

Comparing PMBOK® To The Greek Construction Production Process

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Abstract

This paper sets out to examine the similarities and differences between the PMI "Guide to the Book of Knowledge" (usually referred to as the PMBOK® Guide) and the Greek construction production process (Gcps). The research is confined in scope to include the most essential and readily applicable knowledge areas i.e. those of time and cost management. The comparison between different methodologies is difficult because of the varying application domains, philosophies, procedures and notations. This is corroborated by the scarce relevant literature in which various methodologies have been used. Following a literature review, a systematic effort was undertaken to classify the Gcps according to the PMBOK's® knowledge areas. The major conclusions that can be drawn from this work are that the differences between the two systems in the areas compared are remarkably minimal, nonetheless the experience accumulated indicates that further research in the subject is needed.

Keywords

PMBOK, Project, Construction Industry, Greece

1. Introduction

A number of large infrastructure projects has been implemented in Greece in recent years (e.g. the Athens Metro, a new railway infrastructure, via Egnatia, the 2004 Olympic Games etc.) necessitating the use of advanced project management methods. Such a method is described in PMI's "Guide to the Book of Knowledge" (PMBOK®) whose popularity in a variety of disciplines has increased remarkably throughout the world during the past 30 years. PMBOK, however, has had a minimal impact in Greek construction affairs. Are there areas in which the Greek construction production process (Gcps) can improve based on PMBOK?

Such questions have motivated the research described in this paper. In this work we will concentrate to the “construction production process” i.e. the third phase of a project’s life cycle (feasibility, planning & design, construction and turnover) and, furthermore, to the most essential and readily applicable knowledge areas (from the nine described in PMBOK) i.e. those of time and cost management.

The methodology followed entailed:

- A literature review of project production system comparisons.
- The categorization of the Gcps according to the PMBOK’s knowledge areas,
- The detailed comparison of the two systems.

The major conclusions that can be drawn from this work will then be presented in the final part of the paper.

2. Literature Review

A number of standard project management texts have appeared in recent years in the form of BoKs (Bodies of Knowledge), best practices and ISO standards. The literature on the comparison of the respective texts is, however, scarce and atypical. Below a number of such comparisons is briefly presented.

Wirth and Tryloff (1995) compared PMBOK, the Australian Institute of Project Management (AIPM) Reference Curriculum for Project Management Courses, the Association of Projects Managers (APM) BoK, the Project Management Austria (PMA) BoK, the Norwegian Association of Project Management (NAPM) Fundamentals of Project Management and the International Standards Organization (ISO) ISO/CD 9004-6 based upon: context (objectives of the document), approach (method proposed or logic used), structure and content.

Wideman (2002) and Sigelaub (2004) compare PRINCE2 (a PM standard used mainly in the UK) with PMBOK in terms of application areas, processes and roles. They both conclude that these methods are different in scope, however, they are complimentary in certain areas as these are only covered in one of them (e.g. human resources or procurement management are only covered in PMBOK).

Charbonneau (2004) compares the Rational Unified Process (RUP) used in software development with PMBOK by mapping their respective best practices in a table format. The PMBOK notation of “knowledge areas” is mapped to the RUP’s notation of “disciplines” and the PMBOK’s “process groups” to the RUP’s “workflows”. He concludes that PMBOK is more generic than RUP and as such it can be used as a baseline to compare other project management methodologies.

Liu et al (2003) take a somewhat different perspective as they compare professional construction project management as practiced in China with the West. A number of semantic differences are highlighted (e.g. the difference of the Chinese “construction supervision” as compared with the Western “project management” concept). A general five stage project life-cycle is used (inception, pre-construction, construction, completion and maintenance) to highlight differences in processes, duties and knowledge areas. Liu et al (2003) conclude that despite the number of semantic and legislative differences between the two systems, the similarities are remarkable.

In conclusion, the comparison methods used, although useful and valid, are descriptive, concept oriented and nonconforming to one another. These methods were useful in this research to identify the semantic – concept oriented difficulties underlying the work. More rigorous generic methods for construction process modeling based on IDEF0 as proposed by Karhu (2003) are also applicable, though they have only been used

for project production systems comparison by Voulgari (2004).

3. The Greek construction production system (Gcps)

PMBOK is a codified single reference, currently at its 3rd edition (PMI, 2004), consisting of “generally recognized management practices” represented by 44 component processes. Each process is further described in terms of its inputs, outputs, tools and techniques. Inputs and outputs are documents or documentable items. Tools and techniques are mechanisms applied to the inputs to create the outputs.

In retrospect, the Gcps is described by a multiplicity of Laws (L), Presidential Decrees (PD), Ministerial Decisions and Circulars (MD) issued since 1984. Specific project related information is included in the construction contract. We deal with Greek legislation and construction contracts (referred to collectively as the “Greek construction production system” - Gcps) in some detail below.

