A three-step design science approach to develop a novel human resource-planning framework in projects: the cases of construction projects in USA, Europe, and Iran

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Abstract

Developing a comprehensive human resource (HR)-planning framework that corresponds to the variety of HR-related issues has seldom been observed in existing project management literature. The present study applies a three-step design science approach to introduce a holistic HR-planning framework. The rigor and relevance cycles in this approach address the HR-related issues in projects and the shortcomings of the literature associated with developing a thorough HR-planning framework. Subsequently, the proposed framework is being validated by an exploratory study undertaken at Parsons Brinckerhoff (USA) and BISOL Group (EU). Next, in line with the guidelines of the design cycle for justifying the use of the framework, a survey is conducted on the collected data from 110 Iranian experts in the construction industry. Using Partial Least Squares for analyzing the data, the outcomes indicate that 'Empowerment/Training' could significantly improve the performance of HRs in projects. The results also confirm the substantial impact of 'Quality Assessment' on the constructs included the HR-planning framework. Furthermore, 'Networking Management', 'Delegating', and 'Reward/Compensation' are prioritized as the subsequent influential constructs for effective HR management practices.
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1. Introduction

Project Management Body of Knowledge (PMBOK) (PMI, 2013 p. 255) identifies human resource management (HRM)

practices as '…*the processes that organize, manage and lead the project team'*. According to Hackman (1987), teams include individuals (i.e. human resources) who work interdependently to achieve project objectives. Thus, human resources (HRs) and their effective management are deemed as core elements of directing projects in organizations towards success (Banker et al., 1996; Maurer, 2010). As Tsui (1987) and Tabassi et al. (2012) argue, planning is critical to increase competency levels of HRs and it entails a better management of HRs in an organizational context. Additionally, planning to enhance HRs' competencies, trust, collaboration, and team working skills could eliminate a majority of HR-related risks that might emerge in the course of a project (Baiden and Price, 2011; Bredin, 2008; Campion et al., 1993).

Nonetheless, planning for HRs in projects is often considered more reactive than to be made upon the long-term requirements of

projects, employees, and organizations (Raiden et al., 2004). Project managers prefer to devote themselves more to such aspects of scheduling, budgeting, risk management, and controlling in projects and mostly overlook HR-related issues (Scott-Young and Samson, 2008; Zwikael and Unger-Aviram, 2010). This lack of planning for HRs in projects is followed by the research literature, where there are few studies devoted to thoroughly investigate influential factors that could contribute to a better management of HRs within project's environment (Belout and Gauvreau, 2004; Huemann, 2010). Moreover, as discussed in more details in Section 2, the main shortcoming of the existing HR-planning frameworks is that they are generally parts of more holistic project management frameworks and are not specifically designed for the HRs (Davis, 2014; Pinto and Prescott, 1988; Tsui and Milkovich, 1987). Overall, the attempts that have been made heretofore to introduce factors towards successful HRM practices are mostly general or limited to certain criteria such as HR empowerment (e.g., Kukenberger et al., 2012; Pant and Baroudi, 2008) and/or HR training (e.g., Huemann, 2010; Raiden et al., 2004; Tabassi et al., 2012).

Considering the above, holistic HR-planning frameworks or performance measures should be developed and adopted to reflect main aspects of HRM in projects including appraisal, training, recruitment and development (Bourne and Walker, 2005; Partington et al., 2005) to name a few. The current study is therefore seeking to fill these gaps by presenting a HR-planning framework using a three-step design science approach for developing artifacts consisted of rigor, relevance, and design cycles (Baloh and Desouza, 2009; Baloh et al., 2012; Hevner, 2007; Hevner et al., 2004). Rigor and relevance cycles direct the research towards a comprehensive review of the literature, proposing the initial HR-planning framework, and conducting a qualitative exploratory study of two construction-engineering companies (i.e. Parsons Brinckerhoff and BISOL Group) to establish the face validity of the framework, respectively. The design cycle at the final stage instructs to assess the applicability of the proposed framework, which is being fulfilled by quantitatively testing it through a survey of 110 experts in the construction industry of Iran.

The remainder of the paper is organized as follows. First, a review of the literature addresses the call for devising a detailed plan for managing HRs in projects and identifies the studies that have focused on developing independent HR-planning frameworks in the context of projects. The applied research method of this study, i.e. design science approach, as well as the research steps that follow is presented in Section 3. In Section 4, the presented HR-planning framework is supported by the literature and the exploratory case studies of Parsons Brinckerhoff and BISOL Group. Section 5 presents the numerical results of the survey conducted in the construction industry of Iran using Partial Least Squares (PLS). Eventually, this research concludes by enumerating the highlights of the study and by outlining the limitations and implications for future investigations.

2. Research background

Researchers (Antonioli et al., 2013; Buller and McEvoy, 2012; Datta et al., 2005; Huselid, 1995; Pfeffer, 1998) have emphasized on the positive relationship between HRM practices and organizational performance to help companies achieve their goals. HRM practices in organizations could be defined as plans involved in eliminating HR-related issues in such processes including recruiting, screening, training, rewarding, and appraising the performance of HRs within organizations (Bowen and Ostroff, 2004; Dessler, 2012; Huselid, 1995). However, in the context of projects and in the presence of time and budget constraints as well as the expectations of a wide range of stakeholders from projects' deliverables (Lim and Mohamed, 1999; PMI, 2013), common HRM practices could not always be applied.

Projects encompass several stakeholders including end users, promoters, project designers, government/public bodies, project team, and work force. Hence, countless parties as the core elements of HRs with a variety of expectations would require their needs to be reflected on project's deliverables as well (Cleland and Ireland, 2006; Davis, 2014; Newcombe, 2003; Ballesteros Pérez et al., 2010). Thus, despite the fact that developing HR-planning/management frameworks for large organizations are common practices in the research literature (e.g., Becker and Huselid, 2006; Lepak and Snell, 1999; Wright and Boswell, 2002; Wright and Snell, 1998), these frameworks usually do not take into account HR wellbeing in the unique features of projects' environment within organizations (Belout and Gauvreau, 2004; Huemann, 2010; Huemann et al., 2007).

Nevertheless, a number of attempts have been made to present HR-planning frameworks and/or to highlight the impacts that HRs have on projects. For instance, Tsui and Milkovich (1987) studied HRM through the prism of planning for HR staffing, development, compensation, support, legal issues, job descriptions, and training. Turner and Müller (2005) discussed project managers' critical competencies in directing projects towards success. Belout and Gauvreau (2004) compared the overall impact of HRs entitled as 'Personnel' on the different aspects of a project for its successful implementation. More recently, Davis (2014) identified a limited number of HR-related factors that constitute the standpoint of project stakeholders for project accomplishment. There are also similar studies that identify criteria for project's success, which generally encompass HRM success factors (e.g. Cooke-Davies, 2001, 2002; Lim and Mohamed, 1999; Pinto and Prescott, 1988; Pinto and Slevin, 1988; Verburg et al., 2012). However, considerable amounts of these articles have seldom considered the prioritizations and the applications of the HRM success factors within projects. Moreover, as an internationally renowned project management standard, PMBOK (PMI, 2013) introduces HRM in four consecutive sections including 'Plan Human Resource Management', 'Acquire Project Team', 'Develop Project Team', and 'Manage Project Team'. However, albeit it seems to be a rather holistic HRM framework introduced in PMBOK, Section 4 of this study argues that there are other aspects yet to be addressed in this standard, which could profoundly affect HRM practices in projects.

