers not to shift the blame and take full responsibility as that is their job. Furthermore, IT projects require the project manager to make sacrifices, especially with regard to time, as there are often situations where the project needs 24/7 attention to ensure it delivers as expected. The professionalism unit of competence and identified sub-competencies are depicted in Figure 107.

Marnewick and Labuschagne (2009) dispute that project management is not a profession as it is not recognised or constituted through legislation. Project managers cannot be formally licensed as practitioners. With regard to construction projects, project managers are held liable and accountable as certified engineers and not project managers. Conversely, with regard to IT projects, IT practitioners are not licensed and IT-related work is not certified through a formal body which is legislated. The results shown above are part of a movement to drive the discipline forward and establish IT project management as a true profession.

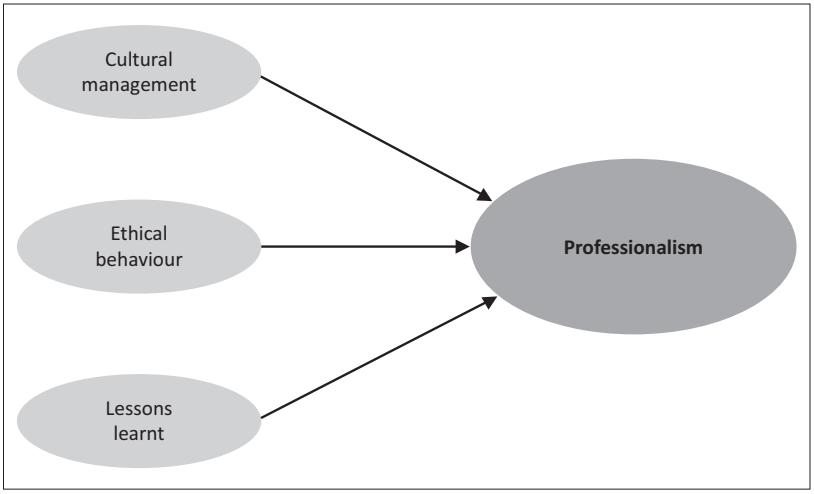

FIGURE 107: Sub-competencies of professionalism unit of competence.

Conclusion

Performance units of competence are divided into the five phases of the project life cycle. Factors were extracted for all of these but validated models could only be constructed for the planning unit of competence as well as the closing unit of competence.

For those units of competence that no validated SEM could be constructed, it is advised that the practitioners adhere to the current body of knowledge detailing these areas. The factors extracted for the competencies of initiating a project, executing a project and monitoring and controlling a project should not be wholly ignored though. Care and attention should be given to address these matters until further research can establish what the real contributing factors to perceived project manager competence are.

With regard to the planning unit of competency, the following factors are considered as part of a project manager's competency:

- Cost planning.
- Project plan approval.
- Procurement planning.
- Quality management.
- Project team identification.
- Project scope planning These six factors do not exist in a strong relationship with one another. The implication is that the absence of one or more of these in the planning phase may not greatly affect the remaining factors.

Conspicuous by their absence is schedule planning, risk planning and communications planning. This is greatly disconcerting because these are considered the cornerstones of project success factors. Further research must address this as a matter of urgency to determine why they are not considered as a predictor project manager competence.

For the unit of competence in closing a project, only two factors are considered as being related to project manager competency. These are administrative duties and stakeholder management. Administrative duties served as an umbrella concept that included various tasks that would formally close a project. This may have the implication that these activities are not well-defined in the mind of project managers, and they will do only what is essential in order to formally close a project. The strongest predictor for the competence of project managers in closing a project is that of stakeholder management where their feedback is elicited and analysed. It is with the strongest certainty possible that one can say a project manager is not competent in closing a project if he or she does not request feedback from the stakeholders. The data suggest that only customers are considered stakeholders in this instance.

With regard to the personal units of competence a multitude of findings was uncovered. The communicating unit of competence, consists of three sub-competencies,

namely, communication methods, communication intangibles and information access. The communicating SEM provided insight regarding the level of influence of each sub-competency component, as well as the relationship between sub-competencies. The validated SEM revealed that the sub-competencies within PMCDF can be reduced and simplified for IT project managers. The communicating results reduced the four sub-competencies of PMCDF to the three mentioned above. Furthermore, the components in the validated SEM were also reduced to represent the true competencies for IT project managers. Only one component was removed from information access, namely, using appropriate information sources. Apart from this exclusion, the remainder of the components remained, implying that the components within PMCDF are relevant for IT project managers.

