ESTABLISHING THE RELATIONSHIP BETWEEN IT PROJECT MANAGEMENT MATURITY AND IT PROJECT SUCCESS IN A SOUTH AFRICAN CONTEXT

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ABSTRACT

Good project management is often considered the make or break of many an IT project. As a discipline, project management has grown significantly, with standards, methodologies, international best practice and bodies of knowledge abound. Despite this, project failures are still prevalent.

In the USA, according to the CHAOS report, only one in three IT projects succeed. While the CHAOS Chronicles represents the state of IT projects in the USA, there are no comparable statistics for South Africa.

The goal of this paper is to provide the results from an empirical research survey done in South Africa. The results show the current success and failure rates as well as the reasons for these. IT projects in South Africa are unique and face different challenges than our USA and European counterparts.

A survey was undertaken to investigate the state of IT projects in South Africa, allowing comparisons to be made between the South African IT industry and IT Project Management in particular, and that of the USA.

The survey combined the nine knowledge areas of the Project Management Body of Knowledge (PMBOK® Guide) with a Project Management Maturity Model (PMMM), in order to answer the following questions:
- *How mature is IT Project Management in South Africa?*
- *What is the success rate of IT projects in South Africa?*
- *What is the relationship between IT Project Management Maturity and project success?*
- *How does South Africa compare with the rest of the world?*
- *Are there any shortcomings in IT Project Management in South Africa?*
- *How can we address these problem areas?*

Based on the results, three key areas are highlighted that need special attention and suggestions are made on how to improve each. This knowledge, if harnessed, can have a positive effect on the chances of project success.

INTRODUCTION

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BACKGROUND INFORMATION

PMBOK® Guide (Project Management Body of Knowledge)

As early as 1981, the Project Management Institute (PMI®) started to produce a set of ethics and standards. Over the years, this set of standards gradually evolved to become what is known today as the PMBOK® Guide. The current version was published in 2000, and a new release is planned for 2004.

The PMBOK® Guide is an inclusive term that describes the sum of knowledge within the profession of project management. There are nine knowledge areas that are divided into two main categories, namely core functions (scope, time, cost and quality) and facilitating functions (human resource, communication, risk and procurement) with integration management tying it all together. Figure 1 shows the nine knowledge areas of the PMBOK® Guide.

The knowledge areas are subdivided into processes, with each of the knowledge areas consisting of between three and six processes. There are 39 processes in all and these are mapped onto the five process groups, which are initiating, planning, executing, controlling and closing.

The PMBOK® Guide is just one of several project management standards in use today. Others, such as the APMBoK, are also widely used. The PMBOK® Guide was chosen for this study because it is both an ANSI standard (ANSI/PMI 99-001-2000), and an IEEE standard (IEEE 1490-1998). Right now it is being reviewed by the ISO for acceptance as an international standard and more than one million copies of the PMBOK® Guide are in circulation.

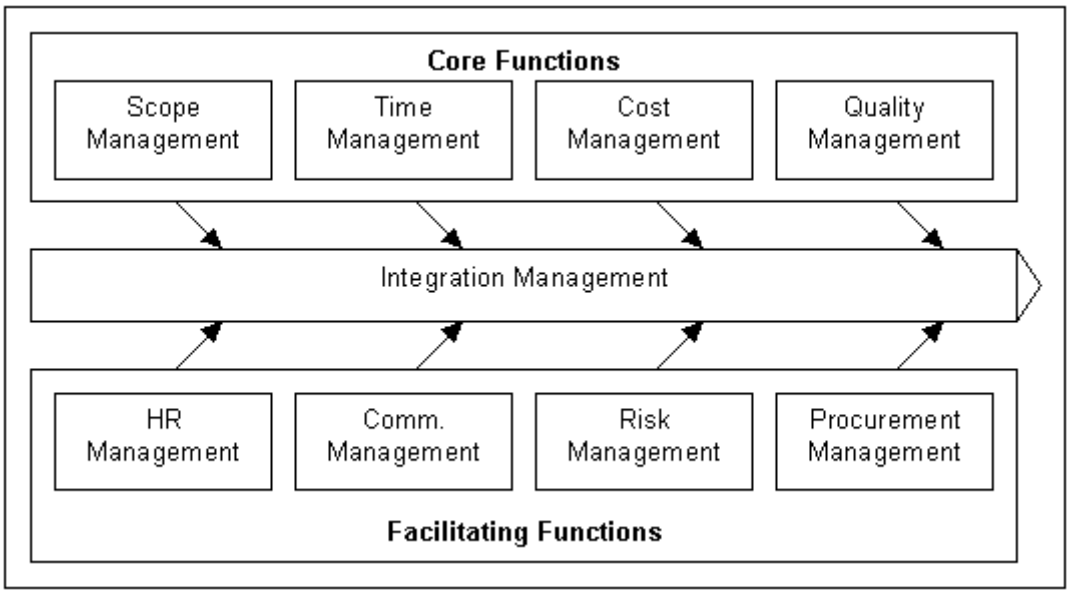

Figure 1. PMBOK(r) Guide.

