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Three conceptual levels of construction project management work

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Abstract

The widespread use of project management standards for professional competence assessment and development is based on a rationalistic approach, whereby competence is seen as constituted by a pre-defined set of attributes in the form of knowledge topics. Yet little is known about whether and how these attributes are used by project managers in the workplace. In this paper we report an empirical exploration of project managers' ways of conceiving and accomplishing their work. We follow Sandberg's [Sandberg J. Human competence at work: an interpretative approach. Göteborg (Sweden): Bas; 1994; Sandberg J. Understanding human competence at work: an interpretative approach. *Acad Manage J* 2000;43(1):9–25.] phenomenographic study of automobile engine designers that found that the basic meaning structure of people's conceptions of their work constitutes their competence at work. From our interviews with 30 project managers in UK construction firms, we identify three different basic conceptions of project management work. Each conception has a different main focus and a different set of key attributes that appeared to project managers when experiencing and accomplishing their work, reflecting a hierarchical arrangement of three distinctly different forms of project management competence. The findings offer an opportunity for a new approach to professional competence assessment and development that complements existing standards-based approaches.

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1. Introduction

The rapid rise of project management as a professional discipline has given rise to a number of well-established standards that define the scope of the discipline and describe its tools, techniques and concepts. These standards are now widely used for professional competence assessment, development and certification. They are based on the assumption that individuals who are able to demonstrate their understanding of the principles of project management embodied in the standards are deemed to be professionally competent as project managers. This follows a so-called rationalistic approach, whereby management competence is pre-defined as a specific set of knowledge areas independent of context and individual. Yet, little is

known about whether and how these attributes are used by project managers in accomplishing their work.

In the first part of this paper we review the two traditional approaches to researching and defining project management competence. We argue that the resulting project management standards do not actually capture project managers' competence in the workplace. We find support for this position in empirical studies that have found no significant relationship between effective workplace performance and project management standards [1]. We suggest an alternative, interpretive approach developed by Sandberg [2,7] based on the principles of phenomenography, in order to explore practicing project managers' ways of conceiving and experiencing their work and understand their competence at work. We describe the methods and results of our study of 30 project managers in the UK construction firms, and conclude with a discussion of the implications of our findings for practice and research.

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2. Theoretical background

2.1. Rationalistic approaches to competence at work

There are two principal rationalistic approaches to studying competence at work, namely *worker-oriented* and *work-oriented* [2,3].

The *worker-oriented* approach takes the worker as the point of departure, and emphasises workers' attributes such as knowledge, skills and abilities and personal traits [3]. Since different work requires different competences, the worker-oriented approach has been criticised as being too generic and context-independent [4]. In contrast, the *work-oriented* approach takes work as the point of departure, and treats work as existing independently of the worker, definable in terms of the technical requirements of work tasks [5]. Advocates of this approach argue that by identifying work activities that are central for accomplishing specific work and then transforming those activities into personal attributes, more concrete and detailed descriptions of competence can be generated, and thus the main problem of the over-generic worker-oriented approach can be largely overcome. However, it is difficult to transform descriptions of work activities into workers' attributes, and it is questionable whether a list of work activities can be sufficient for indicating all the attributes required [6].

2.2. Interpretive approaches to competence at work and phenomenography

In order to overcome the criticisms of the two rationalistic approaches, Sandberg [2,7] developed an alternative, interpretive approach to understanding competence at work based on the principles of phenomenography. Defined as a research approach 'for mapping the qualitatively different ways in which people experience, conceptualize, perceive, and understand various aspects of, and phenomena in, the world around them' [8, p.31], phenomenography was first used in the 1970s to better understand the process of academic learning. The approach has since become increasingly popular for exploring and describing how learners and teachers understand and experience learning and teaching [9,10]. In recent years phenomenography has started to gain supporters outside the educational research domain in fields such as health care [11], academic freedom [12], leadership [13] and most notably human competence at work [2,7].

