A Proposed Framework for Project Managers' Competencies and Role of E-Portfolio to Meet These Competencies

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***Abstract*—Although main project management institutes such as PMI, APM, IPMA, and AIPM have emphasized the importance of project managers' competencies, still there is a need to address this issue to achieve a comprehensive framework which includes all required competencies. Besides, there is a need to introduce a tool which project managers can use to meet those competencies. This research aims to propose a comprehensive project managers' competency framework and to introduce e-portfolio as a new online educational method to support project managers to improve their competencies. For first phase of study, based on comparison of existing project managers' competency standards and literature review the framework including three main components of "Job-competencies", "Person-competencies", and "Contextual-competencies" is proposed. For second phase of study, the questionnaire distributed among professionals in senior executive level, manager level, and senior manager level, and also five industry sectors: Finance, Construction, Engineering Human resource, and Information Technology. The results show that for enhancing project managers' competencies, e-portfolio supports such as knowledge sharing, stimulated virtual software, educational multimedia software, online standard accessibility, educational software, and online updated organizational policies and online bilateral relations among project managers and suppliers.**

***Index Terms*—E-Portfolio, Framework, Project Managers' Competencies,**

I. Introduction

In order to survive in a competitive market, many organizations today are looking for the "competitive advantages". One of these "competitive advantages" is having competent personnel and competent project managers. Therefore, pioneer organizations have a remarkable strive on increasing their personnel capabilities and competencies. As a matter of fact, in contemporary human resource management (HRM) practice, establishing competency of an individual is considered as a resourceful and robust tool (Collin, 1997).

In order to be successful in a business market, project-based organizations should be successful in their projects. One of the factors that influence project success is employing competent project managers. Crawford (2000) points out that a competent project manager is a factor that affects project success. Thus, this leads to the development of some standards for assessing project manager's competencies (Crawford, 2000). Project manager's competency standards illustrate some evaluative criteria, which not only can be used for measuring manager's performance, finding training and development needs, setting of goals among project managers and acting as the basis for succession planning (dainty et al., 2003), but also can be used for predicting performance (Motowidlo et al. 1997) and providing a performance management system.

The competency-based standards which have been developed by project management institutes are as in the following sequence: "Project Manager Competency Development Framework" which is carried out by "Project Management Institute" in 2002, "IPMA Competence Baseline Version 3.0" which is published by "International Project Management Association" in 2006 "AIPM professional competency standards for project management" which is developed by "Australian institute of Project management" in 2008, , and "APM Competence Framework" which is developed by Association for Project Management in 2008".

These standards are prepared based on collective opinions of experienced practitioners in project management and their understanding on competencies required for effective project managers (Crawford, 2005). However, there are some researches that investigate effectiveness of project managers based on other point of views. For instance, Fraser and Zakaria (2003) examined project manager's effectiveness based on stakeholder's perception or Crawford (2005) conducted a research for project management competency based on senior management perception.

Although the existing project managers competency standards are trying to propose a comprehensive model that can be used widely to cover most projects, they fail to do so. For instance, AIPM standard and PMCD framework fail to cover all project manager's competency requirements such as Contextual competencies or in IPMA and APM standards, competency requirements in different project phases are neglected. Other existing project manager's competency models also fail to propose a comprehensive model. Some of

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them carried out in a specific industry and cannot be used for all projects and all industries and some other do not cover all necessary required competencies.

The first purpose of this paper is to provide critiques to these existing project manager's competency standards and, in particular, to explore these standards limitations and stress the need for a comprehensive project manager's competency model. In this research, the aforementioned project manager's competency standards are elaborated, similarities and differences between these standards are explained, their advantages and limitations are listed, and finally a comprehensive model for project manager's competencies that can cover all required competencies is proposed.

The second purpose of this study is to evaluate the role of e-portfolio in project manager's competencies. In order to achieve this purpose first of all experts' recognition about e-portfolio and its usage in their workplace is investigated; second of all from those experts who have applied e-portfolio in their workplace, the advantages of e-portfolio were asked, and finally, a framework which suggests e-portfolio supports on project manager's competency components is proposed.

II. Importance of the Research

As it is acknowledged by leading project management institutes such as Project Management Institute (PMI), International Project Management Association (IPMA), Australian Institute of Project Management (AIPM), and Association for Project Management (APM), achieving competency is a continuous activity for project managers. Thus, achieving competency needs a continuous improvement process. Through a continuous improvement process, project managers not only would be ready for more challenging project like complex project, but also they can widen and deepen their competencies to grow to higher management levels such as Project Director Level or even Executive Project Director Level. By applying e-portfolio as a tool for continuous improvement process in organizations, both project managers and organizations can benefit from its advantages. From individual's perspective, it helps project managers to expand their technical and project management knowledge. Moreover, project managers also can develop their knowledge and experience in other required competency aspects such as job-related competencies, contextual competencies, and personal characteristics. From organizations perspective, e-portfolio help them for updating their personnel and of course project managers' knowledge to have more knowledgeable personnel. In addition, through applying e-portfolio, organizations can achieve solutions for problems they are facing with, and also the tacit knowledge can be shared among organizations from one organization to another one. Furthermore, in one hand, through applying e-portfolio, organizations senior management such as CEOs can highlight the mission and vision of organization to all personnel and they can make sure there is a common understanding among all personnel about organization short-term and long-term objectives; and on the other hand, personnel can transfer their ideas and comments about organization issues in an active way to higher management.