Considering the above, the present study focuses on developing a detailed HR-planning framework as an inextricable part of successful HRM practices in real-world projects (Dvir et al., 2003). The framework will also contribute to distinguish from traditional HRM practices that are merely aligned towards yielding deliverables in forms of products and services (Wright and Boswell, 2002). Additionally, eliminating inconsistencies between the theoretical studies in this field and real-world HRM practices of projects, argued by Noon and Blyton (2002), is another objective that is pursued in this study. These objectives are being pursued throughout this study by developing a holistic HR-planning framework using design science approach discussed next.

3. Research method

3.1. The application of a three-step design science approach for developing the HR-planning framework

Originating from Simon (1996), design science focuses on a body of knowledge consisting of manmade artifacts or constructs to meet certain desired goals and to solve particular real-world problems. Fuller and Kuromiya (1992), two pioneers in developing the design science approach, introduce it as a problem solving approach in a system that acquires new properties and eliminates the existing effectiveness/efficiency issues within the system.

Despite the initial introduction of design science to the field of information systems, it was later on welcomed as a practical multi-disciplinary approach. Design science has been also reported to assist in understanding, explaining, and improving the behavior of existing systems by creating innovative and unique artifacts and frameworks in a well-defined manner (Hevner et al., 2004) or by analyzing the use and performance of designed artifacts (March and Smith, 1995). In the context of 'Organization Theory' research domain, Aken (2004, p.226) specify the mission of design science approach as being '… to develop scientific knowledge to support the design of artifacts by professionals and to emphasize its knowledge orientation'. In doing so, it provides a utility-oriented methodology that aims to address business needs identified by an artifact. Within the research literature, artifacts including theories, frameworks, instruments, constructs, models, methods, and instantiations (Hevner et al., 2004; March and Smith, 1995) are considered as major outputs of the design process.

Hevner et al. (2004) and Hevner (2007) identify three main research cycles for designing and developing artifacts in real-world applications including: relevance cycle, rigor cycle and design cycle. They discuss that these three cycles are required to be clearly defined in a design science-related research to achieve applicable artifacts according to the contextual environment that the artifacts are embedded within. The cycles are customized and illustrated in Fig. 1.

The 'relevance cycle' seeks requirements in the contextual environment of the problem under investigation as inputs to the design science framework and aims to justify the use of artifacts and the acceptable criteria to them. It subsequently introduces

the developed artifacts to the contextual environment. This cycle is consisted of individuals, groups, or any other stakeholders that deal with the system. The 'rigor cycle' encompasses extant literature and scientific methods for designing artifacts and other knowledge-based tools. It contributes to the actual development of artifacts in the design cycle. Following the guidelines provided by Baloh and Desouza (2009) in this cycle, the current study argues that merely focusing on the existing body of knowledge for constructing an artifact is insufficient and a full depedence on the literature and expecting to develop a novel artifact is contradictory. Yet according to Hevner et al. (2004), the only artifacts that design science should be concerned with are those that are novel. Thus, to abate the risk of building an erroneous initial model that is rooted solely in the existing literature, the current study benefits from an exploratory empirical investigation in this cycle. This could significantly contribute to a higher level of practical relevance and novelty of the HR-planning framework. It allows testing the basic propositions of the study, justifying its relevance and checking if there are any additional constraints or constructs that have been overlooked. Hence, in-depth interviews are performed with experienced informants to gain insights on the relevance and potential applicability of the framework.

Given the inherently iterative nature of the design science approach, the initial artifact (i.e. HR-planning framework) needs to be evaluated and redesigned until a satisfactory solution is found. That is when the 'design cycle' is used to pre-examine the artifacts prior to formally applying the artifact for real-world situations. The search for solutions stops when an artifact that '… works well for the specified class of problems…' (Hevner et al., 2004, p. 90) is achieved.

3.2. Research steps

The proposed HR-planning framework in this study is going to be developed as follows. Initially the framework is conceptualized in the form of constructs and measures while discussing the shortcomings of the literature in addressing some certain aspects of HRM in projects. Considering the hypotheses made for assessing the impacts of constructs on the HRM practices in projects, it then evaluates the face validity of the proposed model through two distinct exploratory case studies in Parsons Brinckerhoff and BISOL Group companies. Finally, to evaluate the applicability of the proposed HR-planning framework, a survey on 110 experts in the Iranian construction industry is conducted to evaluate the constructs and measures within this framework. Using PLS analysis the constructs of the framework are prioritized and their interdependencies are established.

4. HR-planning framework development

4.1. Face validation and exploratory case study: Rigor cycle

The face validity (Mosier, 1947) of the framework is evaluated through exploratory case studies of Parsons Brinckerhoff (USA) and BISOL Group (EU). Parsons Brinckerhoff is a multinational planning, engineering, and construction management company. It has been constantly among the leading US companies in mass

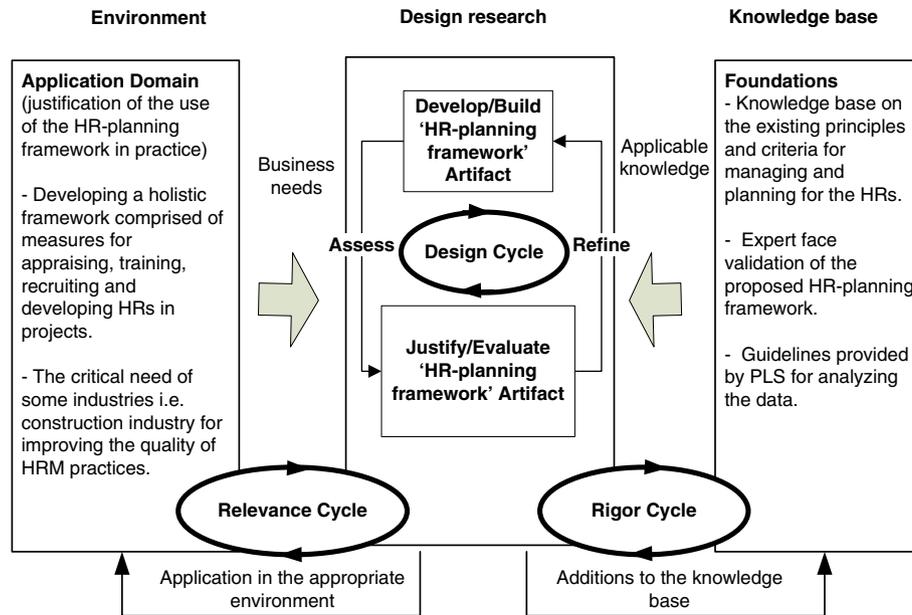Environment   Design research   Knowledge base

Fig. 1. Design science framework for the HR-planning case in projects.

transport and road, highway, rail, bridge and airport design (Roads and Bridges, 2013). BISOL Group is a Slovenian-headquartered and a manufacturer of photovoltaic modules and solar power plants on an international scale. Considering the extreme global competition that has intensified particularly within the last two years in the domain of using renewable energies in the construction industry, the company has successfully retained its profit margin unlike its competitors who initially held a significant share of the market but suffered tremendous losses afterwards (BISOL Annual Report, 2013). Both companies benefit from excellent records of project performance and HR practices and thus became the subjects of the exploratory case studies. Purposive sampling (see Tongco, 2007 for the required steps to fulfill the purposive sampling) was adopted in each company to select the key informants. There were a total number of seven interviews launched with the top executives and board members of Parsons Brinckerhoff and BISOL Group. The profile of the interviews is presented in Appendix 1. Later the interviewees are referred to by the name of the companies that they represent.