Sandberg's phenomenographic study of automobile engine designers found that a worker's conception of their work has an integrative function in constituting competence, in that 'the basic meaning structure of workers' conceptions of their work constitutes human competence' [7, p. 20]. Further, his study showed that variations in conception between individuals may form a hierarchy of competence in terms of increasingly advanced forms of understanding of work. The most central methodological

premise is that '...competence is not primarily a specific set of attributes. Instead, workers' knowledge, skills, and other attributes used in accomplishing work are preceded by and based upon their conceptions of work'. The term conception here refers to 'people's ways of experiencing or making sense of their world' [7, p.12].

2.3. Project management competence

Existing studies of project management competence follow one or other of the two rationalistic approaches described above. One strand of research takes the work-oriented approach and focuses mainly on the development of project management standards [14]. These standards have been developed primarily based on surveying experts' opinions, including those of employers and practitioners [15,16]. The second strand, which takes a worker-oriented approach, seeks to define sets of generic personal characteristics of competent project managers, reflecting the argument that being a competent project manager requires more than just possession of the 'hard' knowledge and skills described in the project management standards [17,18]. The fashion for lists of 'soft' personal characteristics required by competent project managers is revealed in a variety of texts and research-based reports [19–21]. In addition there are a number of empirically based frameworks [22–26].

By separating project managers from their work activities the indirect description of context-free attributes – whether the 'hard' components of a standard or the 'soft' characteristics hidden in personal qualities – specifies the prerequisites for what competent project managers should know and do rather than whether and how they will use these attributes in the workplace. In particular, the tacit dimension of competence that is apparent only in the workplace is overlooked [27]. Since project management is above all a practical rather than a theoretical discipline, project managers' tacit competence and their capability to integrate effectively both their tacit and explicit knowledge into their work should not be neglected. Hence, there is an obvious opportunity to apply an interpretive approach, phenomenography, to exploring practicing project managers' ways of conceiving and experiencing their work, and thus to understanding their competence in accomplishing their work.

3. Method

3.1. Sample selection

The sample of this study consisted of 30 project managers selected from 12 construction firms in the UK. Driven by the intention of the research, namely, to explore project managers' conceptions of their work, certain sample selection criteria were set out in order to make sure the nature and content of the respondents' work are matched. For example, they were from construction firms that were

usually main contractors; they were responsible for delivering the current project according to the main contract conditions signed between their firm and the client/owner of the project under construction; they were working on the site together with a project team, with subcontractors and suppliers usually employed for accomplishing the project; the projects they were working on were of not too complex or novel involving high technology. These criteria have offered to provide a more stable context for capturing project managers' conceptions of their work, which, however, have also limited the generalisation of the research findings, discussed at the end of the paper. Table 1 lists a summary of the samples' demographic information.

The sample size was determined by the achievement of theoretical saturation [28], whereby the emergent consistency of conception among respondents led to no significant new conceptual attributes being discovered. Similar to previous phenomenographic studies [7], the theoretical saturation was reached after about 20 interviews, and confirmed with a high degree of confidence with the additional 10.

3.2. Data collection

Following the phenomenographic approach [7,29], data were collected by in-depth open-ended interviews. The phenomenographic interview focuses on revealing respondents' ways of understanding and experiencing a given phenomenon rather than limiting their answers to aspects of the phenomenon pre-defined by researchers. The main feature of the phenomenographic interview is to use the protocol of principal questions and follow-up questions. Table 2 itemises the interview guide used in this study.

In this study, the principal questions were asked in order to understand *what* the respondents conceived as project management work, and the follow-up questions were then posed so that the respondents were required to elaborate and demonstrate what their statements meant in practical situations, in other words *how* they conceived it. The follow-up questions were used throughout the interviews, following up not only the principal or alternative questions, but also exploring the meaning of various statements or descriptions given by respondents. The constant questioning of the respondents' descriptions serves to elicit the underlying meanings and check the validity of their statements in ongoing communication. The alternative ques-