PMMM (Project Management Maturity Model)

Maturity models are frameworks for helping organisations improve their processes and systems. At present, there is no standard maturity model that applies to project management globally. The PMI® is working on a maturity model named OPM3, which is set to become an international standard maturity model for project management.

Because there is no global model, the maturity model used in this research is a combination of several existing maturity models, including those developed by Micro-Frame Technologies, Inc. and Project Management Technologies, Inc. Another influential model used is the Capability Maturity Model (CMM) developed by the Software Engineering Institute (SEI). Most maturity models make reference to five levels, and are all quite similar in nature.

The maturity model used here defines five levels of maturity, ranging from 1 (initial) to 5 (optimising). Figure 2 illustrates this. A detailed description of each of the five levels of maturity can be found in Appendix A.

Level 1 indicates that processes are disorganised or even chaotic, while Level 5 indicates that an organisation uses feedback from the established processes to continually improve and redefine them. On Level 1 the success of a project is determined to a large extent by individuals, while at Level 5 the organisation can adapt to changes in personnel and still expect the same levels of success.

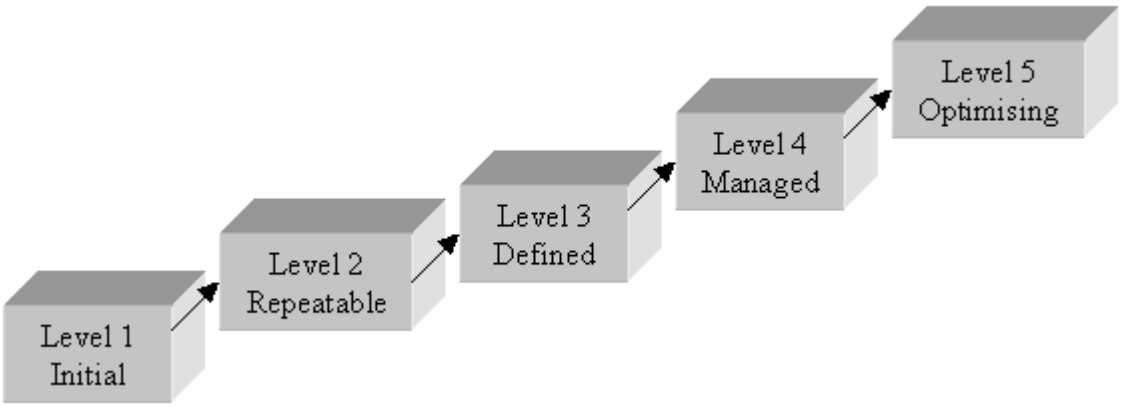

Figure 2. Project Management Maturity Model.

Integrating the PMBOK® Guide and PMMM

The respondents were asked to evaluate the 39 processes defined in the PMBOK® Guide, as they are used on projects in their organisation, according to the project management maturity model provided. This yielded averages for not only the processes themselves, but also for the nine knowledge areas. The average maturity for the knowledge areas was then used to determine the average IT project management maturity for the organisation. These maturity levels can then be combined with reasons for project success and failure (discussed in a later section) to determine the correlation between IT project management maturity and project success.

THE SURVEY

Gathering the Data

From February 2003, a number of interviews were conducted with IT project managers representing several industries, to determine the most common reasons for failures in IT projects. The information gathered during these interviews was converted into a list of the most common reasons for project success.

Table 1. Reasons for project success.

Ranking	Reasons for project success according to interviews (SA)	Top ten reasons for project success according to CHAOS 2000 (USA)	Ranking
1	Auditing of processes	Minimised Scope	6
2	**Business objectives**	**Clear Business Objectives**	1
3	Change control processes	Reliable Estimates	7
4	Communication infrastructure	Standard Infrastructure	9
5	**Executive support**	**Executive Support**	2
6	**Formal methodologies**	**Formal Methodology**	5
7	Handling change		
8	**Project manager competency/experience**	**Experienced Project Manager**	3
9	**Project team**	**Skilled Staff**	8
10	**Requirement definition**	**Firm Basic Requirements**	4
11	Support of innovative / new technology		
12	Understanding user needs		
13	**User involvement**	**User Involvement**	10
14	User understanding of technology		

Table 1 shows the 14 most common reasons for project success, as per the interviews. It also lists the top ten reasons for project success cited in the 2000 CHAOS report. The items that feature in both lists are highlighted. The extent of correlation between the two lists clearly shows that the list used in this study is in line with the one used in the CHAOS report. These reasons formed the backbone of the questionnaire used in the survey.