III. Research Objectives and Methodology

The first objective of this paper is to identify the strengths and weaknesses of the existing project manager's competencies standards published by the main project management organizations. In this paper, these four standards which are PMI, AIPM, IPMA, and APM Competence standards are compared based on five different attributes. These attributes are background, concept and overview, design and structure, and certification assessment.

In "Background" and "Concept and Overview" sections purposes for developing the standards, their concept for developing and the overall information about standards are explained. In "Design and Structure" section, competency elements of standards are compared. The different components of competencies used in standard for project manager's competency evaluation are explored. Finally, in "Certification Assessment" section certification systems for standards are compared, the methodology used in standards and minimum requirements for assessment process in order to be considered as competent project manager is explained. Then, the similarities and dissimilarities of these standards are explored and advantages and disadvantages of each standard are described.

The second objective of this paper is to propose a comprehensive project manager's competency model based on the existing literature review, and also the results obtained from project management competency standard evaluation. However, it should be highlighted that the proposed model is not classified into its elements of competencies. In the other words, it is only classified into the main categories of competencies that affect project manager's performance. Exploring the elements of competencies pertaining to each category is the objective of next research.

For the third objective of this research which is to evaluate the role of portfolio in project manager's competencies, two phases are defined. In the first research phase, experts' recognition about e-portfolio and also the usage of e-portfolio in their workplace is evaluated. The questionnaire distributed between 730 professionals in senior Executive level, manager level, and senior manager level, and also five industry sectors: Accounting/Finance, Building/Construction, Engineering, Admin/Human Resource and Information Technology. Totally 374 usable responses were obtained. Then the advantages of using e-portfolio in workplace from those 58 professionals who has used e-portfolio before were asked. Finally, based on literature review, previous experiences in project management, senior software experts' suggestions, and also the analysis of the study, a framework which suggests e-portfolio supports on project manager's competency components is proposed.

IV. Competency Standards Comparison

A. Background

PMCD framework: This framework was a project sponsored by Project Management Institute (PMI) in 1998. The input was collected from the frameworks published by PMI, National Competency Standard developed by the

Australian Institute of Project Management, Competency Dictionary developed by Lyne and Signe Spencer (1993), Project Management Professional (PMP) Role Delineation Study, and Project Management Experience Knowledge Self-Assessment Manual and some other information from international organizations and industries. After some revisions, the draft was submitted to public for their comments and after reviewing the comments, the final version of the framework was issued in 2002.

AIPM Professional Competency Standard: The Australian institute of project management that is a non-profit organization, and it acts as the main project management body in Australia, developed the "National Competency Standards for Project Management "in 1996, and based on "Registered Project Manager's program" it awarded certificates in three levels of the project director, project manager and project practitioner. In order to upgrade this standard and based on requirements of professionalism in the project management, AIPM developed the "AIPM professional competency standards for project management" in 2008. Compared to the previous AIPM Competency Standard, this standard has the three advantages. The first advantage is that it is a rigorous assessment method. Next, it can be used for the senior management level, and finally, it is able to meet industry needs.

IPMA Competence Baseline 3.0: In 1990s IPMA developed IPMA Competence Baseline version 2.0. In order to improve this standard, IPMA defined a revision project and based on the suggestions and directions from 40 association members, IPMA Competence Baseline 3.0 was published.

APM Competence Framework: This standard developed by Association of Project Management in 2008 in order to be used as a base for project manager's certification purpose.

B. Concept and Overview

PMCD framework- This framework is developed by the " Project Management Institute" in 2002 and is intentionally designed to be applicable in most projects, industries, and organizations. This means that the size of projects, the project complexity and the project nature are not considered in this framework. PMDC framework is a performance-based framework. Based on Gonczi and Hager (1993), performance-based approach means being able to perform in certain pre-accepted level of performance.

This standard proposes a methodology for project management development through the definition of the key components of competencies, which affect project manager's performance in most projects. However, in PMCD framework, the degree of importance of each competency element is not considered. Thus, in addressing this weakness, organizations, which want to employ this standard need to define the degree of importance of each of the competency elements.

PMCD framework is aligned with "A Guide of Project Management Body of Knowledge", "Project Management Professional (PMP) Role Delineation Study" and "Project Management Experience and Knowledge Self-Assessment Manual".

The purpose of this standard is to define a methodology that can be used by individuals and organizations for developing project managers. This standard does not address organizational context and project type. Hence, organizations need to address organizational context and project type if they are interested to use this standard.

In this standard, the description of competency is based on the definition made by Crawford (1997). She defined competency according to three dimensions, which are project management knowledge, project management performance and personal competencies. Thus, a competent project manager should fulfill all three dimensions requirements.

According to the PMCD framework, a project in order to be successful needs a competent project manager and a matured organization. If any of these two is not there, it leads to project failure.

As mentioned before, in the PMCD framework, the industry-specific competencies are not addressed and only the project management competencies as the general basis for project managers in a workplace are addressed. Therefore, individuals and organizations use this standard need to include industry-specific competency to the general competencies. Because of the two reasons, this standard is designed to have general natures. Firstly, competencies are transferable from one industry to another industry. Secondly, since the PMCD framework proposes a general competency, the industries can use it as a base and include their own supplement competencies.