Table 1
A summary of samples' demographic information

		No. of project managers ($n = 30$)
Age	20s	1
	30s	9
	40s	13
	50s	7
Types of projects	Buildings	24
	Utilities/facilities	6
Education	Degree	17
	No-degree	13

Table 2
Interview guide

<i>Warm-up questions</i>	
•	Could you please talk me through your career to date?
•	Could you tell me a little further about your work on this project?
<i>Principal questions</i>	
•	What does project management work mean to you?
•	What is a competent project manager to you?
<i>Follow-up questions</i>	
•	Could you give me an example?
•	What do you mean by that?
•	Could you explain that further?
•	How did you deal with that?
<i>Alternative questions</i>	
•	What are the most important aspects of project management work?
•	What is the most important task of a project manager?
•	Could you describe to me a good project manager you know?
•	If you are now involved in recruiting a new project manager for your company, what are the most important criteria you will look at?
•	What aspects of the project have been successful? What made them successful?
<i>End questions</i>	
•	What do you enjoy most about your work? Why? Example?
•	What do you enjoy least about your work? Why? Example?
•	Is there anything else you would like to say about your work?

tions listed in Table 2 were used when the respondents provided little response to the principal questions or found it difficult to give examples and further explanations. The end questions allowed the respondents to reflect once again on their conception of project management work.

All the project managers were interviewed on the job site of their current project. Each interview lasted between one and two hours. All interviews were audio-taped and transcribed word-for-word. Notes were made both during and after each interview.

3.3. Data analysis

The first 10 interviews were coded using an inductively developed coding scheme based on the interview notes and basic knowledge of the data gained during the transcription process. This coding helped us to digest and become familiar with the data, and the coding scheme provided useful insights for identifying what the respondents conceived as important aspects of project management work. The subsequent analysis of all the interview transcripts followed the principles of the phenomenographic approach [8,30], in particular those of Sandberg's [2,7] advanced approach to understanding competence at work, which involved an ongoing iterative process alternating between *what* the project managers conceived of their work and *how* they conceived of that work, described below.

First, we read each transcript several times, to get familiar with the transcript and try to grasp each project manager's general conception. Then we grouped initially the project managers according to their general conceptions. In this phase, two general conceptions emerged: one focusing on planning and organising the construction

work on site, another focusing on predicting and managing problems.

Second, we read all the transcripts again, to systematically search for *what* each project manager conceived of their work focusing not only on picking up the statements concerning essential aspects of their work but also on the meaning of a particular statement in relation to its embedded context. Following this initial interpretation of each transcript, we shifted the analysis from individual project managers and compared conceptions across project managers, first within and then between the groups established in the first phase of the analysis. This process led to some regrouping. In particular, the comparison within the group focusing on planning and organising the construction work led to its division into two new groups: one focusing on planning and controlling the work details on site, another focusing on organising and coordinating.

Third, we analysed all the transcripts again, but in terms of *how* each project manager conceived of their work. The primary focus now was on how the project managers delimited and organised what they conceived as their work. After we had analysed each transcript, we compared the project managers with each other, first within and then between groups. Again, this process resulted in some project managers being moved from one group to another. The individuals were grouped and regrouped by progressively identifying their main focus and how they utilised what they conceived as important in accomplishing their work.

Finally, to cross-check and further stabilise the identified conceptions, we analysed all the transcripts once again, focusing simultaneously on *what* each project manager conceived of and *how* they conceived of their work.

4. Research findings

In our interpretation of the interview transcripts, three different conceptions of construction project management work emerged. They were project management as: (U1) planning and controlling, (U2) organising and coordinating, and (U3) predicting and managing potential problems. The project managers expressing each conception differed from each other through their ways of experiencing and accomplishing their work. They delimited and organised project management work in terms of certain essential attributes with different focus, forming different characteristic features of each conception. Further, within different conceptions, attributes represented different meanings and approaches. We describe each conception, its main focus, and the meaning of its key attributes, respectively, below, supported by typical examples of statements in the data. The findings are summarised in Table 3.

4.1. Conception U1: project management as planning and controlling

This conception was characterised by its main focus on the construction work process and individual subcontractors.