In terms of data collection and analysis, this study follows the principles of the Grounded Theory methodology (Glaser et al., 1968; McAdam et al., 2008). According to Melnyk and Handfield (1998), Grounded Theory is well-suited for theory-driven empirical studies. Accordingly, the interviews were conducted and recorded via Total Recorder Standard Edition (version 8.5) for Skype communication software (version 6.7.0.102). Interview transcriptions accounted for over 43 pages of text. The data were subsequently summarized using the mechanisms typically used in this methodology including: 'noting patterns and themes', 'counting and listing', and 'making contrasts/comparisons' (Miles and Huberman, 1984). The details of data summarization and organization are available upon request. Additionally, follow-up discussions with representatives of the two companies were made to further enhance the validity of constructs and measures within the proposed framework.

4.2. Construct and measure definition: Rigor and relevance cycles

Since its inauguration in 1969 in the United States, Project Management Institute (PMI) has been perceived to be one of the most accredited institutes worldwide for establishing project management standards, education, training and research programs (Pant and Baroudi, 2008). Hence, the training guide issued by this institute, entitled as 'Project Management Body of Knowledge' (PMBOK), has been extensively referred to as a comprehensive roadmap for managing diverse aspects of projects including HRs (e.g. Al-Tmeemy et al., 2011; Davis, 2014; Tabassi et al., 2012; Zwikael and Unger-Aviram, 2010).

Consequently, according to the current knowledge base presented in Table 1, the instructions provided by PMBOK (PMI, 2013) for managing HRs in projects, and in line with the rigor and relevance cycles (Fig. 1), HR-planning measures have been extracted and categorized in a number of constructs by the authors. Most of these constructs are extended criteria initially introduced by PMBOK (PMI, 2013) and are supported by the extant literature. Nonetheless, some criteria were proposed by the authors to improve the applicability of the current HRM instructions. Furthermore, additions from the face validation of the exploratory case study are noted within each construct of the framework.

The term 'Effective HRM Practices' is here referred to as a dependent construct that indicates the impacts of the proposed latent constructs on successful HRM processes in projects in terms of 'employee financial performance' (Becker and Gerhart, 1996; Becker and Huselid, 2006; Huselid, 1995; Ployhart and Moliterno, 2011; Wright and Boswell, 2002), 'loyalty' (Batt, 2002; Eisenberger et al., 1990; Gerhart and Rynes, 2003; Wright and Boswell, 2002), and 'discretionary efforts' (Eisenberger et al., 1990; Huselid, 1995; Huselid and Becker, 2011; Thompson, 2011). Next, after discussing the

Table 1
The proposed HR-planning framework.

Constructs	Measures	Reference
Organizing (OG)	Cooperating with stakeholders according to project charter (OG1) Identifying organizational culture (OG2) Prioritizing stakeholders and their requirements (OG3) Consulting with the project team in managing stakeholders' needs and requesting relevant changes (OG4)	Barker et al. (1988) Kwak and Ibbs (2002) Bourne and Walker (2005) Arslan and Kivrak (2008) Braun et al. (2012) PMI (2013)
Networking Management (NM)	Identifying and constructing informal networks of stakeholders (NM1) Mitigating impending threats of informal networks on project objectives (NM2)	Krackhardt and Hanson (1993) Jones (1996) Cross and Parker (2004) de Toni and Nonino (2010) PMI (2013)
Delegating (DG)	Appraising individual and collective contributions of HRs in line with the progress of the project (DG1) Delegating roles and responsibilities according to HR competencies and corporate policies (DG2)	Lewis (2002) Bredin (2008) Zwikael and Unger-Aviram (2010) Morris and Williams (2012) Tabassi et al. (2012) PMI (2013)
Empowerment/ Training (ET)	Identifying skill/learning gaps of the HRs (ET1) Developing learning schemes for improving the team performance in term of individual skills, team behaviour and competencies (ET2) Devising an evaluation system to assess the effectiveness and efficiency of training strategies (ET3) Inspire and motivate HRs to learn and lead (ET4)	Hansson et al. (2003) Law and Chuah (2004) Cheng et al. (2006) MacKinnon (2007) Raiden et al. (2004) Huemann (2010) Morris and Williams (2012) PMI (2013)
Staffing Management (SM)	Job requirement analysis (SM1) Specifying the non-assigned tasks for recruitment purposes and their priorities (SM2) Recruiting HRs for carrying out the specified tasks (SM3) Applying safety measures for work packages (SM4) Performance assessment of HR in terms of skills, competencies and team performance (SM5)	Sisson and Storey (2000) Chien (2004) Hu et al. (2007) Lai et al. (2011) PMI (2013)
Quality Assessment (QA)	Quality assessment of HRM plan (QA1) Quality assessment of the supporting documents (QA2) Quality assessment of the evaluation framework for the staff (QA3)	Yung and Yip (2010) Basu (2013)
Reward/ Compensation (RC)	Reward and compensation based on individual responsibilities (RC1) Reward and compensation based on collective performance (RC2)	Becker and Huselid (1998) Appelbaum et al. (2000) Tabassi and Bakar (2009) Chênevert and Tremblay (2009) Maurer (2010) Huselid and Becker (2011) PMI (2013)
Effective HRM Practices (EHP)	Financial performance of the employee (EHP1) Loyalty of the employee (EHP2) Discretionary efforts of the employee (EHP3)	Eisenberger et al. (1990) Huselid (1995) Becker and Gerhart (1996) Batt (2002) Wright and Boswell (2002) Gerhart and Rynes (2003) Becker and Huselid (2006) Huselid and Becker (2011) Ployhart and Moliterno (2011) Thompson (2011)

constructs individually, the overall HR-planning framework as a whole is going to be presented.

4.2.1. Organizing

Project managers should comprehend company culture and policies especially when it comes to stakeholders and more specifically projects' shareholders and customers (Al-Tmeemy et al., 2011; Barker et al., 1988; Braun et al., 2012). Even if the project manager accomplishes to fulfill project tasks within the time, budget and scope constraints but fails in realizing stakeholders' expectations, the project is most likely to become a failure in terms of its deliveries (Bourne and Walker, 2005; Hoegl and Gemuenden, 2001; Newcombe, 2003). Additionally, there are some major concerns in this category including the power of individuals or groups to have a negative impact on the critical aspects of the project, informal alliances, and the potential stakeholders (PMI, 2013). Thus, 'Organizing' deals with sorting and managing the requirements of different types

of stakeholders to ensure project's success (Arslan and Kivrak, 2008). Considering that PMBOK identifies stakeholders as an influential factor, managing project teams in order to identify and address stakeholders' needs is seldom discussed in the HRM chapter of this body of knowledge. Consequently, it is proposed that:

H1. Organizing human resources in forms of project teams and project stakeholders is positively related to effective HRM practices.