The purpose of the PMCD framework is neither for selection of project managers nor for evaluation of project managers' performance. Its purpose is just to provide guidance for individuals and their organizations for developing project managers.

AIPM Professional Competency Standard: The purpose of this standard is to fulfill the requirement of the project management profession. This standard is designed to cover most industries and most projects from the simple one to the more complicated ones. Assessment of nominates is based on the project managers' workplace performance. This standard covers the higher level of management, which is the senior management level in organizations.

In this standard, being competent means to have the minimum predefined levels of knowledge and skills in project management and to be able to apply this knowledge and skills at the workplace. . From "Project Practitioner Level" to "Project Manager Level", or from "Project Manager Level" to "Project Director Level", level of the responsibility and minimum requirements for the knowledge, skills, and experience increase as well.

IPMA Competence Baseline 3.0: IPMA Competence Baseline 3.0 defines a common framework for the certification purpose. 50 members of IPMA worldwide can use IPMA Competence Baseline as a basis and add their own specific competencies and provide a National Competence Baseline. However, this National Standard should be validated by IPMA. The main purpose of IPMA Competence Baseline is to define a standard to be used for the universal certification system. Another purpose of this standard is to develop personnel that are working in the project management area. For assessments, candidates need to submit evidence based on their performance at the workplace,

and assessors evaluate candidates' knowledge and experience according to these submitted evidence. In considering cultural differences, IPMA allows members to have a "National Section" in each competency element by adding new competencies related to cultural differences.

APM Competence Framework: This standard is linked to IPMA Competence Baseline 3 and also APM body of knowledge, and is designed to assess knowledge and experience of candidates who intend to achieve an international recognized certification. In this standard, organizational specific need are not addressed. For the development of the standard, worldwide competence frameworks are studied and project management practitioners' knowledge and experience inside UK industry has been used.

C. Design and Structure

PMCD framework: In the PMCD framework, project manager's competency components are defined according to three dimensions. They are project management knowledge, project management performance, and personal competencies. The project management knowledge and performance are defined based on nine knowledge areas of PMBOK. These knowledge areas are scope, integration, cost, time, quality, risk, human resource, communication, and procurement management. These nine areas of project management knowledge are assessed in five clusters of project management process groups as outlined in PMBOK. These clusters are called initiating, planning, executing, controlling, and closing. In addition of the Project Management Knowledge and performance competencies, the Personal competencies are also addressed in the PMCD framework. The project management performance competencies describe how a project manager is able to apply project management knowledge at the workplace. In assessing project management knowledge, mechanism such as Project Management Professional (PMP) exams can be used. In assessing the performance competencies, the project manager's actual work or outputs can be reviewed.

Based on these nine units of project management knowledge and the five clusters of the project process, a total of 45 competency components is defined. They are then classified into elements of competency and competence criteria. These elements and criteria are used in measuring the project management knowledge and performance in each unit of competency.

In addressing the personal competencies' structures, the PMCD framework is based on the competency dictionary by Lyne and Singe Spencer (1993). There are six units of competencies in this dictionary. They are achievement and action, helping and human service, impact and influence, and managerial competencies. Each unit is classified into clusters, which describe the required behavior in each unit.

AIPM Professional Competency Standard: The knowledge and skills required in this standard are driven from the project management body of knowledge standard (PMBOK). This means that in this standard the areas of project managements are defined according to scope, time, cost, quality, human resource, communication, risk, procurement, and integration management.

IPMA Competence Baseline 3.0: In this standard, competency is defined within the perimeter of technical, behavioral and contextual competencies, and based on these three, 46 competency elements are defined. They are 20 technical competency elements, 15 behavioral competency elements, and 11 contextual competency elements. Technical competencies dealing with project deliverables. Behavioral competencies deal with the personal relation among all parties involved in a project, and contextual competencies deal with the interrelation of the project team within the context of a project.

Each competency element, requirements of knowledge and experience in different IPMA levels are described. Besides this, there is also a section called "main relation" that describes the relation of each competency element with other competence elements.

APM Competence Framework: In this standard, competency elements are defined within these three domains: technical competencies, behavioral competencies, and contextual competencies. Technical competencies contain 30 functional project management competency elements. Behavioral Competencies contain personal project management competence elements, which cover attitudes and skills. These elements are related to project manager's interaction with parties involved in executing a project. Behavioral Competencies have nine competency elements. Contextual Competencies describe the interrelationship between organization and project manager, and they include eight competency elements.

D. Certification Assessment

1) Certification System

AIPM Professional Competency Standard: AIPM Professional Competency Standard certification is in four levels, which are Project Practitioner, Project Manager, Project Director, and Executive Project Director, and based on these levels, the titles awarded to successful candidates are: Certified Practicing Project Practitioners (CPPP), Certified Practicing Project Manager (CPPM), Certified Practicing Project Director (CPPD), and Executive Project Director (Exec PD). Responsibility increases from Project Practitioner level to Executive Project Director Level.

Assessment done in this standard is the performance-based assessment. It means that in the process of assessing candidates, the project manager's application of knowledge and skills at the workplace are evaluated. These competencies are defined based on units of competencies that explain the kinds of competency required for an effective performance in the workplace.