This focus implied that all U1 project managers' key attributes were centred around the construction work details on site, such as the work programme and construction methods of individual subcontractors. The key attributes constituting this conception included: ability to plan, knowledge of construction work, ability to communicate, and ability to manage team.

4.1.1. Ability to plan

Within U1, this attribute meant the ability to plan the construction work sequence and to check and control individual subcontractors' work programme and construction methods. This was one of the most fundamental attributes of U1. It was through this attribute that U1 project managers considered that the cost, time and quality of the project could be controlled.

Q: Could you describe to me your work on this project?

A: Well, it is the sort of planning and controlling of a job. The key thing is really on the job site; you should plan the job properly, and I think if you can plan properly you will have a better chance of controlling everything, everybody and all the subcontractors. (ROW)

Q: How do you plan the job then?

A: There are a number of things to do. First, when you plan the job, you produce such a programme on a computer with start and finish dates of each task. All these dates are completed first and they all need to be sequenced. They need to be in good sequence. That is important. You need to work on that. The control of the site you start with every subcontractor's work schedule and their methods. . . They should have got a programme and should have produced relevant method statements when they tendered for the job, such as health and safety measures. And as required their method statements now need to go through the approval process. . . (ROW)

4.1.2. Knowledge of construction work

U1 project managers considered it essential for them to have good knowledge of the construction work. By this they meant understanding the overall construction process and being aware of the technical requirements of the project, so that they could plan the work sequence themselves and check and approve their subcontractors' work programme and construction methods, providing advice when necessary.

A: A good project manager is somebody with enough knowledge of the construction work, not necessarily academic knowledge but enough experience and practical knowledge to be able to manage the whole process, and with enough confidence to be able to make decisions based on facts. (MIH)

Q: Could you please give me an example of this?

A: One example would be when subcontractors submit their programme and methods, I feel that I would have enough experience and knowledge to be able to check and approve them. In fact, the subcontractors generally

Table 3
The way each conception and its key attributes formed a distinctive structure of project management competence in the UK

Conception	Main focus	Key attributes of conception and aspects of competence						
		Ability to plan	Knowledge of construction work	Ability to communicate	Ability to manage team	Knowledge of commercial management	Ability to coordinate	Ability to deal with problems
U1: Project management as planning and controlling	Construction process and work details	Plan the work; approve subcontractors' programme and methods; control the work process	Understand the construction process and detailed requirements, particularly of the 'H & S' legislation	By regular meetings; control the implementation of the work and keep the plan updated	Allocate work tasks; chase and help people in their work			
U2: Project management as organising and coordinating	Construction work interfaces		U1+ Understand the work interfaces and subcontractors' work interactions	U1+ By various approaches; gain trust to assist in organising and coordinating work on site	U1+ Get people work together; build a team and create a spirit of mutual support, trust and openness	Be aware of the contract and price constraints; manage variations and changes to the contract	Coordinate subcontractors' work interfaces to avoid disruption and inefficiency	
U3: Project management as predicting and managing potential problems	Potential risks and problems Future-oriented		U2+ Know the construction industry; be aware of the history and future development of the industry	U2+ Communicate with all kinds of people; get updated information from all possible sources	U2+ Motivate the team and empower them; care about team members' career development	U2+ Be aware of potential risks and problems in the contract and the possible financial constraints	U2+ Organise and coordinate all and everything; coordinate to avoid the happening of potential risks and problems	Think forward to predict problems; take precautions actions to be able to resolve problems quickly

try to use the minimum labour resources or safety measures. They are always quite positive about what they can achieve in the given time. So you have to help educate the guys to plan their work, demonstrate that they probably need more resources, longer time. You have to help plan their work so that they maximise their efficiency, and their safety. . . (MIH)

4.1.3. Ability to communicate

U1 project managers considered the ability to communicate with others to be another key attribute. Their approaches were to have regular meetings, so that they were able to check and control the implementation of the planned work tasks and to update the project programme.

