

CONSTRUCTION PROJECT MANAGEMENT EDUCATION PROGRAMMES IN SOUTH AFRICA – ADDRESSING THE GAP

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Abstract. *In South Africa, like in most other countries, people become construction project managers by accident. The usual path to become a project manager is through expertise in a **technical speciality** – civil engineering, quantity surveying, architecture, water engineering, construction management and other related disciplines. From time immemorial those with these technical skills are told to run construction projects (as project managers under numerous titles) that are using them. However, the technical part of a construction project is often the smallest and easiest part. Technical success does not necessarily lead to construction project success; it is necessary but not sufficient. Most projects are mismanaged and mismanagement has been accepted as a norm. This sorry state of the South African construction industry (SACI) has created demand for training in construction project management (CPM). Various higher learning institutions – specifically the traditional universities (TU) and universities of technology (UT) – herein referred to as higher learning institutions and other private institutions, have responded by providing training in construction project management in order to address the ‘accidental construction project management syndrome’. But taking a closer look at various programmes in construction project management, one is confronted with programmes which are falling short of what is required/expected – programmes characterized by a significant gap in what is taught. There are strong indications to suggest that those leading these programmes are not aware of what is required and in most situations are misled by various prominent project management knowledge bases, which seem to provide partial project management knowledge frameworks. This paper takes a turbulent journey of using three randomly selected construction project management (CPM) programmes from three higher learning institutions in South Africa to identify the knowledge base gap. Using the project success bridge as a basis of arguing for a fully fledged construction project management (CPM) programme, the paper takes a critical analysis of what is considered as authoritative project management knowledge base and identifies the missing salient parts. Furthermore, based on the analysis, an appropriate construction project management (CPM) programme framework is recommended.*

Keywords: construction project management education, knowledge base gap, South African construction industry, programmes.

1 INTRODUCTION

From time immemorial in the South African Construction Industry (SACI), the majority of civil engineering and building work has been carried out by using traditional methods of procurement – *the traditional procurement systems (TPSs)*, with only a relatively small number of projects being implemented by means of, other procurement systems such as *Design and Build (D&B)*, *Design and Manage (D&M)*, *Management Contracting (MC)* and *Construction Management (CM)*.

The popular trend of using the *traditional procurement systems* has created a situation where building and civil engineering construction projects are *expensive* and *risky* and most of the work takes a *long time to get started* and *delays, disputes* and *extra costs* are a common feature of the SACI. This trend has been dominant across the English Commonwealth Countries (ECC) and both public and private clients have endured the agony.

During the period of recession (1973 to the beginning of the 1980s), the discontent came to a head in the United Kingdom (UK). According to Masterman¹, for the first time clients dissatisfaction with the UK Construction Industry (UKCI)'s inability to meet their needs was publicly expressed. These phenomena, together with the financial and practical consequences of the dramatic increases in oil prices, resulted in the much greater use of management contracting (MC) and the design and build (D&B) procurement system. Although these procurement systems were not used in South Africa at the same pace like in the UK, client discontent on the same issues was visible across the SACI (Hindle and Rwelamila)². During the late 1980s, a few projects started using MC and D&B in South Africa and other ECC (Rwelamila)³.

During the post-recession period (from 1980), there has been a changed pattern of demand for ECC Construction Industries (ECCIs) resources, a lack of skilled labour and public finance and new client attitudes to the organization of the management of the design and construction of projects and the financing of development schemes. In South Africa, from 1994, the ushering in of the new political dispensation brought in various dynamics of re-organisation and increased demand for infrastructure, but confronted by procurement dynamics which are cumbersome.

Despite the increased awareness that the *traditional procurement system* was not capable of delivering every project to client satisfaction, status-quo still remained. The SACI's general performance, in terms of the principal criteria of *schedule, cost, quality, utility* and *health and safety (project parameters)* considerations has continued to be mediocre. Over and above direct concerns by clients on what the *traditional procurement systems* were delivering, SACI experts, public and private clients' debates intensified and the fragmented nature of the procurement process became a focal point as the principal cause of the SACI's poor performance. Late in 1994, the need to address the SACI poor performance was linked to the need to protect the South African public.