The leading unit of competence consists of two sub-competencies, namely, project team support and project team encouragement. The PMCDF recognises five sub-competencies for leading compared to the two identified above. Both project team support, and project team encouragement exhibited five components in the final, validated SEM. On the other hand, three components were removed from project team support and two from project team encouragement, implying that they are not necessary for IT project managers. A key finding is the relationship between project team support, and project team encouragement as the relationship is incredibly strong, signifying that they work very closely together and thrive on each other. Another key finding is that the omission of five components between the two sub-competencies implies that the PMCDF over-compensates for IT project management competencies.

Two sub-competencies are identified for the managing unit of competence, namely, practice adaptation and team dynamics. A valid SEM, however, could not be developed as the model fit measures were not adhered to. This prevented further investigation regarding which components are necessary for each sub-competency. Nevertheless, the EFA results revealed that IT project managers only need to focus on two sub-competencies rather than the three documented in the PMCDF. The lack of SEM development suggests a weakness in this study, and that this unit of competence requires further investigation in the future to establish which components are relevant to IT project managers.

The cognitive ability unit of competence was revealed to have three sub-competencies, namely, analytical ability, environmental understanding and tools and techniques usage. Interestingly, six components were removed from analytical ability and only two remained, namely, looking for opportunities to improve project value or execution and seizing relevant opportunities as they emerge. These are the two key components for IT project managers, and the other six are considered irrelevant. On the other hand, one component was removed from environmental understanding, and none from tools and techniques usage. The relationship between the three sub-competencies was medium to strong suggesting that each work closely with the other. The weakest relationship is

between environmental understanding, and tools and techniques usage. The overall findings show that the IT project manager must focus on three rather than four sub-competencies within the cognitive ability unit of competence.

The effectiveness unit of competence consists of three sub-competencies, namely, facilitation ability, initiative and change management. This is reduced from the four within the PMCDF. Two components are removed from facilitation ability, none from initiative and one from change management. The remaining components are deemed relevant to IT project managers. The relationship between the three sub-competencies is very strong which, once again, signifies the reliance between each sub-competency. A key finding is that the SEM is comparable to the cognitive ability SEM in many ways as the IT project managers must apply their cognitive ability sub-competencies together with their effectiveness sub-competencies.

The sixth and final unit of competence is professionalism and it consists of three sub-competencies, namely, cultural management, ethical behaviour and lessons learnt. Five sub-competencies are documented in PMCDF but these results show that only three are specific to IT project managers. Similar to managing, a valid SEM could not be developed, thus preventing further investigation of the components and relationships between sub-competencies. This unit of competence requires specific attention if the IT project managers are to become true professionals like construction project managers, which are certified engineers. Another weakness in this study is the lack of SEM for professionalism. Further interrogation is required to address this weakness and reveal the components necessary for IT project managers.

Chapter 7

Managerial implications and suggestions

The previous chapters provided statistical analysis about the competence levels of IT project managers. The purpose of this was to statistically determine what the perception is of IT project managers' competency levels and whether the PMCDF is suitable as a competency framework. This chapter concludes the research by looking at the managerial implications of the results. Twelve implications or suggestions were identified.

1. There are various competency frameworks that can be used by organisations to determine the competency level of IT project managers. These frameworks were briefly discussed in Chapter 1. Organisations must investigate which of these are more appropriate and decide on a framework to evaluate their IT project managers' competencies. The decision must be communicated to all as it provides a standard benchmark that can then be used by all IT project managers.
2. Project managers in general, and IT project managers specifically, prefer to be certified as either PMPs or PRINCE2 practitioners. This implies that organisations must first of all determine if there is any value in certification for the organisation as certification is person-based. This implies that when an IT project manager leaves the organisation, the certification goes with the IT project manager. The question that the organisation needs to answer is whether certified IT project managers are better than non-certified IT project managers. If certification is important for an organisation, then the

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certification must be linked to the competency framework that was chosen, that is, PMCDF for PMP or ICB for IPMA certification. It is counter-productive to have a misalignment between the competency framework and the actual certification.