IPMA Competence Baseline 3.0: Based on this standard, there are four levels for certification awarded to candidates: Certified Project Director (IPMA Level A), Certified Senior Project Manager (IPMA Level B), Certified Project Manager (IPMA Level C), and Certified Project Associate (IPMA Level D. At the Project Director Level, members who have advanced knowledge and experience are able to direct program and portfolio. At the Senior Manager Level (Level B), members are able to manage complex projects. At the Project Manager Level (Level C), members are able to manage projects with limited complexity, and in the Project

Association Level (Level D), members are able to apply project management knowledge at their workplace.

2) Assessment Method

AIPM Professional Competency Standard: AIPM Professional Competency standard is a performance-based standard. According to this standard, in order for a candidate to achieve certification, he or she needs to collect evidences based on his or her performance. Then, assessors evaluate these evidences and they will advise the AIPM on the candidate's certification level. AIPM has defined a guideline for assessors in order for them to give a fair assessment and follow AIPM policies.

An assessment can be carried out by one assessor who is chosen by a candidate through the list of candidates available on the AIPM website. All assessors are based in Australia and some of them are able to evaluate candidates from outside Australia. Usually, the candidate meets the assessor twice. In the first session, the assessor usually notifies the candidate on the necessary evidences and documents that the candidate needs to submit. In the second session, all the necessary documents and evidences should have been compiled by the candidate. If there is a need to have more sessions for a more rigorous assessment, the assessor will notify the candidate accordingly. The assessor will report to AIPM on the evaluation of the candidate and almost one month after that, the certificate will be issued by AIPM to the candidate.

IPMA Competence Baseline 3.0: In the IPMA certification system, there are two assessors evaluating candidates. One of the assessors comes from same industry with the candidate, and the other assessor is from another industry. Assessors are certified based on the IPMA certification and must be at least at the same level with the candidate.

For the assessment process, after submitting all necessary documents such as the curriculum Vitae, self-assessment, 360-degree assessment, projects, programs and portfolios of the candidate involved, an interview will be carried out by the assessors. Assessors evaluate the candidate's knowledge and experience in each competency element, and the scale used is from 0 (no competence) to 10 (absolute maximum). Assessors only evaluate the candidate competency level and do not advise the candidate for any required courses. Assessment tools used are written exam, reports which the candidate writes about the projects, programs, and portfolios he or she is assigned to, workshops(optional) that are problem-solving nature and the last but not least, interviews.

In order to achieve good marks for experience, candidates need to gain experience by working in various types and sizes of projects. They also need to work in different organizations. In the IPMA certification system, the evaluation of candidates is based on all 46 competency elements.

3) Assessment Requirement

AIPM Professional Competency Standard: In this standard prerequisite for application for higher level is that nominee must implement one or two projects in lower level. For instance, to apply for the "Project Manager Level", the nominee must prove that he or she has implemented at least one or two projects in the "Project Practitioner level".

At the Project Practitioners Level, members are not responsible for the overall project outcomes. Their responsibility is just limited to their own output. Project Practitioners just apply project performance tools. The minimum requirement at the Project Practitioner level is having competency in applying Scope, Time, and Quality Management Techniques and also having competency in one of the Cost, Human Resource, Communication, Risk, and Procurement Management Techniques. At the Project Manager Level, members are responsible for the overall project outcomes. Candidates in this level need to demonstrate competency in planning and managing all nine units of competencies, which are scope, time, cost, quality, human resource, communication, risk, procurement, and integration management. At the Project Director Level, candidates are responsible for the Program Management. They must demonstrate competency in directing and managing all the nine units of competency.

Another AIPM assessment requirement is called the "Recognition of Current Competency" which means if a candidate intends to apply in a level, his or her recent experience must be in that level. For instance, if a candidate is going to apply for project director level, he or she must work as the Project Director at the time of applying.

IPMA Competence Baseline 3.0: At IPMA Level A, the candidate must have at least five years of experience in the portfolio or program management. At this level, the candidate must show evidences for portfolio and program management. For the IPMA Level B, the candidate must have at least five years in project management, and must show evidences for managing complex projects. For the IPMA Level C, the candidate must have at least three years of experience in project management and must prove enough evidences for managing projects with limited complexity. For the IPMA Level D, the candidate must provide enough evidences for having knowledge in all competency elements.

4) D.4 Recertification

AIPM Professional Competency Standard: After three years of issuing the certificate, AIPM notifies members for recertification. The purpose recertification is to have continuous professional development among members. Based on the "Continuous Professional Development Program", members must develop their capabilities and knowledge. In order to have the recertification, members need to submit points. For different levels of AIPM, the Certificate Level point requirements are varied. For instance, for the Project Practitioner Level, the nominee must achieve 40 points, or for the Project Manager Level, the candidate is expected to score 60 points. These points are gathered by the project managers within three years of their activities. The activities and the score points are available in tables. Therefore, for recertification, no assessment is carried out by the assessor, and the recertification relies on the evaluation of achieved points. However, for the members who are going to apply for the next level, they need to be assessed by the assessor. For instance, a candidate who is going to apply from CPPP to CPPM, he needs to be fully assessed by an assessor.

