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International Journal of Project Management 25 (2007) 423–436
INTERNATIONAL JOURNAL OF PROJECT MANAGEMENT
www.elsevier.com/locate/ijproman

An epistemological evaluation of research into projects and their management: Methodological issues

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Abstract

A unified theory of the management of projects does not exist. Projects are context-specific and located in open-systems. While this is now widely acknowledged, research methodologies often continue to overlook this. This paper addresses methodological issues that have yet to be fully resolved in research in projects and their management and evaluates how these issues have a direct and indirect impact upon research and practice. We argue that the pursuit of explanations that rely upon identifying *general* patterns based upon cause and effect marginalises the *particular*, while a focus upon the *particular* frustrates the emergence of common patterns, shared meanings and normative recommendations. The paper reviews research practice in the light of project management paradigms and their more general epistemological underpinnings.

Keywords: Bodies of knowledge; Causality; Empiricism; Methodology; Paradigm; Positivism; Critical realism; Theory

1. Introduction

The aim of this paper is *epistemological* – an evaluation of how we know what we know through research about projects and their management [1]. The objective is to evaluate the extent to which our knowledge of projects is being developed through the appropriate application of methodology in research. Research methodology is informed by what we know philosophically and its application affects what we come to know. The paper discusses the epistemological and paradigmatic bases that underlie research in this area and it evaluates whether recent research is applying methodologies appropriately in terms of epistemology, integrity of the methodologies and the context in which they are being applied.

Research methodology has a key role in generating knowledge on projects and their management. However, if the epistemological base of our research is weak, then it must also be the case that progress in developing the knowledge base for research and practice in the field is also weak. Thus the primary question being explored is whether we are careful enough in the selection and application of methodologies.

2. The theoretical basis to understanding the management of projects

The absence of both an integrated theory of management, and of project management [2], whether defined in its narrow or broad ('management of projects') senses [3], can be observed in its multidisciplinary nature and the way it draws upon a range of social (and natural) sciences. This diversity of theoretical bases leads to:

1. an eclectic mix of concepts being required for understanding projects or aspects of them;
2. the professional project management associations' BOKs drawing on different conceptual and theoretical underpinnings, as a result often causing confusion in the 'profession' as to the basis of the discipline;

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0263-7863/$30.00
doi:10.1016/j.ijproman.2007.01.006

3. practitioners finding difficulty in assimilating and applying such diversity – echoed corporately where articulating practice and integrating knowledge encounters conceptual difficulties, particularly across the enterprise-program-project interface;
4. application varying as practitioners interpret knowledge differently according to context, circumstance, competence and indeed whim.

A particular problem, which we shall be addressing later in this paper, is the assumption that *general* patterns concerning the management of projects can be identified, which have explanatory power. Even if this were the case, we need to recognise that recommendations based on these insights cannot be applied mechanically with the expectation of automatic outcomes: applicability is contingent upon *context*. While the importance of *context* is widely acknowledged [4], epistemologically context is frequently overlooked in the selection of research methodology, as we shall see in the review of research given below.

The absence of a received theoretical framework for project management, and the importance of context, puts a special burden on ensuring that we pay attention to epistemology and hence methodological issues. In fact, we contend, we fail to do this. Often the term 'methodology' is misused, thereby obscuring epistemological issues concerning research. Methodology is defined as a *system* about *how* we go about something, in this case research. Research methodology is located in the philosophy of how we come to know things, that is, epistemology (Fig. 1). Methods concern *what* we use, in other words, the detailed approach and tools used to undertake specific research.

2.1. Paradigms

Having an appropriate research methodology is only part of the way we epistemologically perceive (construct) knowledge. We create intellectual frameworks – *paradigms* embodying systems of ideas and beliefs [5]. Paradigms shape the way practitioners, professionals and academics perceive the discipline, and directly shape many of its tools and techniques, service offerings and certification programs. Project management has been subject to several such paradigms. PMI's *PMBOK Guide*®, for example (and its newer standards on program management, portfolio management and maturity) reflect an essentially 'execution' view of the discipline, completely omitting reference to the crucial definitional stages [6].

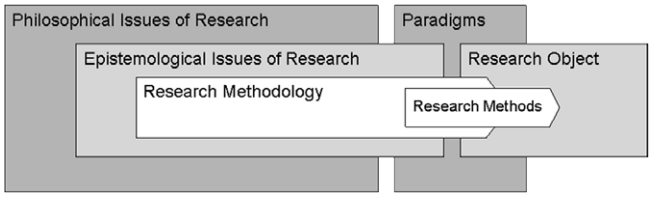

Fig. 1. Applying epistemology, methodology and methods.