In July 1999, following a five year consultative process draft legislation was published for comments recognizing Construction Project Management (CPM) and Construction Management (CM) as fully fledged professions along traditional professions like Architecture, Civil Engineering and Quantity Surveying. The registration for Construction Project Managers (CPMRs) is under the statutory South African Council for Project and Construction Management Professions (SACPCMP).

The need for a CPMR in the SACI to take charge of various fragmented construction project procurement arrangements inherited from the *traditional procurement system* is formally accepted and recognized as, an-integrator of all aspects of the construction project, who should ensure that the proper knowledge and resources are available when and where needed, and above all, ensuring that the expected results are produced in a timely, prestige level in design and construction, acceptable utility levels, cost-effective manner and within health and safety requirements (CIOB)⁴.

While the recognition of Construction Project Management as a distinct profession is no longer debatable in the South African Construction Industry, getting fully fledged construction project managers is a tall order. During the short term to medium term, the majority CPMRs will come from a dominant group of '*accidental construction project managers*' – **these are primarily star performers engineers, architects and quantity surveyors**. *But do these people make outstanding construction project managers? Will they be enthusiastic about their responsibilities? Do they have an aptitude for the requirements imposed on them to lead and manage construction projects?* It is imperative to recognize that the skill set of construction project managers is different from the skills exercised in *engineering, architecture or quantity surveying*. Those organizations and managers who select and develop CPMRs, including the SACPCMP as a registration body should understand the competences required from these people.

These **engineers, architects and quantity surveyors** have the desire to become CPMRs. This is why most of them think that you can become a CPMR simply through experience alone by '*managing projects*'. It makes sense that these people who are normally appointed as CPMRs should really want the job. And indeed, they have all the *energy and enthusiasm* of adolescents, applying themselves to many new project opportunities, putting in long hours, going from one task to another with minimal guidance and even less formal CPM training, moving from construction project to construction project. Most learning is on the job. They enjoy the excitement of exploring technologies and various dynamics at project coal faces. They know from the '*next project coal face*' that other **engineers, architects and quantity surveyors** also love the esoteric properties they deliver. All that talent in a seemingly disjointed environment is the reason that some amazing properties finally get handed over to the clients.

But project management talent is not always obvious. Most of these '*accidental construction project managers*' are counting on their technical knowledge (in **engineering, architecture and quantity surveying**) to make decisions, not on their ability to influence or motivate people.

Unfortunately, retaining an adolescent mentality in a dynamic environment is like carrying around a time bomb; it eventually explodes. Projects are completed late, over budget, of poor quality and without utility and health and safety considerations. And so the adolescents are growing up. An opportunistic approach to launching projects still appears chaotic, but it features an overarching strategy as well as criteria for making decisions.

In the light of all this, appointing and registering ‘*accidental construction project managers*’ is no longer going to be appropriate in the long term, if ever it was! Clients and the SACPCMP should insist on CPMRs with appropriate *knowledge, skills, techniques* and able to use the *required tools*. The major source of CPMs with all these requirements will come from South African Higher Learning Institutions. The salient question is: *Are these institutions aware of what is required to produce a future CPMR with appropriate knowledge?* Using the project success bridge as a basis of arguing for a fully fledged construction project management programme, the paper first takes a critical analysis of what is considered as authoritative project management knowledge base and identifies the missing salient parts (the gap) in CPM programmes offered in South Africa. Secondly, the paper takes a turbulent journey of using three randomly selected construction project management programmes from three *higher learning institutions* in South Africa to identify and assess the knowledge base of current programmes in CPM. Furthermore, based on the analysis, an appropriate construction project management programme framework is recommended.

2 THE CPMR AND CONSTRUCTION PROJECT MANAGEMENT – UNDERSTANDING THE FUNDAMENTALS

According to the Chartered Institute of Building (CIOB)⁴, CPM is the professional discipline which separates the management function of a project from the *design* and *execution functions*.

The CIOB⁴ defines Construction Project Management (CPM) as:

“..the overall planning, coordination and control of a project from inception to completion aimed at meeting a client’s requirements in order to produce a functionally and financially viable project that will be completed on time within authorized cost and to the required quality standards.”

This definition goes along with generic definitions advanced by the Association for Project Management (APM) (2006) and the Project Management Institute (PMI) (2004).

The Association for Project Management⁵, in its primary document – *the APM Body of Knowledge (APMBOK)* defines project management as:

“The process by which projects are defined, planned, monitored, controlled and delivered so that agreed benefits are realized.”