IPMA Competence Baseline 3.0: For the recertification program, IPMA concentrates on candidate's activities

beginning from the issuing of the last certification. For this purpose, IPMA will inform the candidate of the expiry date of recertification, and the candidate has to update his or her curriculum vitae, project or program or portfolio lists, self-assessment, 360-degree assessment, and all training courses attended. All these documents have to be compiled and submitted to assessors. The assessors will then evaluate the compiled documents, and they will arrange for an interview with the candidate and lastly, report the outcome to IPMA.

V. Competency Standards Similarities/Dissimilarities and Advantages/Disadvantages

A. Certification Level

In PMCD Framework, required competencies for different levels of management such as Project Practitioner Level, Project Manager Level, and Project Director Level, is not addressed. This issue is one of the disadvantages of PMCD Framework. By defining different competency levels for different management levels, there would be a sense of the competency requirements understanding among all organizations, otherwise organization expectations about project personnel competencies would be varied from one organization to another organization. Thus, expectation level of competency cannot be standardized. In other words, a project manager that is considered competent in one organization may not be in another organization. In AIPM, IPMA and APM Standards, different certification levels are defined. However, this certification level in IPMA and also APM Standards are different from the AIPM Standard. As described before, in AIPM Standard, management levels are defined for Project Practitioners, Project Managers, Project directors, and Executive Project Directors. This standard emphasizes on the senior management level and for this level defines two categories of Project Director, and Executive Project Director. The advantage of defining this ranking system for management personnel is that, for bigger organizations with different programs and different portfolios, this system is more practical. In IPMA and APM Standards, project manager's levels are defined in two categories: project manager for projects with limited complexity (Level C), and project manager for complex projects (Level B). This ranking categorizing is more practical for organizations with different projects from simple to complex ones.

Furthermore, achieving competency is a continuous process. From time to time, and from a project to the next project, project individuals must develop their competencies and enrich their experiences, skills and knowledge from one level to next level. Based on IPMA, APM, and AIPM Standards, candidates would have enough motivation to increase their competencies and grow to higher competency levels. However, in PMCD Framework which defines the competency just in Project Manager's level, this motivation for growing to next levels diminishes. For instance, in AIPM Standard, the candidate has opportunities to upgrade his or her knowledge and skills in project management area by entering the "RegPM program". Through "continuous professional development program" candidate can upgrade his or her knowledge and skills and increase competencies from "project practitioner level" to "project manager level" or from "project manager level" to "project director" level. "Continuous professional development program" proposes a "best practice" for growing personnel to be at the highest level of management. Considering that "competency" varies within the time, or in the other words, organizations and individuals in different times and different phases of a project require different competencies; through this "continuous professional development program" they can fulfill this requirement.

B. Required Competencies for different Project Phases

Required competencies for project managers in different project phases vary. It seems that once a project starts in the initiating phase, some competencies are required and in other project phases such as in the execution of closing phase, other kinds of competencies is required. In IPMA, APM, and AIPM Standards this issue is not addressed. However, in PMCD Framework this issue is captured and required competencies for project managers in different project phases- initiating, planning, execution, controlling, and closing- are highlighted. This issue is one of the advantages of PMCD Framework.

C. Meaning if being Competent

In IPMA and APM standards, a competent manager is the one who has enough knowledge and experience in three categories of Technical, Behavioral, and Contextual Competencies. In AIPM Standard and PMCD Framework, a competent manager is a person with enough knowledge and experience in Project Management area. In AIPM Standard and PMCD Framework, assessing candidate's knowledge in project management area is straightforward and can be measured by using some tools such as PMP exam. The advantage of AIPM Standard and PMCD Framework compare to IPMA and APM Standards is their strength for measuring knowledge in project management. However, these two standards have some weaknesses compare to IPMA and APM Standards. In these standards, the only factor which is seen for assessing candidates is "Project Management Competencies". The knowledge and skills in project management which need to be applied at a workplace are assessed in these standards. However, other pivotal required competencies for competent project managers are not addressed in these standards. The technical competencies are neglected in these standards and required technical knowledge, and technical skills cannot be assessed. In AIPM Standard, personal competencies which are personal traits, characteristics and behavior of a project manager are not addressed. In PMCD Framework and AIPM Standard, Job-related competencies that are solely related to the job are also neglected in these standards. Contextual competencies which are essential are not included in these standards.

D. Basic Competencies in each standard

All AIPM, APM, IPMA Standards and PMCD Framework are designed for covering most projects and most industries. It means that project size, project complexity, and project nature, organizational specific needs, and cultural differences

are not taken into account in these standards. It has advantages and disadvantages. The advantage is that, this provides a basis for transportability between organizations. In the other words, it provides circumstances for transferring of project management competencies across different industries, and organizations from different countries. The disadvantage of this issue is that since the size and type of projects, organizational specific needs, and cultural differences are not considered in these standards. Therefore, some required competencies related to aforementioned items would be missed. For instance, the circumstances of a complex project are totally different from a simple project. Thus, a project manager needs to acquire more knowledge in QA-QC issues and safety issues, and other competencies to manage sundry stakeholders, in which, in a smaller project, may not be necessary. Thus, since all projects are unique, project manager, must possess related competencies for each project.