My personal work is planning. . . You need to be planning regularly for every event because things change and they may not go in accordance with the way you have originally planned. So you need to sit down with your own team, the subcontractors and with the client, you need to communicate with them and you need to be able to plan and update your plan regularly. . . Communication with people is very important. Regularly, we hold meetings on site, meetings within the team, with subcontractors and meetings with the client. . . For instance, at this stage we meet with the client once a week, we inform them about the progress of the job, about any problem, and if the client has any new requirement we discuss that and we will see together how the plan needs to be updated. (STM)

4.1.4. Ability to manage team

For U1 project managers, this attribute meant the allocation of work tasks to each team members, and then chasing them and helping them to fulfil their tasks. Following the project managers' focus on construction work details, their team members were also concerned with checking and controlling work procedures and the programme.

A: . . . You need to allocate liabilities, and the sharing of roles makes us work as a team. (BOG)

Q: You mentioned just now 'sharing of roles', could you describe a little further your role?

A: Well, we are a team for this project. My role is that I am in charge of the job and I need to make sure that we have got a programme in the first place, and ensure everyone implements their work. In fact I cannot just enforce authority. If anyone starts failing in any way, I will try to help him. Everyone makes mistakes and they should learn from it. So my approach would be not just point them at what they should do, but tell them what to do and why they are wrong, and tell them what would be the problem if that goes wrong. (BOG)

4.2. Conception U2: project management as organising and coordinating

This conception saw project management work as organising everything together and coordinating inter-

faces of work tasks on site. Its main focus was not only on the construction work process but also on the work interfaces involving multiple liaisons of subcontractors. Compared with U1, these project managers expressed two further attributes: *knowledge of commercial management* and *ability to coordinate*. At the same time, although these project managers still agreed with the importance of planning for good project management, they did not consider it to be a central attribute. The key attributes constituting this conception included: knowledge of construction work, ability to communicate, ability to manage team, knowledge of commercial management, and ability to coordinate.

4.2.1. Knowledge of construction work

This attribute for U2 project managers meant understanding not only the overall construction process but also the interfaces of each project task, so that they could put everything together as a big picture and allocate work tasks in the most efficient way.

I think he [a good project manager] needs to have a reasonable level of technical ability such as the building process. He does not need to know everything and all the details, but he should understand the main principles of the workings of each trade subcontractor, and make sure the work interfaces between each subcontractor are clear so they can proceed. (TRG)

4.2.2. Ability to communicate

U2 project managers communicated with people not only by regular meetings, as in U1, but also by a variety of other approaches. They placed more emphasis on socialising and gaining trust with each other. The purpose of communication was to provide practical help in organising and coordinating the overall project.

Apart from regular meetings, team bonding is also a good means to communicate with people. Everybody works hard on site. It is always nice to take people out for a drink or a meal. We sit down and just relax and try not to think about work. It is a bonding thing, and you have to learn to bond with people. Here on site, you are driving them to say 'we want it, we want it today, we want it this way. . . ' one evening the team meet at a club in a relaxed atmosphere, it is not a regular thing, maybe once a month, but you do that to show that you appreciate what they have done. It builds trust between you and your client and people you are working with. (MAK)

4.2.3. Ability to manage team

For U2 project managers teamwork was not only for ensuring that each member could fulfil their role, as in U1, but also – more importantly – for getting everyone to work together as one team towards the single goal of the project. Therefore, these project managers aimed to lay down principles that would enable the team to carry

out their work, build a spirit of trust and openness to encourage people to express their ideas, worries and suggestions, and support and help each other.

A: I think project management is based on trust and a lot of hard work, which is not from myself but from the team. Project management is about team, teamwork and team method, and you cannot succeed without a strong team. (BIK)

Q: What do you mean by 'teamwork' and 'team method'?