Feedback from the interviewees on this construct was positive and the H1 did not change from the initial theory-informed H1. As Parsons Brinckerhoff stated:

'*[We]… have a formal project kick-off procedure where we discuss and define projects' stakeholders in extremely detailed manner. In any case that we do not fulfill this task thoroughly, we often confront inconsistencies in our relationships with the stakeholders. When we pinpoint the expectations of stakeholders in a project, both communications and services/activities provided by our project team to the stakeholders are being more efficiently achieved.*'

4.2.2. Networking management

Networking management deals with the networks that employees form in terms of their relationships with one another across functions or divisions that help them to accomplish tasks faster (Krackhardt and Hanson, 1993). A considerable amount of organizational activities and work processes is carried out through informal relationships and hidden networks rather than the formal structure (Cross and Parker, 2004; de Toni and Nonino, 2010). Informal interactions that constitute hidden networks in an organization or a project are constructive ways of understanding interpersonal factors that could influence the effectiveness of HR plans. These networks are also reliable sources of acquiring critical information (Jones, 1996) that could be beneficial for better understanding of HR-related issues. PMBOK (PMI, 2013, p.263) has identified networking as a way of making collaborative formal/informal links to better understand '… political and interpersonal factors that will impact the effectiveness of various staffing management options' with no hints that could explain how to identify these hidden networks. Hence, it is suggested that project managers detect these hidden networks and the potential risks within them, so that they are prepared to mitigate impending conflicts either within the networks or outside of them in case they could influence other stakeholders in a project. Hence, initially the following is proposed:

H2. Managing informal networks of HRs is positively related to effective HRM practices.

When asking about this hypothesis, BISOL Group noted that:

'*This […is good because it…] is a very clear instruction for us to look for informal networks in our company and our projects. Nevertheless, this is merely one side of the coin, since apart from discovering the existing informal networks*

we also try to build some in our favor and manage them as well.'

Considering this comment and some ambiguities in phrasing of H2, this has been revised as follows:

H2. Discovering, building and managing the informal networks of people are positively related to effective HRM practices.

4.2.3. Delegating

Delegating certain amounts of responsibilities to project team members and creating a balance between the capabilities of HRs and the tasks they should fulfill, enhance team's performance and the overall competencies of individuals (Zwikael and Unger-Aviram, 2010). PMBOK (PMI, 2013) has obliged project managers to provide challenges and opportunities for HRs in projects; however, it has not clarified how these opportunities or challenges should be defined. For extensive global projects, apt delegations of tasks and working packages save significant amounts of time and funds (Bredin, 2008; Hobday, 2000). Delegation also aims to optimize the contributions of individuals towards the realization of project objectives by correctly recognizing their competencies (Tabassi et al., 2012). Moreover, by appraising the performance of HRs in projects, project managers gain a better insight of capabilities of individuals (Morris and Williams, 2012); hence a more productive delegation process could occur. It is therefore suggested that:

H3. Delegations of responsibilities to project team members positively affect HRM practices.

Both Parsons Brinckerhoff and BISOL Group confirmed H3, hence the hypothesis remained as such in the survey.

4.2.4. Empowerment/training

Raising skills of HRs considering project's needs is directly related to the training and the knowledge acquired by HRs, whereas according to MacKinnon (2007, p. 7) '… the more the individual knows (either explicitly or implicitly), the greater his/her skill is'. Training and empowerment are perceived to be inseparable parts of employee development strategies in projects and in companies as a whole (Huemann, 2010; Raiden et al., 2004). Empowerment could help project team members to be more adaptable, responsible and teachable both individually and in a context of a team (Kukenberger et al., 2012; Pant and Baroudi, 2008). PMBOK (PMI, 2013) addresses this aspect of HRM in projects as identifying the training needs of HRs in the 'Plan Human Resource Management' and improving HR competencies and training in the 'Develop Project Team' sections, respectively. PMBOK however is not declaring the specifics to the empowering and training programs. Moreover, despite the insisting on having a 'Personnel Assessment Tool' to identify training needs, it overlooks the importance of measuring the effectiveness of training programs after they are being delivered to the personnel. Additionally, empowerment could be in the form of inspirations and motivations of HRs to present their best work in projects (Morris and Williams, 2012).

Training plans could encompass approaches intended for helping team members to acquire qualifications (e.g. certificate of fitness for occupation) that would be beneficial for the project. Appropriate training plays a critical role in enhancing individuals' capabilities towards change (Cheng et al., 2006; Hansson et al., 2003). Law and Chuah (2004) suggest a three-step approach for planning HR training programs including identification of training objectives, development of relevant training approaches, and evaluation of training strategies. Considering the above, the following is proposed:

H4. A proper training and empowering plan in projects is positively related to effective HRM practices.

Both Parsons Brinckerhoff and BISOL Group confirmed H4, hence the hypothesis remained as such in the survey.

4.2.5. Staffing management

Systematic management of HRs in projects calls for specifying job requirements and types of skills that the recruited staff should have to fill vacancies in projects (Hu et al., 2007). 'Staffing Management' could be addressed more accurately according to the size and complexity of the project; i.e. it could be developed as a separate staffing management plan or as a part of HR-planning documents (PMI, 2013). A well-organized staffing management plan including selection, recruitment, and safety issues could significantly improve project's performance (Lai et al., 2011). Accordingly, project managers should identify projects' skill requirements, apply role and responsibility matrices to distinguish the skill gaps, and recruit skilled staff to fill these gaps (Tesch et al., 2007), respectively. Since PMBOK (PMI, 2013) emphasizes on the critical role of staffing management in the HRM discipline, this construct has been included in the proposed HR-planning framework and the following hypothesis as well:

H5. Staffing management is positively related to effective HRM practices.

Both Parsons Brinckerhoff and BISOL Group confirmed H5, hence the hypothesis remained as such in the survey.

4.2.6. Quality assessment

According to Basu (2014, p.180), 'There exists a new dimension of quality in projects beyond the product and process quality and that is organization quality…'. The 'organization quality' deals with defining success factors for diverse knowledge areas of project management. Quality assessment of HR plans ensures that templates and the associated documents commonly used in project management plans (e.g. project organizational charts, human resource plan, job descriptions, project performance appraisal sheets, resource calendars) are compatible to the overall HR-planning policies. This has been seldom considered in PMBOK (PMI, 2013). Considering the lack of a clear definition of measures for assessing the quality of HR-related practices and documentations in both the literature and PMBOK (Basu, 2014; Meredith and Mantel, 2011; Yung and Yip, 2010), the authors have highlighted the importance of recurrently measuring the quality of the documents and project management plans for obtaining

successful HRM practices. Moreover, as Parsons Brinckerhoff noted:

> 'Given the many years of implementing different projects and the hundreds of project managers that we collaborated with, it is for certain that those managers who are obsessively monitoring the quality of multiple and diverse aspects of their projects, are almost always the managers who deliver their projects more successfully.'

Thus, it is suggested that in addition to the direct impact of quality assessment on an effective implementation of HRM practices in projects, it could also determine the quality of measures and evaluation frameworks in a certain number of constructs as defined as the following hypotheses:

H6a. Quality assessment is positively linked with the quality of evaluation systems defined in 'Empowerment/Training' construct.

H6b. Quality assessment is positively linked with the quality of measures defined in 'Networking Management' construct.

H6c. Quality assessment is positively linked with the quality of the individual performance measurement system defined in 'Staffing Management' construct.

H6d. Quality assessment is positively linked with the quality of team performance measurement system defined in 'Delegating' construct.

H6e. Quality assessment is positively linked with effective HRM practices.