E. Assessment-Based Standards vs. Development-Based Framework

In spite of other competency standards that are assessment-based, PMCD framework is a development-based framework which defines a methodology for achieving required competencies. Based on this methodology, after defining performance criteria and defining desired level of proficiency, the level of project managers based on these items are assessed and the gaps in competence are addressed and finally required actions to fill these gaps are identified. This issue is another PMCD Framework in comparing to other competency standards, which define a rigorous methodology for competency development.

F. Assessment Processes

Another advantage of IPMA, APM, and AIPM Standards that cannot be seen in the PMCD Framework, is that based on the assessment carried out by the assessors, a candidate should be aware about his or her deficiencies and gaps. Based on these gaps, the candidate can attend related training courses. Therefore, the candidate can identify his/her weaknesses and resolve them by taking actions in proper directions.

In the AIPM assessment process, there is one assessor and in IPMA and APM Assessment process, there are two assessors that one of them is from same industry the candidate and another one from a different industry. IPMA and APM assessment process would be more rigorous since industry-specific competencies can be assessed more accurately compared to the AIPM Standard.

VI. A Proposed Comprehensive Project Managers' Competency Model

Based on the results of comparing project manager's competency standards and literature review a model that defines project manager's competencies in three main categories is proposed. These main categories are Person-related Competencies, Job-related Competencies, and Contextual Competencies. (Fig. 1)

A. Job-related competencies

Roberts (1997b) defined this competency as performance standard, which is expected to achieve. This competency is also known as functional competency (Martin and Staines, 1994) or task-specific competency (Bergenhengouwen, 1996) or job-focused (Holmes and Joyee, 1993). Elkin (1990) addressed this competency as "micro competency".

In order to define required job-related competencies, first of all an analysis for the job should be carried out in order to identify job requirements. Through this job analysis most important tank distinguished (Cardy and Selvarajan, 2006). The assumption for identifying these competencies is that the job is fixed and therefore, these competencies have a static nature. In order to define the required job-related competencies, job expectations should be rigorously explained. The importance of this type of competency in projects with a consistent set of tasks that all functions are established clearly, like construction industry is higher than other types of projects like research projects for developing a new product that contextual competencies and person-related competencies are more important.

Some researchers have defined competency just in terms of work-related areas and other components of competency such as person-related competencies and contextual competencies are being neglected. For instance, Armstrong (2001) defined competency as the work-related concept, Pettersen (1991) stated that in selecting project managers, they are identified based on task-related aspects. These researchers, who defined competency solely on work-related competencies, are widely criticized. Dainty (2003) criticizes this approach in construction industry that a lot of variables which are out of project managers' control have effect on achievement of defined out-put criteria. Jacob (1989) refers to soft qualities such as creativity and flexibility that are pivotal for organizations and cannot be categorized in job-oriented competencies. Cheng et al. (2003) argue that management is a creative activity. Atkinson (1999) debates that out-put competencies define in the early stage of projects, which at least are known in projects and these criteria change within a project life-cycle. Cole (2002) contends that this approach is unsuitable for higher level of management positions.

B. Person-related competencies

Person-related competencies include personal characteristics that also known as soft competencies and input-competencies. Input-competencies are the knowledge and skills of project managers that bring to a project. Input-competencies can be defined in two components: Project manager's knowledge and skills in Project Management area and Project Manager's Technical knowledge and skills.

Woodruffe (1991) defined this competency as a dimension of behavior. Robert (1997) defined it as input-based criteria, which means personal behavior, traits, and characteristics that a person brings to projects. Garavan and Mcguine (2001) believe that this competency is more popular in US rather than in Europe. Gadeken (1994) in his research distinguished six behavioral competencies for effective project managers. According to the American Management Association,

competency is defined as the characteristics of a person whose performance is superior (Boyatzis, 1982). This aspect is the result of research done by McBer Associates, who started in 1970s in order to distinguish characteristics between superior managers and average managers. This competency is also known as "macro competency" (Cheng and Dainty, 2003). Brown (1993), Spencer and Spencer (1993) mentioned that personal competency for project managers is more pivotal when dealing with complex situations. This approach relies on superior effective managers (jones and Connolly, 2001). The approaches for defining project managers' competency that just considers person-related competencies and does not contemplate other aspects of competency such as work-related competencies and also contextual competencies are criticized. For instance, Stuart and Lindsay (1997) argued that since person-related competencies concentrated on project managers' competency as individuals and did not focus on organization context, this could not fulfill all required characteristics of a competent project manager. In the model proposed by Crawford (2005), she defined components of competency as "performance-based" which refers to work-related competencies and "attribute-based" which refers to knowledge, skills, and personal characteristics. In this model, knowledge and skills that a person brings to a project is called "input-competencies" and personal characteristics of a project manager are called "personal competencies".

C. Contextual Competencies

In a research carried out by Crawford (2005), results showed that competencies valued by project management practitioners were different from competencies valued by senior management. Therefore, in order to have a comprehensive competency standard which all parties' expectations are fulfilled accordingly, contextual competencies should be addressed. Contextual competencies include client-related competencies, organization-related competencies, environmental competencies, and sub-contractors/suppliers-related competencies. Project managers should have ethical competencies toward these four groups. They should have enough competencies for managing their organizations' expectations including top management and lower level teammates, and deliver their promises. They should also have enough competencies to manage clients' expectations and promises. In carrying their duty to sustain the environment, project managers should have respective competencies on codes, safety standards, and environmental friendly standards.