A: As I said it is a people industry, you need to have an understanding of people and you need to be able to build a team. For instance, we have now over 20 staff here on this project, and the majority of them are new people to the company over the past two years. So we are taking new people and building a team. These people came from different projects or different places. A project manager has to understand everybody's needs and ways and what is required, and you need to make them understand each other's ways and work together as a team to achieve that one goal. I believe they can carry out their role, but sometimes it is difficult for them to see others' needs and the big picture, so you need to influence the team and to create an open team environment. (BIK)

4.2.4. Knowledge of commercial management

U2 project managers also attended to the commercial sense of organising and coordinating their work. They were aware of the duties of all parties involved in the project contract and the relevant price constraints. In particular, they needed to understand the implications of any variations and contractual changes, and the duties of each party involved.

A: Economically, we have to work within the constraints of what the project costs are. We have been told that figure, and we have to get procurement to make sure the work is delivered within that budget and on time. (JOA)

Q: Could you explain that further?

A: I mean for instance the use of specialised subcontractors. Whatever their price I have to make sure they did their job. Sometimes there might be variations or design changes to the contract. I have to be there to manage any variations and changes, to make sure it is within the budget. . . If the client asks for us to change something then we have to make sure that the client will pay for that. (JOA)

4.2.5. Ability to coordinate

Within U2, this attribute meant the ability to coordinate the subcontractors' work interfaces. These project managers understood the interfaces between subcontractors' work both technically and commercially, so that they could manage and coordinate properly not only to make sure the project work could progress in the right

sequence, but also to avoid inefficiency and disruption to subcontractors' work.

The most important aspect of my work is the coordination of everything on site, just making sure that things happen in sequence and on the dates you want them to happen, and making sure that everybody complies with what you want them to do. . . So as a manager you need to have a programme in place and really you have to coordinate well. It is wrong to set dates and to push for the completion of work on those dates. You cannot just push and push, because you are working with so many subcontractors in so many areas and pushing doesn't work. (MIJ)

Another respondent said that:

There are a lot of interfaces which need coordination from us, because [subcontractors] have difficulties in seeing the big picture outside their own trade. . . You have to explain to them that once they finish, that is not the end of the job but only the release of work for the following trades. You have to try to educate them on what they need to produce in order for others also to produce results. (CHL)

4.3. Conception U3: project management as predicting and managing potential problems

The main focus of this conception was on potential risks and problems facing the project. The most essential aspect of these project managers' work was being able to predict and manage potential problems, reflected by a new attribute, *ability to deal with problems*. The key attributes constituting this conception included: knowledge of construction work, ability to communicate, ability to manage team, knowledge of commercial management, ability to coordinate, and ability to deal with problems.

4.3.1. Knowledge of construction work

In U3, this attribute meant having knowledge of not only the construction process on site but also the whole construction industry. In order to predict and manage any potential problems, U3 project managers needed to be aware of the potential risks and opportunities in construction work generally. They collected knowledge of the past, present and anticipated future of the industry.

Apart from the health and safety issue, training and an understanding of the construction industry including its history, its development and where it is going is very important. Because we are in a changing market full of risks and opportunities, new technology and new materials are coming up all the time, so it is very important to have a background within the construction industry. (MIF)

4.3.2. Ability to communicate

U3 project managers emphasised the ability to communicate with all kinds and levels of people relevant to the

project. They were prepared to take various approaches to communication. In order to predict potential problems and manage them well, they needed to be able to get up-to-date information of all kinds from all possible sources.

The biggest thing for being a good project manager is being able to communicate with lots of different people at different levels. . . In order to carry out the works, information is quite important. We need to save information from one part and give the information to other part. If we cannot get right information or give necessary information at the right time, there would be problems and delays. So what we've got to do is to communicate with people and also make people communicate together, so we are 'middle men' if you like. For instance, when we deal with the architect we know what's their idea and what they want, and at the same time we know what the client wants and we have to communicate what the client wants to the architect and our team, so all parties know what are the requirements and what is wanted at the end. (ASR)

4.3.3. Ability to manage team

In addition to the attributes conceived by U1 and U2 project managers, U3 project managers attended to teaching and motivating their team members. They cared about their team members' career development.