Putting the CIOB⁴ and APM⁵ definitions into a more-clearer framework, the Project Management Institute (PMI) (2004), in its project management Body of Knowledge (PMBOK) document defines project management as:

“...the application of knowledge, skills, tools and techniques to project activities to meet project requirements.”

In order to perform CPM duties falling under the CIOB's⁴ Code of Practice for Project Management (CPPM) and the APM's⁵ APMBOK, the PMI⁶ PMBOK insist that the Construction Project Manager (CPMR) must have *knowledge, skills*, and use various *techniques* to make decisions. Furthermore, *tools* should be used to facilitate various undertakings.

In the long-term therefore, the SACI will expect CPMRs to come from various higher learning institutions and these will be basically (in most situations) Quantity Surveyors, Engineers, Architect and Construction Managers with post-graduate qualifications (Diploma or Degrees) in project management (generic) or construction project management (built environment specific).

3 THE CPM KNOWLEDGE BASE – WHAT ARE THE ISSUES FOR CPM CURRICULUM?

Studies and research (for example Sarna⁷; Wheelwright and Hayes⁸ and Gadeken⁹ have identified the competences needed by project managers. Although these competences are generic they fit well within what is expected for a CPMR especially when you relate these competencies with the functions of a CPM as articulated in the CIOB's⁴, Code of Practice for Project Management (CPPM).

In order to remain within Sarna⁷, Wheelwright and Hayes⁸ and Gadeken's⁹ arguments, reference to project management and project manager are used interchangeably with construction project management and construction project manager respectively.

An effective project manager is a “*technological entrepreneur*” who can do each of the following:

Invoke the inner confidence to ask dumb questions and keep asking them; thrive in the ambiguity that surrounds working in an unstructured environment without clear lines of authority; operate through interpersonal ad hoc agreements and understandings, on the basis of personal credibility, good will; react instinctively to opportunities and crises, and thus maintain the credibility of the project (fill in any excuse); and identify the people whose support is crucial to the success of the project and win their allegiance.

As a “*technological entrepreneur*” there are *six competencies* that distinguish outstanding project managers from their contemporaries:

- *Sense of ownership and mission* – responsible for the project and other broader organizational issues.

- *Political awareness* – knows who influential players are, what they want and how best to work with them.
- *Relationship development* – spends time and energy getting to know project sponsors, users, and contractors.
- *Strategic influence* – builds coalitions and orchestrates situations to overcome obstacles and obtain support.
- *Interpersonal assessment* – identifies specific interests, motivations, strengths, and weaknesses of others.
- *Action orientation* – reacts to problems energetically and with a sense of urgency.

These studies and research results support strongly the idea that technical expertise (*in quantity surveying, engineering, construction management and architecture*) is not the most important requirement for successful construction project management. Clearly, the practice of promoting the best quantity surveyors, engineers or architects without CPM training to manage construction projects is ill founded. These studies indicate that far more important is a sense of mission, the sense of really wanting the construction project to succeed, and a political awareness of how to get things done. Construction technical expertise is necessary on the project core team, but not necessarily by the construction project manager.

The above findings strongly reinforces the argument that any construction technical expert (*quantity surveyor, engineer, architect or construction manager*) who wants to become a construction project manager should attend a project management course internal or external to his or her employing organization.

A well balanced project management course (generic or construction focused) should cover the 7 broad topic areas (project management coal-face knowledge (PMCK and executive project management knowledge (EPMK)) and indicated in Table 1.

Table 1 Project management curriculum broad topics

Main Broad Topic	Sub-topics
PMCK1: Project techniques (PT)	project planning; estimating; and risk analysis techniques – <i>ability to put together a project plan</i>
PMCK2: Behavioural aspects of PM (BAPM)	team building; motivating team members; developing effective project teams; dealing with upper managers, contributing department managers and other stakeholders.
PMCK3: Controlling techniques (CT)	project reviews; meeting skills; project audit techniques; and project close-out techniques.
PMCK4: Organisational issues (OI)	techniques for managing across organizations when the PM has all the responsibility and little authority.
PMCK5: Business fundamentals (BF)	the business of the organization; how decisions affect the bottom line, how to run a project as if it were a business.
PMCK6: Marketing and customer issues (M&CI)	techniques of defining and developing a market; understanding the needs and desires of the project's customers and end users.
EPMK: Creating an environment for successful projects (CESP)	change to project-based organizations; strategic emphasis for projects and portfolio and programme management; developing a core team process; developing PM in the organization; organizing for PM; understanding upper management influence; developing a learning organization, planning for project manager selection; and developing a PM information system.