The advantage of this model is that unlike previous models that try to explain project manager competency requirements in specific industries or organizations, this proposed comprehensive model not only covers all necessary competency requirements, but also can be used for a wide range of projects, from simple to complex projects, and also can be used for different industries and organizations. However, it should be considered that the proposed comprehensive model just covers main competency categories, which are Person-related, Job-related, and Contextual-related competencies. In order to identify competency elements of these main categories an analysis on project type, size, complexity, analysis on minimum requirements for project manager's Technical knowledge and skills and also project management knowledge and skills, and requirements for personal characteristics, analysis on the project context which means client analysis, organization analysis, environmental and supplier analysis, should be carried out.

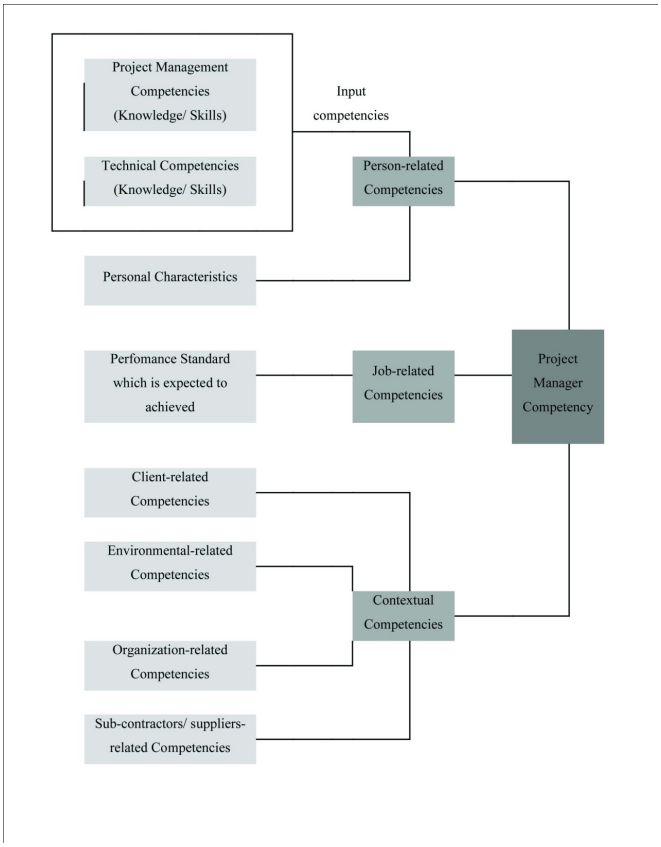

Fig. 1. A Proposed Comprehensive Project Managers' Competency Model

VII. E-Portfolio

An electronic portfolio (also known as an e-Portfolio, e-portfolio, e-folio, digital portfolio, webfolio and etc.) is essentially an electronic version of a paper-based portfolio created in a computer environment, and incorporating not just text, but graphic, audio and video material as well. There are three main types of e-portfolios, although they may be referred to using different terms: Developmental (e.g., working), reflective (e.g., learning), and representational (e.g., showcase). A developmental e-portfolio is a record of things that the owner has done over a period of time, and may be directly tied to learner outcomes or rubrics. A reflective e-portfolio includes personal reflection on the content and what it means for the owner's development. A representational e-portfolio shows the owner's achievements in relation to particular work or developmental goals and is, therefore, selective. When it is used for job application it is sometimes called Carrier portfolio. The three main types may be mixed to achieve different learning, personal, or work-related outcomes with the e-portfolio owner usually being the person who determines access levels. There are three main uses for electronic portfolios: for students while studying, for graduates while moving into or through the workforce, and for institutions for program assessment or

accreditation purposes (Lorenzo & Ittleson, 2005a). The first use allows students to demonstrate their competence (Milman & Kilbane, 2005); develop, demonstrate and reflect on pedagogical practice; show their attitudes, knowledge and skills (Sherry & Bartlett, 2005);Document how inquiry works in practice; and provide evidence of reflection (Smits et al., 2005). Electronic portfolios are most commonly used in this way in colleges of education (Lorenzo & Ittleson, 2005a). The second is a way for graduates or those already in the workforce to gain licensure or registration (Milman & Kilbane, 2005; Echeone, Pigg, Chung, & Souviney, 2005);to showcase their qualifications and competencies in job interviews, for appraisal, or for promotion (Milman & Kilbane, 2005); as well as for critical reflection and learning purposes (Lorenzo & Ittleson, 2005a). The third use is as a vehicle for institution-wide reflection, learning and improvement to demonstrate institutional accountability, to make accreditation processes more visible, and to show collective student progress (Lorenzo & Ittleson, 2005a).