4.2.7. Reward/compensation

Incentives specify criteria for delegating rewards and compensating for distinguished HR services. Rewards should be based on activities that are associated with an individual's responsibilities and her/his collective performances in order to encourage personnel to be more involved in working groups (Appelbaum et al., 2000; Becker and Huselid, 1998; Chênevert and Tremblay, 2009; Huselid and Becker, 2011). Reward systems could have some advantages including an increase in the efficiency and the extent of participation by HRs in projects (Tabassi and Bakar, 2009). Maurer (2010) believes that a rewarding system could build a longer-lasting mutual trust between project team members. 'Recognition and Rewards' is included in the 'Develop Project Team' section of PMBOK (PMI, 2013) and due to its significance, it has been assigned as an independent construct that is critical to motivate HRs and to help them grow. Thus, the following is proposed:

H7. Rewarding and compensation is positively related to effective HRM practices.

Both Parsons Brinckerhoff and BISOL Group confirmed H7, hence the hypothesis remained as such in the survey.

4.2.8. Overall construct

Table 1 illustrates the summary of the proposed HR-planning framework. The primary objective behind developing the constructs and their measures in this framework is to cover the diverse

aspects of HR-related issues in projects and to eliminate the shortcomings of the knowledge base in this area.

When asked about the overall concept of the framework, the interviewees noted that:

'Project management and more specifically the outcomes of the projects are critical for our organization. We are building bridges, roads, public buildings, all with extremely high public exposure. There is no room for mistakes. Moreover, our industry has been hit hard and the competition is fierce. Thus, it is critical for us to fully deliver the projects and keep our customers happy. Success though highly depends on how well human resources are recruited, managed, and led within the projects. The framework is very promising as it tackles exactly the details that make a difference when dealing with people in projects.' [Parsons Brinckerhoff]

'I like such a holistic HR-planning approach. The truth is that all our project managers intuitively understand how important it is to deal with project stakeholders appropriately. It seems however that each project manager has her/his own way of dealing with HRs and there was heretofore no such framework to address this concern systematically. I am certain that the framework would help our organization tremendously as it defines the process of HR-planning explicitly.' [BISOL Group]

The structural model of the HR-planning framework is presented in (Fig. 2). In order to justify the use of the proposed framework in real-world projects, it is tested empirically asking the Iranian experts in construction industry to evaluate its measures. The data gathering method and the outcomes of this evaluation are discussed next (Fig. 2).

5. Empirical testing of the HR-planning framework: design cycle

5.1. The case of Iranian construction industry

According to the design cycle of the adopted design science approach (Hevner, 2007; Hevner et al., 2004), in order to justify/evaluate the proposed artifact, which is the novel framework for HR-planning, and to determine the potential relationships between the constructs in this framework, it is required to be applied within a relevant contextual environment. Considering the main objective of this research that is to develop a HR-planning framework for effectively managing human resources in projects, exploratory testing (Eisenhardt, 1989) of the framework within the construction industry of Iran is fulfilled and PLS analysis (Gefen et al., 2000) is applied to evaluate the framework and its applicability. This could also help better comprehending the extent to which the proposed framework could be applicable in real-world projects.

5.1.1. Sample

The study opted for Iranian construction industry as the most fitted environment for the valuation of constructs within the proposed HR-planning framework. This was mainly due to the significance of the industry in the total rates of employments and investments (Tabassi et al., 2012), the access to data, and the potential for improvement by the introduction of such framework to this industry.

In 2009, it was estimated that the annual turnover in the Iranian construction industry amounted to US$38.4 billion with the anticipated growth rate of 4.4% over the period of 2008–2012 (Austrade, 2010). These statistics also reveal that from March 2004 to March 2005, total Iranian households and dwelling units increased by 15.1 and 13.5 million, respectively, signifying a demand for at least 5.1 million dwelling units. Hence, considering the upward trend in population growth during the 1980's, the accelerated increase in demands for housing deems inevitable for 2014 and beyond. Iran is also located on the active Alpine–Himalayan belt and has experienced more than 130 strong earthquakes during the past centuries (Tabassi and Bakar, 2009). Thus, the safety of buildings has become critically important given the increasing number of victims reported by earthquakes in Iran (Mehrabian et al., 2005; NGDIR, 2013). Nevertheless, the unrestrained growth in the number of the construction projects could be associated with the quality of the constructs being substantially diminished compared to the quantity of buildings on demand, causing catastrophic damages in buildings that are incapable of withstanding earthquakes (Berberian and Yeats, 1999; Mehrabian et al., 2005; Tabassi and Bakar, 2009). In addition to the questionable safety, it is often argued that this phenomenon is the outcome of poorly managed work force; hence the significant reduction in the quality of constructional affaires (Raiden et al., 2008).

Thus, a survey of 110 construction experts in Iran was launched to test the HR-planning framework. The respondents were mainly participants in managerial courses held by Iran University of Science and Technology (IUST) as representatives of their firms for the national mandatory standardization program that required a close collaboration between the construction industry and prestigious Iranian universities. The unit of analysis is the measures included in the artifact (i.e. HR-planning framework). Therefore, the analysis is constrained to the extent to which these measures contribute to an effective HRM practices in projects. Table 2 reveals the descriptive statistics of the respondents.

5.1.2. Questionnaire design

Given that the proposed framework is consisted of 25 measures (22 measures of latent constructs and 3 measures of the dependent construct) in 8 main groups, in a similar vein the questionnaire involved 25 questions as the representatives of the latent constructs and their impact on 'Effective HRM Practices' (i.e. dependent construct) within the HR-planning framework (see Appendix 2).

The study operationalizes constructs with perceptual measurement scales and their nominal definitions. Each measurement

Table 2
Profile of the respondents (N = 110).

	Frequency	Percent	Valid Percent
Job position of the respondents			
Client Representative	14	13	10.9
Contractor	26	23.3	19.1
Technical Supervisor	22	20.0	16.3
Architect	11	10	8.1
Site Engineer	22	20.0	17.3
Project Manager	15	13.6	11.8
Total	110	100.0	83.5
Types of the organizations that have participated in the survey			
Contractor	40	36.7	31.8
Consultant	30	26.7	22.7
Developer/Client	40	36.7	29.0
Total	110	100.0	83.5
Gender distribution among the respondents			
Male	84	76.4	65.3
Female	26	23.6	18.2
Total	110	100.0	83.5
Years of experience of the respondents			
<2	7	6.7	3.6
2–5	15	13.3	11.8
5–10	37	33.3	28.2
10–15	33	30.0	24.5
>15	18	16.7	15.4
Total	110	100.0	83.5

item employs a 7-point Likert scale response anchored with 'Not a priority', 'Low priority', 'Somewhat priority', 'Neutral', 'Moderate priority', 'High priority', 'Essential priority'. The measurement items and corresponding responses for the constructs in the proposed HR-planning framework are presented in Appendix 2. To assess the validity of the content and to provide suggestions on semantic alternations, the measurement items were initially evaluated by a panel of 12 Urban Construction Faculty members

as being experts in the field of construction industry. Subsequently, the measurement items were sent to four senior project managers recognized by the Iran Project Management Association (IPMA) for further recommendations towards improving the quality of the questionnaire. These assessments culminated in revising the content of the questionnaire and making it more perceivable by the respondents.

5.1.3. Data collection method

The questionnaires were distributed either in the aforementioned managerial courses or by e-mail and fax to the respondents. After three rounds of follow-ups, 98 questionnaires were received, which indicated a proportionally high corresponding rate of 89%. This mainly originated from incentives that the developers of the program offered to the participants, including a charitable act of donating 10 dollars per each response to the victims of Bushehr and Azerbayejan earthquakes in 2012–2013. Eventually, a final amount of 92 questionnaires was validated to be considered in the final analysis of the data.