Unless those who are qualified as engineers, architects, quantity surveyors and construction managers and want to become CPMRs decide to accept the truth that they lack project management knowledge (see Table 1) and decide to pursue PM courses (generic or construction specific), very little is likely to improve for the majority of *accidental construction project managers* in the long term/in the future.

More construction projects are lost due to inadequate people management than have ever been defeated for technical reasons. In their quest to improve their abilities to lead projects, construction project managers have, as a powerful ally, the modern construction/consulting organizations within which they operate. Top management within these companies need to make a concerted effort to create the training environment within which construction project managers can flourish – *training could be within organizations or external to the employer organization from existing higher learning institutions.*

3.1 Where do these 7 topics belong?

In order to answer the question it is important to understand the construction project success bridge concept (see Figure 1).

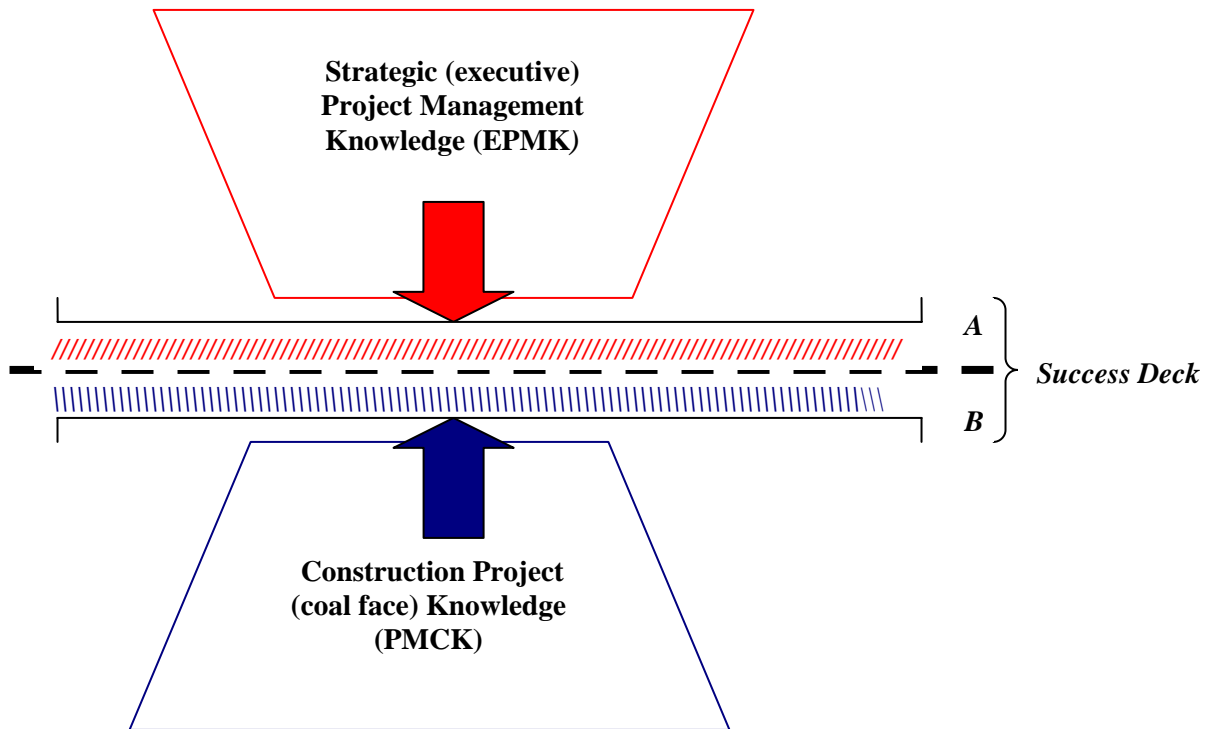


Figure 1: The construction project success bridge

Debates on project success from various researchers and practitioners (for example Winch¹⁰; Pinto and Slevin¹¹; Turner¹²; Cook-Davies¹³; Gardiner¹⁴; Kerzner¹⁵) have led to a significant level of understanding of project success factors. Cook-Devies's¹³ ability to distinguish between *project success* (success criteria defined by the project objectives) and *project management success* (success criteria defined by the inputs to the management system that lead directly or indirectly to the success of the project) brings the reality of strengthening the bridge (see Figure 1) from the organization side (EPMK) and the project coal-face side (PMCK). His identified success factors of project success and their relationship with PM curricula broad topics (Table 1) are shown in Table 2.