3.1. Greek construction legislation

The basic construction legislation includes:

- L1418 (Public construction works and relevant subjects) issued in 1984 (L1418/84) and its amendments (L2052/92, L2229/94, L2308/95, L2372/96, L2412/96, L2576/98, L2719/99, L2940/01, L3127/03) and,
- PD 609/85 and its amendments (L2229/94, L2338/95, L2741/99, PD 48/88, PD 286/94, PD 368/94, PD 402/96, PD 210/97, PD 285/97, PD 218/99 and PD 334/01).

Other relevant legislation includes L3263/2004 (Public construction works award system to the lowest bidder), PD 346/98 (Adaptation of the Greek legislation to the European Directive (EC) 92/50), and PD 334/01 (Adaptation of the Greek legislation to the European Directive 93/37/E.C). More specific instructions are provided in a number of MDs such as, for example, MD D. D.17/01/117/F.N. 332/16-11-89 (Specifications for the implementation of project management studies), MD D. D.17a/10/16/F.N. 380/16.2.1998 (Expert consultant audits for Quality for the EU co-financed public projects) etc.

This legislative framework is complex, difficult to trace, time dependent (as amendments are issued from time to time) and expands over thousands of pages. It was for this reason that the scope of this research was confined to the most essential and readily applicable knowledge areas i.e. those of time and cost management. The main coverage of time and cost in the legislation is as follows:

Fifteen (15) days after the signing of a construction contract the time schedule of the project should be submitted for approval. (L 1418/84 – article (ar) 5, paragraph (par) 4). The specification of this time schedule is described in MD D. D.17/01/117/F.N. 332/16-11-89. The submitted time schedule should be approved within ten (10) days. Penalties for non conformance are specified in PD 609/85 – ar 36. Time extensions of this time schedule are only permitted under strict requirements. Interim payments are made monthly based on measured quantities of works performed (PD 609/85 – ar 40 & 41). Other related issues (e.g. data recorded on site) are covered by PD 609/85 – ar 32 & 33. Defects should be rectified by the contractor at his own expense (PD 609/85 – ar 46).

L 1418/84 –ar. 8 & PD 609/85 – ar 43 define the procedure to follow to extend project deadlines and increase project budget case additional or unforeseen works are required. L1418/84 –ar. 10 specifies that project cost escalations due to inflation should be considered every three months according to the cost indices published by Government agencies.

3.2. The construction contract

According to the Greek legislation, all public construction projects require a contract which should include:

- Project design (including design assumptions, calculations and details).
- Project description (presentation of the project and its requirements, necessary work packages and budget).
- Cost analysis (labor, plant, materials) for all works required. The cost refers to the amount of money that the project sponsor is expected to pay - not the actual cost of the works.
- Detailed list of the quantities of all the works included in the contract.
- Budget (including general expenses, profit and VAT).
- Bill of Quantities.
- General Requirements of the Project (GRP) including milestones, interim payments procedures etc.
- Technical Requirements of the Project (TRP) i.e. technical specifications.
- Special Requirements of the Project (SRP) i.e. complimentary technical specifications.

The construction contract should also make specific reference to the Laws, Presidential Decrees and Ministerial Decisions pertaining to the project execution. No clause of the contract can supersede, nor contradict with the current legislation.

3.3. Discussion

Construction legislation is not published as a single reference BoK by the Government, although there are various private initiatives (usually publishers) that undertake this activity for a fee. The format and layout of the legislation is such that process charts, standardized documents or examples are not included. Expertees developed through experience are required to be able to apply the legislation correctly and, indeed, a special type of lawyers (construction lawyers) deals with this subject and offer invaluable services to the industry. A direct consequence of this situation is that non standardized documents are used even by the same project sponsor (e.g. different GRPs, SRPs etc.) leading to misunderstandings, disputes and eventually delays, claims, litigation and, possibly, corruption.

PMBOK is a single point of reference. It would help, perhaps, to have a different version for each discipline (i.e. a construction BOK), but this is not a prerequisite (an update of PMI (2000) will, however, be welcome). An effort to harmonize PMBOK to the EU legislation and directives is also required, if application of the PMBOK to the European construction markets is sought.

To be able to compare the Gcps to PMBOK subjective judgement and experience were impartial. We summarize the comparison made in the next paragraph.

4. Comparing PMBOK to the Gcps

The main characteristics of PMBOK and the Gcps are summarized in Table 1 below.