How paradigms are categorised depends, to an extent, upon purpose. Recently, for example, Winter [7], drawing upon the work of Hobday and others [8], identified six paradigmatic approaches:

(i) "Systems analysis" that forms a rational deterministic paradigm [9]; this is the dominant one in most textbooks, teaching and practice.
(ii) "Organisational design" that considered integration and differentiation [10], including characterisation of organisations as *ad hoc* [11] and temporary [12].
(iii) "Project-based structures" that draws, *inter alia*, upon major projects [13] and project activities in different economic sectors [14] to analyse the strategic and front-end factors within a project and the exogenous factors that may affect projects.
(iv) "Strategic direction" that links projects with business strategy [15], with emphasis upon context and contingent capabilities and competencies [16].
(v) "Information processing" [17] that addresses project uncertainty as an overriding feature by drawing upon economic concepts, such as transaction cost analysis [18].
(vi) "Critical management" that draws upon critical social theories and investigates issues concerning the general maintenance of the *status quo* and whom is being served, at the extreme viewing project management as one instrument of social control through the control of projects [20].

From the "critical management" approach, Hodgson and Cicmil [19], drawing upon Fincham [21], identified three perspectives:

(a) "Rational/normative": creating structure and goals in a simple cause–effect perspective (cf. (i) and (ii) above, 1 and 3 below).
(b) "Processual": socio-technical interaction through and inducing processes to create outcomes (cf. (iii)–(iv) above, 2 and 4 below).
(c) "Narrative": interpretative and critical perspective that can provide internal disciplinary insight-cum-development, yet tending towards providing external critiques (cf. (v) above, and 4 below regarding internal development).

Artto and Wikstrom [22], analysing projects through the enterprise as the unit of analysis, identified eleven topic clusters of research on projects, which they organised into three foundational categories for project enterprises:

(I) "Organisation": open-systems that relate to the business objectives of project enterprises, under which projects and their objectives are subsumed (cf. (ii)–(iv) and (b) above, 2 and 4 below).

(II) "Process": product and service innovation and development, performance criteria and multi-project activities are viewed and organised as processes (cf. (iii)–(v) and (b) above, 2, 3 and 4 below).
(III) "Technological and social change": social and behavioural theories, external technological and economic change (cf. (v), (vi), (b) and (c) above, 2–4 below).

Pryke and Smyth [23], drawing on project context rather than management *per se* [24], identify:

1. The *traditional* project management approach – a strong emphasis on control techniques and tools [25] and tending to have a task-orientated, efficiency focus [26]. This is highly aligned to "systems analysis" – see above. Scheduling tools and earned value provide two classic examples, lean production and supply chain management provide two more recent examples (cf. (i) and (a)). (We acknowledge that recent developments such as critical chain and performance management have brought an added social science and behavioural element, moving away from predominantly linear thinking.)
2. The *information processing* approach – a technocratic input–output model of managing projects [17], which contains social theory and tends towards an efficiency focus, drawing upon economics and managerialist sociology to address information as a means of reducing uncertainty and improving attendant risk management (cf. (v), (a) and (II)–(III)). This paradigm tries to graft a more integrated approach onto linear task-orientated thinking, and human dimensions tend to be subsumed under the technocratic and managerial considerations.
3. The *functional* management approach – includes the strategic, front-end 'management of projects' approaches [27], drawing on organisational design and social theory, and being more holistic with a focus upon effectiveness as well as efficiency. This is a more integrated paradigm, embracing structures, open-systems and processes in pursuit of functional outcomes (cf. (ii)–(iv), (b) and (I)–(III)). The task-orientation gives way to a broader appreciation of human and organisational behaviour, indeed a range of people issues. It considers internal and external factors influencing the project, the result being a broader definition of the project linking into business, strategy, portfolio and programme management, as well as issues such as learning, competency development and stakeholder analysis. The thinking is less linear [28], although research methods have not always recognised this.
4. The *relationship* approach – views managing social relationships as a means to manage and add value to, and through, projects [23]. It is based in social theory and tends to focus upon effectiveness. This emergent paradigm argues that people add value individually and through relationships, because relationships are behind all the other tools and techniques. The approach draws upon a diverse set of research [29]: addressing the object–actor dichotomy raised by Engwall [16] as relationships are not only actor-to-actor, but actor-to-object too; and incorporating perspectives from "critical management". This paradigm is not a substitute for, but is complementary to, other paradigms. The approach is theoretically diverse and certainly not linear in thinking, and arguably has the broadest definition of managing projects of all the paradigms (cf. (iii), (iv), (vi), (b), (c) and (I)–(III)).

2.2. Bodies of knowledge and guides: the problem of the general and particular

Different paradigms directly inform the BOKs. Generally, the scope of managing projects has been conceptually enlarged as paradigms shift from the *traditional* onwards, yet theoretical difficulties still arise around the definitions of projects, project management/management of projects, and so on.