Table 2 The relationship between PM success factors and PM curriculum broad topics

Critical success factors of project success	PM curriculum broad topics
(1) Adequacy of company-wide education on the concept of risk management	EPMK
(2) Maturity of an organization's processes for assigning ownership of risk	EPMK & PMCK1
(3) Adequacy with which a visible risk register is maintained	EPMK & PMCK1
(4) Adequacy of an up-to-date risk management plan	PMCK1
(5) Adequacy of documentation of organizational responsibilities on the project	EPMK
(6) Keep project (or project stage duration) as far below 3 years as possible (1 year is better)	EPMK
(7) Allow changes to scope only through a mature scope change control process	PMCK1
(8) Maintain integrity of the performance measurement baseline	EPMK & PMCK3
(9) Existence of an effective benefits delivery and management process that involves mutual cooperation of project management and line management functions	EPMK ; PCMK2; EPMK4
(10) Portfolio and programme management practices matched to the corporate strategy and business objectives	EPMK
(11) A suite of project, programme and portfolio metrics that provide feedback on current project performance & future success, so that project, portfolio and corporate decisions can be aligned	EPMK; PCMK5; PCMK6
(12) An effective means of learning from experience on projects, that combine explicit knowledge with tacit knowledge in a way that encourages people to learn and to embed that learning into continuous improvement of PM processes and practices	EPMK & PMCK3

As clearly noted above (Table 1, Figure 1 and Table 2) project success is a combination of 'Construction Project Knowledge (PMCK)' and 'Strategic PM Knowledge (EPMK) – down-stream and upper-stream PM knowledge base of the project success bridge (Figure 1). Matching down-stream and upper-stream PM knowledge base to 'Critical success factors of project success' (Table 2) strengthen the importance of all 7 broad topics in any full fledged PM programme.

4 EXISTING PM PROGRAMMES CURRICULA IN SOUTH AFRICA – HOW DO THEY MEASURE-UP?

In order to reflect and synthesize information on current project management programmes curricula in South Africa (SA), it was necessary to identify PM programmes. As a guiding line and the following question was formulated:

Are South African higher learning institutions aware of what is required to produce a future Construction Project Manager with appropriate knowledge?

4.1 Research objectives

The findings presented in this paper were conducted as a preliminary study to establish what is taught under project management programmes at higher learning institutions in South Africa. The primary focus of the research as indicated above was to establish if higher learning institutions project management training curricula are within what is considered to constitute project management skills envelope.

There are 9 higher learning institutions in South Africa offering project management courses as indicated in Table 2.

Table 2 Higher learning institutions providing project management training in SA

Institution	Type of Qualification Masters (M)/ Post Grad. Diploma (PGD) /Diploma (D)/Programme (P)/Cert. (Duration)	Generic (G)/Construction Specific (CS)
University of South Africa (UNISA)	D, P & Cert.	G
University of Pretoria (UP)	M & Cert.	CS
University of Cape Town (UCT)	M & PGD	G
Nelson Mandela Metropolitan University (NMMU)	M & D	CS (M) & D (G)
University of Kwazulu Natal (UKZN)	M, PGD & Cert.	G
Witwatersrand University (WU)	M	CS
Cape Peninsular University of Technology (CAPUT)	D	CS
DAMELIN	D	G
Cranefield College	M, PGD & D	G

4.2 Preliminary study scope and methodology

A simple random selection was carried out among the Higher learning institutions listed in Table 2. Three universities were selected. In order to keep the Universities names anonymous and allow the author to carry out a focused analysis, these universities will be identified as UNI1, UNI2 and UNI3.