The questionnaire was distributed at the monthly PMITSIG (Project Management in IT Special Interest Group) public meeting, hosted by the CSSA (Computer Society of South Africa) and PMSA (Project Management South Africa). To secure as many responses from as many different industry sectors as possible, honours students in IT Project Management at RAU were also called on to interview IT project managers. In April of 2003, about 90 honours students gathered more than 800 responses from IT project managers. These questionnaires led to the majority of the responses in this survey.

Analysis of Results

The data gathered in this survey was processed and analysed by Statkon, an independent organisation, operated by the Statistics department at RAU, specialising in statistical analysis, using SPSS, a statistical analysis software package.

DATA FROM SURVEY

Distribution of Respondents

A total of 823 responses were received. Three of these were removed from the survey because the respondents did not complete the entire questionnaire. One additional questionnaire was removed by Statkon, because of statistical anomalies (the respondent had marked all maturity levels as 5, and had marked all reasons for failure, success and challenges). This means that 819 usable responses from more than 11 industry sectors were used in the final analysis.

Several of the respondents work in organisations spanning more than one industry sector. The distribution among industries is as follows:

Table 2. Industry representation.

Industry	Count	%
Information & Communications Technology (ICT)	400	49.0%
Finance & Banking	209	25.5%
Consulting	115	14.1%
Manufacturing	75	9.2%
Government & Public Sector	55	6.7%
Engineering	45	5.5%
Energy & Utilities	44	5.4%
Transport	31	3.8%
Retail	31	3.8%
Construction	20	2.4%
Other	65	8.0%

Success Rates

A total of 1 633 individual projects were examined to determine reasons for project failures, success and challenges. The success rates calculated in this survey compared to those reflected in the CHAOS report are as follows:

Table 3. SA vs. USA success rates.

Year	Successful	Failed	Challenged
CHAOS - 1994	16%	31%	53%
CHAOS - 1996	27%	40%	33%
CHAOS - 1998	26%	28%	46%
CHAOS - 2000	28%	23%	49%
CHAOS - 2002	34%	15%	51%
SA – 2003	**43%**	**22%**	**35%**

This shows that South Africa has a higher success rate than that of the USA. But on the negative side, the failure rate for projects in South Africa is also higher than that in the USA. The percentage of challenged projects in South Africa raises a few questions. It could be that South African organisations adjust their objectives as changes are made to the project, and that success is then measured according to the revised objectives, rather than the original ones. As a result, a project that is three months late and 20% over budget on the original objectives could still be considered successful according to the revised schedule and budget objectives. Another reason could be that not all respondents have yet experienced a failed project, with the data showing a larger number of successful projects compared to failed projects.

Success Factors

The respondents were asked to evaluate three projects based on the most recent successful, failed and challenged projects that they were involved with. A list of 14 possible reasons for failure / success was given. The respondents were asked to indicate whether the reason given had an impact on the success / failure of the project.

Table 4. Comparing reasons for success, failure and challenges.

	Reasons for Success	Reasons for Failure	Reasons for Challenges
1	Project team	**Communication infrastructure**	**Requirement definition**
2	Understanding user needs	**Requirement definition**	Handling change
3	**Communication infrastructure**	**User involvement**	**Communication infrastructure**
4	**Requirement definition**	Executive support	**User involvement**

The table above (listing the top four reasons for success, failure and challenges), shows that the problems IT projects face in South Africa are not necessarily the implementation of standards or methodologies, but rather the soft issues. The common denominators that emerge throughout are communication infrastructure, requirement definition and user involvement. All three factors involve users either directly or indirectly. This supports the notion that there is a divide between project teams and end-users.

IT Project Management Maturity

Perceived Levels of Maturity

The PMMM provides a baseline, which it followed by a framework for improving project management practices in an organisation. The principle is that as the organisation progresses through the maturity levels, it becomes better at what it does, and also better equipped to deal with changes in procedures and practices, thereby enabling an organisation to complete projects at a higher rate of success.