5.2. Numerical results and analysis

5.2.1. PLS analysis

PLS analysis is adopted to analyze the data using SmartPLS 2.0 software. PLS has the merit of predicting latent constructs as linear combinations of the observed measures and their subsequent constructs (Anderson and Gerbing, 1988; Chin, 1998). Consequently, PLS aims to maximize the proportion of variance of the latent construct that is explained by the predictor constructs. This feature becomes extremely useful when there is a considerable amount of highly collinear factors (Tobias, 1995). PLS also supports both reflective and formative types of relationships (Campbell, 1960). While reflective measures are dependent on their associated constructs, formative measures
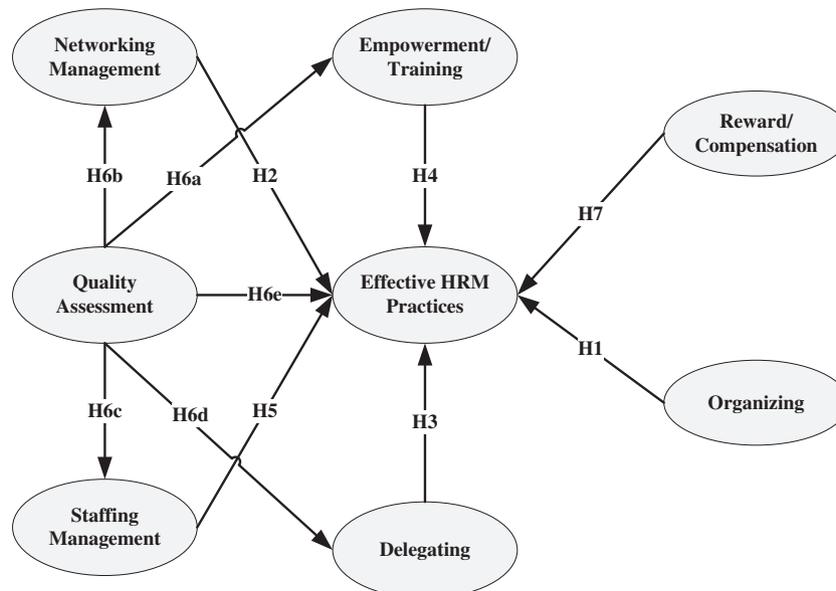

Fig. 2. HR-planning framework structural model.

form or cause changes on them (Bollen and Lennox, 1991). All the measures included in the proposed framework are formative. Distinguishing the nature of measures in constructing the soft model of constructs and measures could help mitigating computational errors. PLS clarifies the relationships between these measures and the latent constructs in a weighted manner. This could subsequently estimate values of the constructs (Chin and Newsted, 1999).

5.2.2. Measurement model

The two factorial validity tests including convergent validity and discriminant validity should be fulfilled as a part of construct validation of the PLS model (Gefen et al., 2000; Straub et al., 2004). In terms of convergent validity, construct reliability and measure reliability should be assured (Peter, 1981). Measure reliability is certain when measurement items load significantly on their latent constructs. Significance in t-value or subsequently a minus 0.05 p-value at the same alpha protection level could confirm the convergent validity (Chin, 1998). Most of the loadings are significant at the 0.01 level and above 1.96 recommended t-values (Table 5). The tests for significance are conducted using bootstrapping with 500 resamples.

Construct reliability and validity are assured via composite reliability (CR) and the average variance extracted (AVE) (Gefen and Straub, 2005). Values for CR and AVE should be threshold of 0.6 and 0.5 respectively (Bagozzi and Yi, 1988) (see Table 5). Additionally, by ensuring the square root of all the AVEs to be significantly larger than pair wise correlations of the latent constructs and having the value of at least 0.5, this aspect of the convergent validity would be adequate (Chin, 1998; Fornell and Larcker, 1981) (see Tables 3 and 4).

Discriminant validity is assured when there is an apt pattern of measure loadings on a single latent construct and simultaneously a low degree of loading on the remaining constructs, hence the decrease in the error variance (Gefen and Straub, 2005). Accordingly, the cross-loadings of the measures on all the proposed constructs of the HR-planning framework are illustrated in Table 4.

Considering loadings of below 0.6 for the measures of one construct on the remainder of the constructs and above 0.7 loadings for all the measures within a construct, this feature of the discriminant validity is also assured (Table 4 and Table 5).

Table 5 illustrates the summarized descriptive statistics of the measures categorized under the latent constructs.

In addition to validating the measurement and structural models, Tenenhaus et al. (2004) propose a goodness of fit (GOF, $0 \le GOF \le 1$) index to determine the overall fit of the model, which should also be taken into consideration given the lack of a global fitting function for evaluating the goodness of PLS modeling. Being originally defined as the geometric mean of the average communality and Squared multiple correlation (R^2), Wetzels et al. (2009) argue that AVE could equal the average communality in the formula (Formula 1). They also propose three criteria of small ($GOF_{small} = 0.1$), medium ($GOF_{medium} = 0.25$), and large ($GOF_{large} = 0.36$) for the GOF on the grounds of the cut-off values for AVE and R^2 in the literature. Consequently, obtaining the value of $GOF = 0.491$, indicates the overall fit of our proposed HR-planning framework.

$$GOF = \sqrt{\overline{AVE} \times \overline{R^2}} \qquad (1)$$

5.2.3. Structural model

Verifying the reliability and validity of measures and constructs, the explanatory and predictive power of the proposed HR-planning model is next to being examined. Squared multiple correlations (R^2) of the latent constructs are being evaluated at this stage. As can be inferred from Fig. 3 and Table 6, the proposed constructs within the HR-planning framework and namely H2, H3, H4, H5, H6e, and H7, explain 83.5% of 'Effective HRM Practices' as the endogenous latent variable. Additionally, all path coefficients have positive values as expected, which imply direct relationships between the exogenous and endogenous latent variables (i.e. constructs) within the proposed model.

Comparing path coefficients reveals that 'Empowerment/ Training' ($H4 : \beta = 0.758$) is strongly associated with effective HRM practices in projects. The 'Delegating' ($H3 : \beta = 0.153$) construct, is project manager's next priority for managing HRs. 'Reward/Compensation' ($H7 : \beta = 0.110$), 'Quality Assessment' ($H6e : \beta = 0.093$), 'Staffing Management' ($H5 : \beta = 0.071$), and 'Networking Management' ($H2 : \beta = 0.066$) should be considered as further priorities by project managers to achieve 'Effective HRM Practices'. Assessing the quality of the documents and evaluation criteria for the empowerment and training of the HRs

Table 3
Correlations (AVE in the diagonal).

Construct	Delegating	Effective HRM Practices	Empowerment/ Training	Networking Management	Organizing	Quality Assessment	Reward/ Compensation	Staffing Management
Delegating	**0.917** [*]							
Effective HRM Practices	−0.023	**0.966** [*]						
Empowerment/Training	−0.173	0.886	**0.815** [*]					
Networking Management	0.097	−0.208	−0.177	**0.908** [*]				
Organizing	−0.030	−0.302	−0.225	0.173	**0.883** [*]			
Quality Assessment	−0.318	0.312	0.433	−0.198	−0.422	**0.906** [*]		
Reward/Compensation	−0.062	0.457	0.427	0.111	−0.050	0.209	**0.964** [*]	
Staffing Management	−0.051	0.377	0.319	−0.073	−0.095	0.353	0.255	**0.867** [*]

[*] Square root of the AVE on the diagonal.