A: . . . management of the programme to adapt it to change internally caused or client caused, also management of a good site team, keep them motivated. (RIC)

Q: How do you keep the team motivated then?

A: Select people who are self-motivated in the first place, give them the role they are capable of doing, let them have the opportunity to expand. And it is important to empower them a little bit and let them cover a bit for their résumé. (RIC)

I give my team enough opportunities to learn so they can develop their own career, and that is part of what I think the project manager's work is. It is to make sure the team is developed to do what is required. If they are put in the position where they are project manager next time, they can get there to manage the project, because they have learned a little bit from me how to manage projects, and they can use that to develop their career. (JOM)

4.3.4. Knowledge of commercial management

Within U3, this attribute meant being aware of financial constraints and knowledgeable about contractual and commercial risks.

Q: What do you mean by commercial awareness?

A: Well, as a project manager, you have responsibilities for the overall project but not just one or two particular aspects of the job. So you must be aware of all the contractual arrangements for the project and understand the financial constraints the project is facing. At the end of the day, you have to make profit, if you don't

make profit, you don't exist and you don't survive. So you always have to face the constraints of finance against other aspects of the job such as health and safety. So you cannot just think about getting the job done, you have to know about the finance constraints, so that you could identify the potential risks and know how much you could compromise. (JOD)

4.3.5. Ability to coordinate

The meaning of this attribute in U3 was closely related to predicting and managing potential problems. Its focus was not only on the work interfaces, as in U2, but extended to everybody and everything involved in the project. In line with their focus on potential risks and problems, these project managers tried to conduct all parties and coordinate everything so as to avoid issues.

You have the overall full responsibility for the job, so you must be able to put everybody involved in the project all together and coordinate everything. It is not just the field thing, which is the site manager's job, but everything involved. Many people when talking about project management would always think the project manager's role is to manage construction work on the job site, that's not correct. The project manager should see the big picture. He sets rules and direction, and it is the site manager's job to ensure the day to day running of the job site. I think this is actually the big step from site manager to project manager. . . You have to focus on the big picture, but inside that big picture, you need to encompass everything there. Well, it is like conducting an orchestra. You have to conduct them all and coordinate everything. You need to be able to foresee a problem and to coordinate before it happens, so you can try to avoid it happening. (RIC)

4.3.6. Ability to deal with problems

For U3 project managers, this attribute meant being able to predict potential problems and be prepared to resolve problems quickly once they happen.

A good project manager is somebody with a broad vision and foresight, being able to identify a problem before it occurs, and being able to take actions to solve the problem, somebody who is a good motivator and team builder, somebody who has got good leadership skills, and somebody who understands construction and the client's requirements. (PAD)

Another respondent said that:

The fact is that every single building you built is different. . . and therefore the problems are different. You would have got all sorts of problems in there that you have not encountered before. They are there to make it more complicated for you and you have to be able to resolve them and be prepared to sort them out and to get the project built. (ADR)

4.4. Summary: A hierarchical relationship of three forms of construction project management competence

We have described each conception's main focus and its key attributes that appeared to project managers in experiencing and accomplishing their work. The examples of quotes illustrate the meanings of each attribute in each conception, respectively. Within each conception, the meanings of all its key attributes were internally related to each other, forming a specific structure of competence in project management with these key attributes being the essential aspects of competence. The way each conception and its key attributes formed a distinctive structure of project management competence is shown in Table 3 and illustrated below taking conception U1 as an example.

U1 was characterised by its main focus on construction work details on site and on individual subcontractors. Project managers expressing this conception planned the work sequence and produced a master work programme, according to which and with their knowledge of the technical requirements, they checked and approved each subcontractor's programme and construction methods, and controlled the work process on site. This was the fundamental aspect that also required and depended on the other aspects of this conception. In order to control the work on site, they allocated the management work tasks to team members, and then chased and helped people to implement their work. Thus, they needed to have a full understanding of the construction process and a better general knowledge of construction work than others. In order to keep the work schedule updated and control the implementation of work on site, they held regular meetings with relevant parties. Therefore, it can be seen that the meanings of the four key attributes within this conception were internally related to each other, centred around the planning and controlling of work on site, forming a distinctive structure of competence in project management work.