Actual Levels of Maturity

The actual maturity level for an organisation can be determined by combining the averages for each maturity level. The average maturity for an organisation is, therefore, the average of the maturity of the nine knowledge areas, where the average of a specific knowledge area is determined by the processes within that knowledge area. When examining the actual levels of maturity per organisation size, as well as the perceived levels, the following results emerge:

Table 5. Average maturity levels.

Organisation size	Actual Maturity level (1-5)	Perceived Maturity level (1-5)	Difference
Small	2.75	2.77	0.02
Large	2.88	2.95	0.07
Very Large	3.19	3.36	0.17
Total	***2.92***	***3.00***	***0.08***

When actual maturity levels are compared to perceived levels, organisations in general tend to overestimate their abilities. However, small organisations do not overestimate by a large margin, while very large organisations tend to estimate their maturity at a comparatively much higher level than the actual values show. This could be because small organisations use less project teams, and these teams are smaller, and

most processes are followed informally. Large organisations have many teams, that are bigger, and formal processes are needed to coordinate all the activities. The actual levels of maturity, however, show that large organisations do not necessarily always make use of their formal processes

Looking at each of the nine knowledge areas of the PMBOK® Guide for all respondents, the maturity levels are as follows:

Table 6. Maturity levels – PMBOK® Guide knowledge areas.

PMBOK® Guide Knowledge Area	Maturity (1-5)
Project Integration Management	3.02
Project Scope Management	3.12
Project Time Management	2.99
Project Cost Management	2.94
Project Quality Management	2.82
Average for Core Functions	***2.97***
Project Human Resource Management	2.87
Project Communication Management	2.93
Project Risk Management	**2.65**
Project Procurement Management	2.99
Average for Facilitating Functions	***2.86***

Project Risk Management has the lowest maturity level, while Project Scope Management boasts the highest level of maturity. There is quite a large gap between the maturities of these two knowledge areas, but all the other knowledge areas have similar maturity levels. While none of the reasons for success and failure are directly related to risk management, most project failures can be traced back to poor or absent risk management. One of the defining criteria for a project is that it involves uncertainty. Projects, by their very nature, are risky. Poor implementation of risk management can therefore lead to or contribute to project failure.

PMBOK® GUIDE PROCESS GROUPS

As mentioned earlier, the processes in the PMBOK® Guide are sub-divided into the following project management process groups:

- Initiating processes
- Planning processes
- Executing processes
- Controlling processes
- Closing processes.

The following table shows the maturity levels for each of the processes within their relevant process groups. Each of the processes falls into only one of the process groups, resulting in some empty cells in the table. The process groups also do not comprise an equal amount of processes.

When looking at the average maturity levels for the process groups, it becomes clear that there is no single process group that stands out as being directly responsible for project failures. We can, therefore, conclude that failures are a result of a combination of factors, spanning all five of the process groups. Initiating processes seem to have a high average but, considering there is only one process in that process group, the value has less significance. Controlling processes do, however, have the lowest average of the five process groups, confirming that control is a problem area in project management.

Table 7. Processes according to process groups.

	Process groups				
Knowledge areas and processes	Initiating	Planning	Executing	Controlling	Closing
Integration management					
Plan Development		2.96			
Knowledge areas and processes	Initiating	Planning	Executing	Controlling	Closing
Plan Execution			3.17		
Integrated Change Control				**2.97**	
Scope management					
Initiation	3.27				
Scope Planning		3.14			
Scope Definition		3.24			
Scope Verification				3.15	
Scope Change Control				**2.94**	
Time management					
Activity Definition		3.22			
Activity Sequencing		3.02			
Activity Duration Estimating		2.93			
Schedule Development		2.99			
Schedule Control				**2.87**	
Cost management					
Resource Planning		3.00			
Cost Estimating		3.04			
Cost Budgeting		2.95			
Cost Control				**2.92**	
Quality management					
Quality Planning		2.85			
Quality Assurance			2.89		
Quality Control				**2.81**	
Human resources management					
Organisational Planning		3.03			
Staff Acquisition		2.87			
Team Development			**2.77**		
Communication management					
Communications Planning		2.96			
Information Distribution			3.01		
Performance Reporting				2.97	
Administrative Closure					**2.86**
Risk management					
Risk Management Planning		2.80			
Risk Identification		2.85			
Qualitative Risk Analysis		2.66			
Quantitative Risk Analysis		2.62			
Risk Response Planning		2.63			
Risk Monitoring and Control				**2.60**	
Procurement management					
Procurement Planning		3.04			
Solicitation Planning		**2.99**			
Solicitation			3.10		
Source Selection			3.03		
Contract Administration				3.05	
Contract Closeout					3.00
Average for each process group	***3.27***	***2.94***	***3.00***	***2.92***	***2.93***

CONCLUSION

Looking at these results as a whole, it is clear that South Africa has a comparatively high project success rate (when compared to the CHAOS report). South African project managers can therefore be considered on par with, and in many cases better than their international counterparts. But is this good enough?