3. Competence and the associated certification does not come by itself. Having obtained a specified certification does not automatically confer competence on an individual project manager. Organisations must have the enablers in place that allow IT project managers to develop their competencies. These enablers might include aspects like formal and informal training as well as coaching.
4. Planning of an IT project is crucial for its ultimate success, and the results highlighted six important competencies that IT project managers must portray during the planning phase. The first competence is to do proper cost planning for a project and this is especially important in the case of agile projects. IT projects are notorious for being over-costed at the end. Secondly, IT project managers must spend more time with the stakeholders to get final approval of the project plan. The results highlighted that IT project managers rush ahead with a project without the necessary authorisation which could lead to contractual issues later in the project. Although procurement is not seen as an important competency by IT project managers, they must show due diligence with the procurement of hardware, especially the contracting of resources such as software developers from foreign countries. Quality is also an aspect that needs to be incorporated during the planning of an IT project. Various examples exist where a final solution was delivered with bugs and these are then resolved after the go-live date of the project. Special attention can be given to agile development as it seems that this method resolves some of the quality issues and concerns during development. The identification of a project team is also highlighted as an important competency during the planning phase. It is not always that easy for an IT project manager to select his or her own team as the project team is most of the time based on available resources. Special attention must then be given to the competence levels of the team itself and how this might have an impact on the overall time, cost and quality constraints of the project. The final competence focuses on the scope of the project, that is, what needs to be delivered by the project. It is extremely difficult to determine the full requirements upfront and do proper scope planning based on these requirements. IT project managers should look at alternative ways to determine requirements and deliver these in smaller chunks or even smaller projects.
5. Only four major execution competencies were identified through the research. An obvious competence is that of monitoring the project during the execution phase. IT project managers are responsible and accountable for the successful delivery of the project. They should be able to identify and report any deviations that might have a positive or negative impact on the final constraints of the project, irrespective of the constraints. The wellness of the project team has also been identified as a competency that the IT project manager must portray throughout the project's life cycle. IT project

managers must on a continuous basis motivate, manage and lead the team. An important competence that was identified, is quality. Quality is especially an issue when it comes to the development and the delivery of bug-free code whether it is customisations or integrations. It might be worth the effort to introduce some or all the principles of the Agile Manifesto to ensure the delivery of bug-free code.

6. Apart from the competencies identified for the execution process group, only one additional competency was highlighted, namely, risk management. As mentioned earlier, risk management is a knowledge area that IT project managers are shying away from. IT project managers must take cognisance of the importance of this skill and should pay attention to it. Research has proven that there is a positive correlation between risk management and project success rates.
7. IT project managers are almost forced to ignore the closing stages of a project. The reason for this is that they are managing multiple projects, and there is actually no time to properly close a project. Two competencies that are important is that of administrative closure and stakeholder management. All contracts and loose ends should be procedurally closed to minimise the risk of any legal actions after project closure. Also, stakeholders should be managed until the final closure and delivery of the product and/or service. This will also assist with the transition from projects to operations, as operations will know which stakeholders are mostly influenced by the project's deliverable. It is of utmost importance that all the stakeholders are satisfied with the final product and/or service. They are ultimately the people that will be using the product and if they are not satisfied with the end-result, the project itself is then a failure.
8. When it comes to the communication competence, two important factors were identified. The first is that the way information is distributed, plays an important role on how communication is perceived amongst the team members and also the various stakeholders. IT project managers must include the preferred way of communication as part of their stakeholder analysis. This will enable them to send the correct information in the correct format. It is also suggested that they apply the AA-BB-CC principle as earlier explained. The second factor focuses on transparency within the project environment. Information must be accessible to all the team members and stakeholders. This transparency also ensures that integrity and honesty forms part of the project culture. There are various ways to promote transparency, such as the uploading of documents to a portal.
9. The leading competence highlighted an important aspect, namely, that the project manager is only successful if he or she has the support of the project team. Two factors that came to the fore were the importance of the support of the team and, secondly, the encouragement of the team that comes with the support. When one unpacks the support of the team factor, the aspects that are important to the team are the factors that motivate them, such as rewards. The impression is created that, when the IT

project manager is supporting and motivating the team member, the same favour is returned and team members then automatically support the project manager. The team is encouraged through open communication channels where the vision and project alignment is discussed and where the project manager creates an environment where open and robust discussions can occur.