Based on the main broad-topics and sub-topics as indicated in Table 1, every detailed curriculum of the project programmes of the three universities (UNI1, UNI2 and UNI3) was scrutinised to establish if the seven broad topics defining a typical fully fledged project management programme were adequately covered by each of these curriculum.

In order to establish some basic metric to establish comparison each of the seven broad topics was given 100% points, indicating that if the curriculum is covering all the required areas of the knowledge base then the programme scores 100% points for the topic. The total percentage point for a project management programme covering all the required topics and knowledge base areas is 700%.

4.3 Analysing the programmes

Programmes content scores (Table 3, 4 and 5) were prepared after an intensive content analysis of the three randomly selected programmes (UNI1, UNI2, and UNI3).

Research subject A: UNII (Table 3)

The project management programme at UNII has four compulsory modules and two electives. An MSc Degree and a Post Graduate Diploma (PGD) in project management are offered. Candidates registered for both the MSc and PGD are required to take the four compulsory modules. Only MSc students are allowed to take two approved elective modules and a dissertation.

Table 3 PM programme content score

Main Broad Topic	Programme Content Score
Project techniques (PT)	90%
Behavioural aspects of PM (BAPM)	30%
Controlling techniques (CT)	20%
Organisational issues (OI)	20%
Business fundamentals (BF)	25%
Marketing and customer issues (M&CI)	60%
Creating an environment for successful projects (CESP)	10%
TOTAL POINTS	255/700

As clearly indicated in Table 3 above, the programme is stronger in project management techniques (90%) and in marketing and customer issues (60%). While the programme focuses more on typical human resources management (HRM) fundamentals, the programme is weak in issues of team building, developing effective teams and motivating team members. The programme is also weak in business fundamentals (25%), controlling techniques (20%) and organisational issues (20%). The programme is dismally weak in the fundamentals of creating an environmental for successful projects (10%).

Looking at this programme through the '*construction project success bridge*' (Figure 1) it is clear that most of what is covered for the programme falls under the '*Construction Project Knowledge (PMCK)*' and very little from the '*Strategic PM Knowledge (EPMK)*'. This strongly suggests that this programme will produce graduates with a skewed knowledge base and only capable supporting a weak '*success deck*' of the '*construction project success bridge*' (Figure 1). This programme needs an extensive review in order to become well balanced (to remove the gap) from both '*Construction Project Knowledge (PMCK)*' and '*Strategic PM Knowledge (EPMK)*'.

Research subject B: UNI2 (Table 4)

Four core taught modules (general) are compulsory and three taught elective modules focused on PM) are allowed for the Master of Commerce Degree in Project Management. After passing all the core and elective modules a dissertation is supposed to be taken in order to graduate.

Table 4 PM programme content score

Main Broad Topic	Programme Content Score
Project techniques (PT)	90%
Behavioural aspects of PM (BAPM)	25%
Controlling techniques (CT)	20%
Organisational issues (OI)	15%
Business fundamentals (BF)	20%
Marketing and customer issues (M&CI)	65%
Creating an environment for successful projects (CESP)	15%
	250/700

Fundamentally this programme has similar characteristics to UNI1 (see Table 4 above). It has a strong score in project management techniques (90%) and in marketing and customer issues (65%). Again like UNI1, it has a strong focus on typical human resources management (HRM) fundamentals, but weak in issues of team building, developing effective teams and motivating team members. Similar to UNI1 the programme is also weak in business fundamentals (20%), controlling techniques (20%) and organisational issues (15%). Although slightly better than UNI1 in the fundamentals of creating an environmental for successful projects with a 15% score, it still falls within the same category of UNI1 as dismally weak in this knowledge base.

Analysing the programme against the ‘*construction project success bridge*’ (Figure 1) brings you to the same conclusion as under UNI1 that it is dominated by ‘*Construction Project Knowledge (PMCK)*’ and very weak on ‘*Strategic PM Knowledge (EPMK)*’ (there is a clear gap) . Based on these results, it could be strongly argued that its graduates will have a skewed knowledge base and only capable of supporting a weak ‘*success deck*’ of the ‘*construction project success bridge*’ (Figure 1). Like UNI1, this programme will need an extensive review where its content should have a balanced knowledge base from both ‘*Construction Project Knowledge (PMCK)*’ and ‘*Strategic PM Knowledge (EPMK)*’.