If the answer is no, this report has identified a number of areas that could be improved. The fact that control processes are lacking in maturity needs to be addressed. It is not enough to plan a project and then leave it to run its course. All aspects of a project need to be evaluated and controlled at every phase of the project life-cycle. When looking at the PMMM discussed in Appendix A, it becomes clear that these control issues are irrelevant once an organisation reaches a maturity level of 4. Considering that the average level of maturity reported in this document is 2.92, this goal can certainly be achieved.

Communication is responsible for most of the failures and challenges in South African projects. Since our formal communication processes and procedures, as prescribed by the PMBOK® Guide, are relatively mature, the problem can only lie with informal communication. Face-to-face meetings, telephonic interviews and other forms of informal communication need attention. Project teams need to bridge the gap between technical staff and business staff, thereby enabling them to better understand the needs of their customers, and to deliver better products and services. Communication is based on language. Another possible contributor to poor informal communication is the number of official languages that we have in South Africa, and that much of the communication taking place may not necessarily be in a person's first language.

Risk Management also needs serious attention. Most project failures can be avoided if risks are identified and managed before they impact on the project. It is not sufficient to perform a risks analysis and then do no risk management. It might be that people are very optimistic and do not believe that things will go wrong or that people are prepared to accept the risk and its consequences without really understanding the impact thereof. Risk management is an area that the project community has battled with for many years, evidence of which is the total rewrite of this knowledge area in the 2000 edition of the PMBOK® Guide.

The way in which success is defined must also be clarified. Are we judging our projects based on redefined or adjusted objectives instead of the original ones? Is it correct to call a project successful if it is six months late, but provides all the requirements added by the customer three months before the scheduled implementation date? Should success be defined from the viewpoint of the users, the project team, the project manager or the sponsor? A number of opinions abound as to what constitutes success.

When looking at the state of IT Project Management in South Africa as a whole, we are certainly not lagging behind. Our success rate is higher than that of the USA, and we have a smaller percentage of challenged projects. One area of concern is our failure rate, which is higher than that reported in CHAOS.

By controlling projects better, working on our communication skills, and managing risks properly, we can turn failures and challenges into successes, delivering projects that are on time, within budget and to the satisfaction of the users. While the results of this report are encouraging, there is still a lot of room for improvement. South Africa clearly has the potential to become a world leader in the field of IT Project Management, but this cannot be achieved unless the professionals in the field work together to address the issues identified in this report.

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APPENDIX A

Project Management Maturity Model Definition

Maturity Level 1 - Initial Process

Processes - No established practices and standards.

Documentation - Loose and ad-hoc.

Management - Management understands the definition of a project, and is aware of the need for project management.

Metrics - Collected informally on an ad-hoc basis.

Maturity Level 2 - Structured Process and Standards

Processes - Processes exist, but are not considered an organisational standard.

Documentation - Documentation exists on the basic processes.

Management - Management supports the implementation of project management, but understanding and involvement is not consistent / applied to all projects. Large projects are executed in a systematic fashion, and management is involved in such projects.

Metrics - Basic metrics to track cost, schedule and technical performance exist.

Maturity Level 3 - Organisational Standards and Institutionalised Process

Processes - All project management processes are in place and established as organisational standards. These processes involve the clients as members of the project team. Nearly all projects use these processes.

Documentation - Documentation exists on all the processes.

Management - Management is regularly involved in input and approval of key decisions.

Metrics - Metrics are formally collected and each project is evaluated and managed in light of other projects.

Maturity Level 4 - Managed Process

Processes - project management processes, standards and supporting systems are integrated with other corporate processes and systems.

Documentation - Processes and standards are documented to support using metrics to make project decisions.

Management - Management understands its role in the project management process. There are different management styles and project management requirements for different projects.

Metrics - Efficiency and effectiveness metrics are used. All projects, changes and issues are evaluated based upon metrics from cost estimates, baseline estimates, and earned value calculations.

Maturity Level 5 - Optimising Process

Processes - Processes are in place and actively used to improve project management activities.

Documentation - Lessons learned are regularly examined and used to improve project management processes, standards and documentation.

Management - Management is focused not only on effectively managing projects but also on continuous improvement.

Metrics - The metrics collected during project execution are used to understand the performance of a project and to assist in the making of organisational management decisions for the future.