Further, as demonstrated in Table 3, the variation in meaning from U1 to U2 to U3 can be arranged as a hierarchy of competence in terms of increasingly advanced forms of conception. For example, in U1, project management work was seen as planning and controlling, with the main focus on construction process and work details on site. In U2 the work was expanded to include not only planning and controlling but also organising and coordinating the construction work interfaces, the main focus of which also shifted onto work interfaces and multiple subcontractors in the construction process. Thus U1 formed a background for U2. In this way, a cumulative hierarchy of project management competence was formed: conception U1 was the least comprehensive, U2 was more comprehensive than U1, and U3 was the most comprehensive. This suggests that individuals holding U3 were the most competent and that those holding U1 were the least competent with regard to construction project management work in the United Kingdom. This suggestion was sup-

ported by the data in that project managers who expressed more comprehensive conceptions were also able to express less comprehensive conceptions, while the reverse did not seem to be the case. This was more evident through the key attributes of each conception, namely, the essential aspects of each form of competence. As illustrated in Table 3, each conception consisted of a different set of attributes, and the same attribute meant different things to the project managers holding different conceptions. A variation of meanings of attributes in different conceptions demonstrated a cumulative and hierarchical relationship.

5. Discussion and conclusions

Existing studies of project management competence based on standards accord with the so-called rationalistic approach to competence and describe project management competence as a specific set of attributes independent of the context of project management work and independent of individual project managers. Following Sandberg's [2,7] phenomenographic approach to understanding competence, this research takes the project management work and worker (i.e., project managers) as one entity and demonstrates how practicing project managers' ways of experiencing their work, namely, their conceptions of their work, constitute their competence at work. The research findings suggest that whether and how project managers use the attributes described in project management standards in accomplishing their work are preceded by and based upon their conceptions of that work. Specifically, with different conceptions, project managers attach different meanings to attributes and organise the attributes into a distinctive competence in performing their work. Further, the variations in conceptions form a cumulative hierarchy of project management competence. Thus, the research findings not only illuminate what constitutes project managers' competence in accomplishing work, but also offer an opportunity for a new approach to project management competence assessment and development.

The prevalent use of standards for assessing and developing project management competence takes predefined areas of knowledge as the point of departure. Accordingly, in order to develop project management competence, efforts are put into transferring important attributes to those who do not possess them. This research moves the point of departure from knowledge areas to project managers' conceptions of their work. We do not claim that the attributes described in project management standards are not necessary for competent project management work performance. Rather, the shift of emphasis enabled by the phenomenographic approach makes it possible to better describe whether attributes are used in accomplishing work, and more importantly, how attributes are formed, developed, and organised into distinctive structures of competence in project management work performance. Hence, the assessment of project

management competence should not only involve examining the possession of knowledge, but should also consider the fundamentally different ways in which people experience project management work, namely, their conceptions of their work. The most basic form of developing project management competence is then to change people's conceptions of their work. This has implications for project management professional organisations to update their competence assessment and development programme. This may also have implications for designing and conducting effective training courses on project management.

6. Limitations and implications for future research

The findings of this research are based on data from a single industry in one country. Characteristics idiosyncratic to construction projects, such as their relatively well-defined goals and methods for achieving the goals, have offered to provide a more stable context for capturing project managers' conceptions of their work. However, these characteristics mean that caution should be exercised in generalising the findings in this research to contexts other than construction projects in the United Kingdom. Future phenomenographic research into project management competence may further examine project managers' conceptions of their work activities in other sectors such as IS/IT and other countries. If similar sets of attributes and structures of conceptions can be found, then it might be possible to confirm general characteristics of project management competence. If differences of conception between contexts are found this would provide valuable information for those in the project management profession who are concerned with the development and application of uniform standards. In this way it is our hope that the research findings reported here will complement existing standards-based approaches to professional competence assessment and development.

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