Table 4
Cross loadings.

	Delegating	Effective HRM Practices	Empowerment/ Training	Networking Management	Organizing	Quality Assessment	Reward/ Compensation	Staffing Management
DG1	**0.929**	0.025	−0.123	−0.006	−0.069	−0.314	−0.007	−0.085
DG2	**0.906**	−0.073	−0.200	0.197	0.021	−0.268	−0.113	−0.003
EHP1	−0.046	**0.975**	0.193	−0.267	−0.309	0.172	0.435	0.416
EHP2	−0.121	**0.956**	0.138	−0.195	−0.319	0.392	0.205	0.317
EHP3	0.102	**0.967**	0.235	−0.135	−0.245	0.105	0.386	0.355
ET1	−0.046	0.175	**0.833**	−0.267	−0.309	0.272	0.435	0.416
ET2	−0.178	0.498	**0.935**	−0.225	−0.050	0.381	0.326	0.215
ET3	−0.311	0.355	**0.931**	−0.027	−0.251	0.214	0.383	0.203
ET4	−0.081	0.332	**0.894**	−0.022	−0.035	0.420	0.213	0.132
NM1	−0.037	−0.196	−0.153	**0.886**	0.280	−0.125	−0.051	−0.002
NM2	0.188	−0.183	−0.167	**0.929**	0.060	−0.223	0.222	−0.118
OG1	−0.059	−0.328	−0.273	0.252	**0.950**	−0.409	−0.081	−0.129
OG2	0.164	−0.160	−0.099	0.138	**0.825**	−0.403	−0.047	−0.088
OG3	−0.049	−0.320	−0.194	0.159	**0.946**	−0.433	−0.003	−0.137
OG4	−0.097	−0.188	−0.185	0.000	**0.803**	−0.220	−0.053	0.080
QA1	−0.346	0.291	0.296	−0.275	−0.403	**0.904**	0.155	0.308
QA2	−0.342	0.336	0.145	−0.106	−0.337	**0.926**	0.252	0.319
QA3	−0.155	0.235	0.463	−0.148	−0.413	**0.888**	0.158	0.337
RC1	−0.083	0.454	0.387	0.127	−0.152	0.265	**0.967**	0.258
RC2	−0.035	0.427	0.438	0.087	0.062	0.134	**0.962**	0.233
SM1	0.025	0.350	0.283	−0.012	−0.123	0.398	0.214	**0.916**
SM2	−0.043	0.335	0.271	−0.090	−0.090	0.275	0.317	**0.826**
SM3	−0.107	0.397	0.341	−0.134	0.014	0.273	0.147	**0.861**
SM4	−0.151	0.242	0.179	−0.092	−0.175	0.329	0.210	**0.848**
SM5	0.054	0.288	0.299	−0.007	−0.040	0.233	0.229	**0.876**

accounted for almost 40% ($H6a : \gamma = 0.633$) of the variations within the 'Empowerment/Training' construct. This is roughly 12% ($H6c : \gamma = 0.353$), 10% ($H6d : \gamma = 0.318$), and 4% ($H6b : \gamma = 0.198$) for 'Staffing Management', 'Delegating', and 'Networking Management' constructs, respectively.

Table 5
Descriptive statistics of measures and constructs.

Construct	Measure	Mean	SD	Loadings	CR	AVE
Organizing	OG1	3.967	1.938	0.950	0.934	0.781
	OG2	4.067	1.660	0.825		
	OG3	4.000	1.875	0.946		
	OG4	4.067	1.701	0.803		
Quality Assessment	QA1	4.200	1.540	0.904	0.932	0.821
	QA2	4.167	1.683	0.926		
	QA3	4.200	1.789	0.888		
Networking Management	NM1	3.933	1.507	0.886	0.903	0.824
	NM2	3.800	1.990	0.929		
Delegating	DG1	3.800	1.990	0.929	0.914	0.842
	DG2	3.867	1.676	0.906		
Empowerment/Training	ET1	4.500	2.030	0.833	0.888	0.665
	ET2	3.933	1.660	0.935		
	ET3	4.333	1.709	0.931		
	ET4	4.433	1.736	0.894		
Staffing Management	SM1	3.567	1.906	0.916	0.938	0.752
	SM2	3.333	1.826	0.826		
	SM3	3.667	1.918	0.861		
	SM4	3.467	1.306	0.848		
	SM5	3.733	1.639	0.876		
Reward/Compensation	RC1	3.900	2.006	0.967	0.964	0.930
	RC2	4.000	1.819	0.962		
Effective HRM Practices	EHP1	4.500	2.030	0.975	0.977	0.933
	EHP2	4.200	1.972	0.956		
	EHP3	4.267	1.760	0.967		

Moreover, the standardized parameter estimates along with t-values that indicate the level of significance could help testing the hypotheses. According to Table 6, the findings reveal that with the exception of 'Organizing' ($H1 : t = 1.403, p > 0.05$), the remaining constructs are significant at 0.05 or 0.01 level. Notably, 'Empowerment/Training' ($H4 : t = 12.619, p \ll 0.01$), 'Quality Assessment' ($H6e : t = 8.682, p \ll 0.01$), and 'Delegating' ($H3 : t = 3.706, p \ll 0.01$) have respectively the highest level of impact on the effective HRM practices.

To sum up, according to the t-values and path coefficients that are presented in Fig. 3 and Table 6, by focusing more on training and empowering of HRs ($H4 : t = 12.619, p \ll 0.01$), delegating certain responsibilities to HR ($H3 : t = 3.706, p \ll 0.01$), and identifying their preferences in terms of the informal communicational networks that they are embedded within ($H2 : t = 2.996, p \ll 0.01$), projects could mostly benefit from HR capabilities and skills. In achieving the above, the role of quality assessment is emphasized upon in diverse aspects of developing the HR-planning framework, where there should be certain monitoring techniques to assess the applicability of the proposed measures within the constructs (Basu, 2014). This is especially critical when it comes to the evaluation processes that are developed to assess the effectiveness of training systems (H6a : t = 10.385, p ≪ 0.01), the performance of HRs (H6c : t = 4.207, p ≪ 0.01), and their contributions to project teams (H6d : t = 3.826, p ≪ 0.01).