Research subject C: UNI3 (Table 5)

This MSc PM programme is taken over two years and divided into four semesters. Two subjects are taken in the first semester, four subjects in the second semester of the first year and the same subject distribution for the second year. Upon passing all the courses prescribed the student is required to submit a dissertation.

Table 5 PM programme content score

Main Broad Topic	Programme Content Score
Project techniques (PT)	90%
Behavioural aspects of PM (BAPM)	45%
Controlling techniques (CT)	25%
Organisational issues (OI)	20%
Business fundamentals (BF)	45%
Marketing and customer issues (M&CI)	20%
Creating an environment for successful projects (CESP)	05%
TOTAL POINTS	250/700

Though the spread of programme content score are different from UNI1 and UNI2, its total content score falls within the same bracket as UNI1 and UNI2. Like UNI1 and UNI2, is stronger in project management techniques (90%) and equally stronger (45%) in business fundamentals and behavioural aspects. This is the only programme which in addition to being more focused on typical human resources management (HRM) like UNI1 and UNI2; it is far better in issues of team building, developing effective teams and motivating team members. Along the lines of UNI1 and UNI2, the programme is also weak in controlling techniques (25%), marketing customer issues (20%) and organisational issues (20%). The programme is dismally weaker than UNI1 and UNI2 in the fundamentals of creating an environmental for successful projects (05%), hence a clear gap exists between the ideal PM programme and this programme.

In the eyes of the ‘*construction project success bridge*’ (Figure 1), the programme is one sided [dominated by ‘*Construction Project Knowledge (PMCK)*’]. Again this strongly suggests that this programme will produce graduates with a skewed knowledge base and only capable of supporting a weak ‘*success deck*’ of the ‘*construction project success bridge*’ (Figure 1). Along with UNI1, and UNI2, this programme will require an extensive review in order to embrace both sides of the ‘*construction project success bridge*’.

5 CONCLUSIONS

Ability in technical expertise of civil engineering, architecture, quantity surveying and other related areas is not an overriding indicator of the effective construction project manager. It certainly provides increased credibility on the job in any construction industry, but has been elevated in importance beyond what it deserves. Construction project managers (CPM) need to have leadership potential, hence one of the knowledge base running thread in any PM programme curriculum.

The PMBOK is a very important document when addressing issues of PM knowledge base but it should not be treated as an absolute base for PM knowledge base as is the case in most South African higher learning institutions and in practice. It has a significant number of weaknesses (gaps) and these need to be considered over and above what is provided in PMBOK.

The APMBOK when used in conjunction with the PMBOK provides a more balanced framework on PM knowledge base. It is thus recommended that South African higher learning institutions and other institutions involved in PM practices should have a good understanding of both documents when addressing issues of PM knowledge base. The APMBOK has an organic running thread (fitting the changing nature of the PM profession) in its framework and this provides an excellent grounding when dealing with PM knowledge base.

Based on the analysis of three South African PM programme curricula there are strong indications to suggest that South African higher learning institutions are not aware of what is required to produce a future CPM with appropriate knowledge. Most of the CPM programme courses are dominated by the **technical knowledge base** (scope, WBS, schedules, resource allocation, baseline budgets, and status reports) of managing *'the project'* – primarily focusing on the *'project coal face'*. Although there is a *'project coal face'* bias across the programmes analysed but its coverage still falls short of what is expected for this part of the curriculum. Very little is covered under **socialcultural knowledge base** (leadership, problem solving, teamwork, negotiation, politics and customer expectations).

All programmes surveyed are very weak in areas of understanding the components for successful projects - *change to project-based organizations; strategic emphasis for projects and portfolio and programme management; developing a core team process; developing PM in the organization; organizing for PM; understanding upper management influence; developing a learning organization, planning for project manager selection; and developing a PM information system.* This weakness is so significant to warrant a conclusion that most South African PM programmes are half-baked (they exhibit a clear gap) and need extensive reviews.

It is recommended that any review of a PM programme in South Africa should be conducted in a well structured manner and an appropriate construction project management (CPM) programme described in Table 1 should be used as a principal guideline when designing programme modules. This framework should be used when designing specific or generic programmes.

This preliminary study was limited to South Africa, but the author's experience on CPM programmes offered in various countries in Europe, Australia, Pacific Rim countries, North America and other countries in Africa strongly suggest a huge similarity to the South African situation.

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