10. The environment wherein a project is managed, is crucial to the ultimate success of the project. One of the cognitive abilities that an IT project manager must possess, is that of understanding the environment wherein the project is managed. The environment includes aspects such as the organisation, the country and even the industry. Another ability or competence is that of an analytical skill. The question is whether this skill can be acquired – or is this one of those skills that distinguishes an excellent IT project manager from an average IT project manager? Thirdly, IT project managers must also know and be able to use the appropriate tools and techniques, within the project management discipline. There are a plethora of tools and techniques, and it is the responsibility of the IT project manager to identify the tools and techniques that he or she can use, and then become masters in that specific tool or technique.
11. Three factors were identified that constitute the effectiveness competency. The first factor addresses the notion of change management. Two aspects spring to mind here. The first is that the IT project manager must manage change within the project itself. Changes must be kept to a minimum to prevent scope creep. Secondly, projects bring about change within the organisation and this is where change management plays an important role. IT project managers must enlighten the organisation at large, and the users specifically, on how the new project deliverable is going to impact their working environment. IT project managers must also show initiative during the course of the project. They cannot always wait for someone to provide guidance and advice. It is sometimes necessary to take the initiative to move the project forward. Again, can this skill or competency be taught? The third identified factor is the ability to facilitate. During the course of a project, various conflict situations arise which need to be addressed and deflated. This is where the ability to facilitate plays a role.
12. Professionalism is the last of the competencies, and three factors have been identified. The first factor is that of cultural management. In today's business environment there are multiple races and cultures that form part of the project team. It is thus easy for an IT project manager to insult or upset a team member. This can happen unintentionally and create discord within the team. It is advised that IT project managers, as well as team members, undergo cultural diversity programmes. Ethical behaviour plays an enormous role within the South African context. In a country where bribery and corruption is rife, it is expected of IT project managers to behave ethically. How this competence can be acquired is not that easy to answer. At the end of the day it all depends on the IT project manager's beliefs. The last factor is that of lessons learnt.

As mentioned earlier, there is not always enough time to reflect on a project after closure, but a professional IT project manager should perform lessons learnt.

In summary, although the PMCDF lists various performance and personal competencies, only a minority of these are deemed important as per Table 52.

TABLE 52: Most important competencies.

#	Competency
1	Cost planning
2	Project plan approval
3	Procurement
4	Quality management
5	Project scope planning
6	Human resource management
7	Project progress tracking
8	Risk management
9	Administrative closure
10	Stakeholder management
11	Method of communicating
12	Access to information
13	Management of project team
14	Analytical ability
15	Environmental understanding
16	Usage of tools and techniques
17	Facilitation ability
18	Initiative
19	Change management
20	Cultural management
21	Ethical behaviour
22	Lessons learnt

The competencies list provided in Table 52 summarises the results of this research. If IT project managers are competent in these 22 competencies, then they improve the chances of project success drastically.

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Project managers' competencies have not been investigated much in academic literature. This original research makes a significant contribution, and displays a depth of knowledge and understanding of the relevant literature. It encompasses competency models and standards on the one hand, and on the other provides a review of success criteria. The bibliography is a valuable resource.

Prof. Dr Yvan Petit, Professor and Programme Director, Postgraduate Programmes in Project Management, Université du Québec à Montréal

This book makes a valuable contribution to research gaps in the field of Project Management in the sector of Information Technology. Investment in research on Project Management has thus far not yielded sufficient returns with regard to improving the level of competence of project managers. The adequacy of existing theories on the complexity of projects and the competence of project managers can be questioned. The importance of this research lies in its evaluation of the IT Project Manager´s performance and personal competencies, which are preconditions for the success of a project. The book concludes with a section on the factors and models for competency units which is most insightful. Herein lies the strength of the book.

Prof. Dr Josef Langerman, Global Head Engineering Transformation / Information Technology and Services of the Standard Bank Group and Professor at the University of Johannesburg

Communication management and risk management are important across the board. This book discloses the current state of Critical Management Studies in South Africa. Structural equation modelling is identified by means of descriptive and multivariate statistics and major competency factors. Various validated predictive models can then be developed. Scientifically, the book contributes to the current body of knowledge by focusing on the competencies needed by IT project managers for successful management.

Prof. Andries G. van Aarde, Chief Editor, AOSIS Scholarly Books

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