6. Discussions and conclusions

This study develops and justifies a planning framework for HRs in projects using the principles of a three-step design
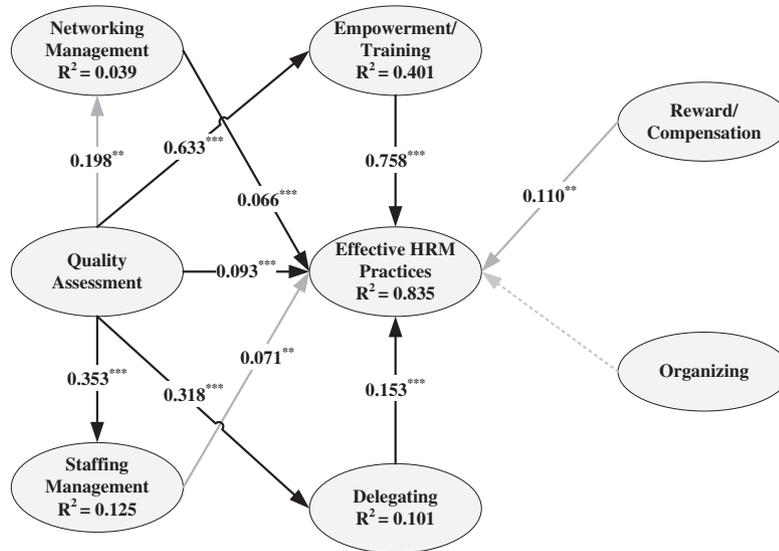
Notes:
a) Black bold arrows illustrate significant relationships; Grey bold arrows illustrate less significant relationships;
Grey dotted arrow illustrate non-significant relationship.
b) Path coefficients are shown by values above the arrows.
c) *** Significant at 0.01 level
d) ** Significant at 0.05 level

Fig. 3. PLS results.

science approach. The development of the HR-planning framework is guided through the comparisons made between the proposed framework and the available knowledge base comprised of scientific publications and face validation by experts of two internationally renowned construction companies, i.e. BISOL Group (EU), and Parsons Brinckerhoff (USA). Additionally, in order to establish the competency of the proposed framework in addressing the antecedents of effective HRM practices, it is examined by conducting a survey of 110 experts in the construction industry of Iran. By applying PLS analysis to the collected data, the results empirically validate that certain aspects of the proposed framework are strongly associated with HRM practices in projects. The outcomes reveal that similar to the emphasis that has been made by the researchers on the merits of HR training and empowerment

(e.g., Huemann, 2010; Kukenberger et al., 2012; Pant and Baroudi, 2008; Raiden et al., 2004; Tabassi et al., 2012), training and empowering practices in projects should be in fact considered as a primal concern by project managers. Additionally, this study emphasize upon several other aspects of HRM practices that have been overlooked more or less by researchers and practitioners including delegating roles and responsibilities, identifying informal communicational networks and their risks, constantly monitoring skill requirements of the project and capabilities of HRs, and planning for compensation and rewarding programs during the course of projects. The outcomes of the analyses also recognize the quality assessment of the overall HRM plans and documents developed by project teams to be critical in standardizing the documentation processes in projects. Moreover, unlike the initial assumptions that were made concerning the

Table 6
PLS results for the structural model (Bootstrap (500), *n* = 92).

Predictor construct	Latent construct	Hypothesis	t-value	P-value	Supported
Organizing	Effective HRM Practices	H1	1.403	0.164	×
Networking Management	Effective HRM Practices	H2	2.996	0.004 ***	✔
Delegating	Effective HRM Practices	H3	3.706	≈0.000 ***	✔
Empowerment/Training	Effective HRM Practices	H4	12.619	≈0.000 ***	✔
Staffing Management	Effective HRM Practices	H5	2.311	0.023 **	✔
Quality Assessment	Empowerment/Training	H6a	10.385	≈0.000 ***	✔
Quality Assessment	Networking Management	H6b	2.027	0.046 **	✔
Quality Assessment	Staffing Management	H6c	4.207	≈0.000 ***	✔
Quality Assessment	Delegating	H6d	3.826	≈0.000 ***	✔
Quality Assessment	Effective HRM Practices	H6e	8.682	≈0.000 ***	✔
Reward/Compensation	Effective HRM Practices	H7	2.100	0.038 **	✔

*** Significant at 0.01 level.
 ** Significant at 0.05 level.

necessity of stakeholders' requirements to be reflected on HRM practices (i.e. 'Organizing' construct), the outcomes of the surveys refute this hypothesis. The authors suggest that this might have been rooted in the experts' anticipation of this concern to be addressed in other aspects of project management including 'Project Communications Management' (PMI, 2013).

7. Limitations and implications for future studies

This study is subject to a number of limitations that could be considered in the future research. The experts participating in quantitative evaluation of the framework are mainly concerned with construction projects. Hence, it is recommended that viewpoints from experts of multiple project management contexts to be reflected on the overall performance of the HR-planning framework. Confirmatory quantitative analyses of data sources collected from projects worldwide on the applicability of the framework are thus required to achieve higher degree of generalizability. Additionally, HRM instructions provided by other renowned project management standards (e.g. PSA, ISO, NSCPM, PRINCE) could be referred to and included when discussing HR-related issues in projects. This could help developing the HR-planning framework to an even more demanded choice in projects worldwide. Moreover, according to Simon (1996) and Hevner et al. (2004), despite the fact that the construction of design artifacts (i.e. HR-planning framework) is built upon validated theories, it may not be entirely clear how well it works in practice. It is therefore critical for researchers and practitioners to characterize contextual environments and real case studies that could test the extent of the impact by the proposed framework on successful implementation of HRM practices in projects. Finally, in order to be able to report unambiguously on the project-based performance of an organization using the HR-planning framework, a longitudinal study could help evaluating the outcomes of implementing the framework in a rather extended timespan and on several instances within multiple organizations. This enables practitioners to benefit from the HR-planning framework and to provide groundwork for additional research aimed at more extensively explicating the resultant phenomena.

Conflict of interest

There is no conflict of interest here.

Appendix 1. Profile of the interviews

No.	Company	Interviewee's functional position	Date (2013)
1	Parsons Brinckerhoff	Associate Consultant	18 February
2	Parsons Brinckerhoff	CEO	25 February
3	Parsons Brinckerhoff	Senior Project Manager	29 February
4	Parsons Brinckerhoff	Director of Highways and Transportation	4 March
5	BISOL Group	President and CEO	12 March
6	BISOL Group	Vice President and CTO	12 March
7	BISOL Group	Member of the Board	14 March

Appendix 2. Measures

Instruction: Scale (1–7), where 1 = not a priority, 2 = low priority, 3 = somewhat priority, 4 = neutral, 5 = moderate priority, 6 = high priority, 7 = essential priority.

Organizing

1. Stakeholders cooperating in making managerial decisions and applying alternations to the project.
2. Project manager familiarizing himself/herself with the organizational culture.
3. Project manager prioritizing the stakeholders for considering their needs in the project.
4. Project manager including team members' ideas for making decisions and applying changes to the project.

Quality assessment

1. Cross checking the HRM plan with the pre-defined criteria before applying it to the project.
2. Checking for the adaptability of the supporting documents of the HRM plan project's documents.
3. Reviewing the criteria determined for assessment purposes of the HRs.

Networking management

1. Incorporating hidden relational networks of HRs in the HRM plan.
2. Planning for mitigating disruptions rising from hidden relational networks of HRs.

Delegating

1. Measuring the team performance of HRs according to the pre-defined criteria.
2. Balancing between HR competencies and their responsibilities.

Empowerment/training

1. Looking for skills required for the project and identifying skill gaps of the HRs.
2. Devising a HR training plan in line with project's objectives.
3. Assessing the quality of the HR training plan.
4. Applying techniques for keep HRs motivated.

Staffing management

1. Project manager identifing detailed job requirements associated with project's tasks.
2. Signifying specialties that require HR recruitment.
3. Planning for recruitment.
4. Planning for safety in the project's working environment.
5. Measuring the individual performance of HRs according to the pre-defined criteria.

Reward/compensation

1. Signifying performance measurement criteria and the associated rewards according to individual responsibilities.
2. Signifying performance measurement criteria and the associated rewards considering collective performance.

Effective HRM practices

1. Employees contributing to the financial well-being of the project.
2. Employees remaining loyal to the project's objectives.
3. Employees adding value of their own to the project's deliverables through discretionary efforts.

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