VIII. Learning in Project Management

Organizations in order to develop their personnel and of course their project managers skills need to engage them in problem solving, decision making and allow them to come up with new ideas in working groups. Project managers through this learning method can improve their collaboration, communication and critical thinking skills. Keser and Karahoca (2010) in their research mentioned the aforementioned approach as an interactive education tool which can be used in project management courses.Another way for advancing project managers knowledge is applying post-project review. “Post Project Review” enhances the body of knowledge in organization. In a research conducted by Anbari, Carayannis, and Voetsch in 2008 the importance of post-project review in future project success and also organizational competitiveness is highlighted. Furthermore, the planned changes in organizations need a lot of people to be involved (Kotter, 2007; Schifalacqua et al. 2009). By involving the project manager’s in the process of planned changes in organization they would be motivated to the changes. In order to facilitate the process of planned changes in organization the method of “Action Learning” can be applied. In this method, project managers in order to improve their performance try to study their own actions and experience. On the other words they review the actions they have taken and discuss about the results of their actions and based on the results of the discussion, they can identify the best actions for adaption to the planned changes in organization. Therefore, learning process in organizations not only helps them to develop more competent personnel and project managers who have the abilities of decision making, critical thinking, and a sense of collaboration and communication with other project team members, but also increases the body of knowledge in the organization as a strong tool for future project success and organizational competitiveness and also helps for adaption to the changes in organization to be matched with the market demands.

IX. Role of e-Portfolio in Project Managers’ Competencies

For the third objective of this research which is to evaluate the role of e-portfolio in project manager's competencies, two phases are defined. In the first research phase, experts’ recognition about e-portfolio and also the usage of e-portfolio in their workplace is evaluated. The questionnaire distributed between 730 professionals in senior Executive level, manager level, and senior manager level, and also five industry sectors: Accounting/Finance, Building/Construction, Engineering, Admin/Human Resource and Information Technology. Totally 374 usable responses were obtained. The results show that around 84 percent either have never heard about e-portfolio or never have used it in their industry. Only 58 professionals or around 16 percent have used it before in their workplace.

TABLE I: Demographic Profile of Respondents

Position	**Frequency**	**Percentage**
Senior Executive	125	33.4
Manager	165	44.1
Senior Manager	84	22.5
Industry		
Accounting/ Finance	53	14.2
Building/ Construction	86	23.0
Engineering	92	24.6
Admin/Human Resource	67	17.9
Information Technology	76	20.3
How Familiar with e-portfolio		
Never heard about it	115	30.7
Heard, but never used	201	53.7
used, few times	42	11.2
used, regularly	16	4.3

Then the advantages of using e-portfolio in workplace from those 58 professionals who has used e-portfolio before were asked. The results show that respondents strongly believe that using e-portfolio is helpful in self-directed learning and also helpful in continuing professional development. However, respondents believed that in the existing e-portfolio methods, interaction between project manager’s and also learning based on learner’s own pace and requirements are not sufficient.

TABLE 2: Respondents Attitude Toward e-Portfolio Usage in Workplace

e-portfolio Advantages	**Frequency**	**Percentage**
Helpful in Continuing Professional Development	46	95.8
Accesible in any time	37	77.1
helpful in workplace learning	24	50.0
helpful in selt-directed learning	48	100.0
learning progress based on learner's own pace and learner's requirements	16	33.3
helpful for learning through interaction between project managers	18	37.5

In the next research phase, based on literature review, previous experiences in project management, senior software experts' suggestions, and also the analysis of the study, a framework which suggests e-portfolio supports on project manager's competency components is proposed.

X. Proposed Framework

In order to enhance the project managers' competencies in three main categories of person-related competencies, job-related competencies and also contextual competencies e-portfolio as a new tool is used. For instance for promoting project manager's competencies in project management and also technical competencies can use knowledge sharing and simulated virtual skills, for improving project manager's personal characteristics can use educational multimedia software, for job-related competencies can use online standards, for contextual competencies can use educational software, online updated organization's policies, and online bilateral relations between project managers and suppliers, as shown in Fig. 2.

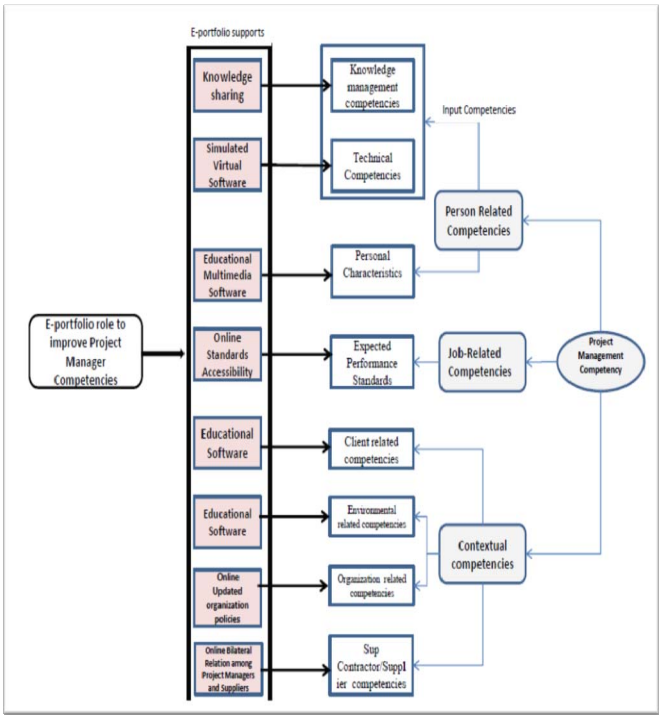

Fig. 2.

XI. Further Works

Based on this research still yet e-portfolio could be more developed, using Intelligence techniques we support our portfolio to be more smart and be more effective and efficient for project managers. Moreover, having online community such as Social networks would support project managers to share their ideas and their knowledge and expand their experience through virtual communities.

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