Table 1. Main characteristics

PMBOK	Greek construction project production system
Any type of project	Public construction projects only. Private or PPP construction projects are not covered.
Comprehensive	Comprehensive but not complete
Largely descriptive. Prescriptive on a high level	Both descriptive (L & PD) and prescriptive (MD), yet, not complete.
Covers all aspects of project management	Some aspects covered (see Table 2)

Need to be configured to the needs of the different projects	All processes should be considered
US / International Standard	Greek standard. Considerable differences between EU construction production systems

The PMBOK's knowledge areas covered by the Gcps are those of "integration", "scope", "time", "cost" and "quality". "Risk" is partially covered, whereas "communications" and "human resources" are not covered. Finally, "procurement" is covered through EU directives and general procurement legislation. In the remainder of this paragraph, we will deal with time and cost comparisons in more detail.

4.1. Time Management Comparison

According to PMBOK, project time management includes six processes: Activity definition; activity sequencing; activity resource estimating; activity duration estimating; schedule development and schedule control. The comparison to the Gcps was made in a tabular form as shown indicatively in Table 2 below.

Table 2. Time Management Comparison – Part A : Activity Definition

PMBOK	GREEK CONSTRUCTION PRODUCTION SYSTEM
Activity Definition	
Inputs	
1 Enterprise environm. factors	Not covered (though required on projects co-funded by the EU)
2 Organizational process assets	Not covered nor required by legislation. Most companies maintain historical records for their own use.
3 Project scope	Covered in the contract.
4 WBS	Covered, if required, in the contract
5 WBS dictionary	Not covered. May be included in the contract.
6 Management plan	Covered in the contract and in MD D. D.17/01/117/F.N. 332/16-11-89
Tools & Techniques	
1 Decomposition	Not specifically covered. PMBOK process can be readily applied.
2 Templates	Not specifically stipulated in the legislation. Ministry's of Finance MIS, however, has made certain templates compulsory to facilitate reporting of multiple projects. The templates can be included in the contract (e.g. GRP)
3 Rolling wave planning	Not specifically covered. May be specified in the contract. PMBOK process can be readily applied.
4 Expert judgement	Not specifically covered. PMBOK process can be readily applied.
5 Planning component	Not applicable.
Outputs	
1 Activity list	MD D. D.17/01/117/F.N. 332/16-11-89 – ar.8, par. a
2 Activity attributes	Partially (dependencies) covered in MD D. D.17/01/117/F.N. 332/16-11-89 – ar.7, par. a. Coding requirements may be covered in the contract. PMBOK can be readily applied.
3 Milestone list	Partially (compulsory milestones) covered in GRP.
4 Requested changes	L 1418/84 –ar. 8 & PD 609/85 – ar 43.

Similar tables can be developed for all project management processes. The overall conclusion is that the topic is adequately covered by the Gcps provided that appropriate clauses are included in the contract (e.g. GRP).

4.2. Cost Management Comparison

According to PMBOK, project cost management includes three processes: Cost estimating; cost budgeting and cost control. PMBOK considers a broader view of cost management (“life-cycle costing”, and “value engineering”) which is not shared by the Gcps. Furthermore, the Gcps considers cost estimating and cost budgeting as a single process. Last, but not least PMBOK’s cost management is based on the project plan, whereas cost management in the Gcps is largely based on delivered products (quantities) or services and, thus, it is not necessarily linked to the project plan. Indeed, many project plans become outdated as they lose importance in the final stages of the project. EU directives and special GRP clauses, however, may stipulate differently, requiring the contractor to link the project plan to the project budget. It should also be noted that precision levels and organizational procedures links (although, again, may be stipulated differently in the GRP) are not required by the Gcps. Control thresholds to negotiate the amount of variation allowed are also not used in the Gcps. Variations are dealt with as described in the last paragraph of section 3.1 above.

In conclusion, the semantics of cost management are quite different between PMBOK and the Gcps. The process most fully covered by the Gcps is that of “cost control”. Cost control is dealt with L1418 (ar 8, 10, 11, 41, 43, 52, 53, 55, 56), PD 609/85 (ar 40, 42, 43, 44) and MD. D.17/01/117/F.N. 332/16-11-89.

There are a number of improvements that can be introduced in the Gcps based on PMBOK’s cost management. These are:

- The consideration of various costing alternatives, the development of commercial cost databases, the use of parametric estimating, vendor bid analysis etc.
- The maintenance of historical information from previous projects. Project calendars defined in the Gcps should be expanded to include detailed resource calendars linked to the project activities and their respective bill items. The introduction of performance measurement analysis. The development of a risk register and the study of contingency allowances (currently catered for by a fixed percentage of the project budget). Funding limits reconciliation plans can also be developed.

5. Conclusions

The major conclusions that can be drawn from this work are:

- The development of a standard project production comparison procedure is welcome as it will facilitate improvement between the different methods and long desired convergence.
- The differences between PMBOK and the Gcps in the areas of time and cost management are minimal; however, further investigation is needed, if fruits are to be harvested.

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