The *PMBOK Guide*® [30] is *the* formal model of project management for a very great many people and enterprises. It is the most simplistic, with a primary focus upon task execution and fails to refer to the management of front-end issues, exogenous factors, strategy or human factors [31]. It is a product of the 'traditional' paradigm and the information processing paradigm feeds into this. PMBOK is epistemologically closely associated with positivism, seeking general explanations and solutions for practice, tending to disregard context. The IPMA Competency Baseline [32] and APM Body of Knowledge [33] reflect the functionalist framework. The Japanese BOK [34] is more eclectic, not quite reflecting any of these paradigms.

All the BOKs are value-driven and reflect differing epistemological approaches – primarily positivist and empiricist, with some interpretativist aspects [1], as we shall see shortly – as well as differing paradigmatic perspectives. These theoretical bases affect the way we articulate and provide guidance. The paradigms shape the scoping of the domain. The epistemological base affects the way we seek knowledge, affecting not least the deployment of research methodology – and the manner in which we try and state good practice (or generalise-able rules). Positivism for example seeks general explanations, whilst interpretive methodologies seek particular explanations [35] and empiricism either the general or the particular. Morris points to the *critical realist* view that:

> "...reality is stratified: there may indeed be causal relationships (laws, event sequences, etc.) discernable at a level of observation but these are just subsets of what can be observed, and what can be observed is itself a subset of what, at a deeper level of reality, in fact exists." [36]

Attempts by the BOKs to systematise the knowledge required to manage projects are largely based on the underlying assumption that there are identifiable patterns and generalisations, from which rules, controls and guidelines for best practice can be established that are replicable, even

if not in absolutely every circumstance. Accepting that projects are socially constructed ('invented not found') they have a reality; inventing that reality may, reasonably, be seen as normative; project management is close to an instrumental rationality view of the world – "rational action oriented to practical goals" [37]. Nevertheless, many believe that the pursuit of such generalisations is futile [20], arguing that the variety of different contexts is too great to allow for much to be said that is useful. Others however, conscious or not of the epistemological difficulties, have pursued the attempt to externalise lessons-learned and to generalise practitioner insight and research findings:

> "The trouble, of course, is determining at what point such (theoretical and conceptual) knowledge becomes so generalised that it is of limited value, and at what point it is so specific that it is no longer generalisable." [35]

The difficulty is compounded by the range of *disciplines* involved. Conceptual and theoretical diversity has some benefits, but connecting such a breadth of disciplines is made much harder when and if authors fail to make explicit their theoretical, epistemological or methodological position – which, we contend, most fail so to do. Hence, everyone involved in trying to articulate knowledge in this area needs to be clear on their theoretical bases: the professions in their bodies of knowledge; researchers in their methodologies and methods [38].

3. Research methodology and philosophical underpinnings

This methodological problem has been faced before. Geography does not have its own theory as a discipline, spatial activity being understood through other theories and concepts. That does not mean that space is benign. Indeed, space has powerful *contextual* effects upon the way in which activities are worked out in practice. In geography, Sayer argued that positivism neglected such contextual effects or tended to infer too much from spatially-led analysis in efforts to identify *generalisations* and *causal laws* [39]. Management, and the management of projects specifically, faces a similar situation.

A critical awareness of the methodological implications of the different paradigms and the different theories that underpin research on the management of projects is long overdue. Just as the various BOKs can create self-fulfilling perceptions and self-serving reinforcement amongst practitioners as to what constitutes appropriate knowledge, so too an uncritical use of methodology can create self-fulfilling perceptions and self-serving reinforcement amongst academics [40]. The following section briefly addresses key epistemological aspects of dominant methodologies used in project research.

3.1. Applying positivism and empiricism

Positivism and *empiricism* are closely aligned traditions. First, we consider positivism, then empiricism, although some analysis pertains to both. Both positivist and empiricist traditions explain events based on the Humean law of causality – linear thinking. This creates a preference for closed cause–effect models, yet social systems and many natural systems are open. Seeking linear cause–effect relationships tends to atomise research. The search for complete explanations becomes especially problematic. Mending a car may be best approached in this way, but restoring a violin would not be. Managing projects requires a more integrative, holistic understanding.

Positivism has been dominant historically in research on projects. It underpins the *PMBOK Guide*®. Positivism, in its various forms, pursues *generalisations* in order to establish principles or laws to govern its object. This might suggest it is the most appropriate methodology for a practitioner-oriented discipline like project management. However, there are general and specific criticisms.

A general criticism is the induction–deduction problem. Positivism first used verification, proceeding by induction. When further evidence subsequently came to light contradicting initial findings, the generalisations and laws induced from research, were challenged. Falsification was Popper's alternative, stating nothing can be proved positive, but ideas can be falsified where evidence no longer support hypotheses [41]. A further variation retains ideas where evidence does not support null-hypotheses, that is, a negative proposition. Popper's causality is deductive rather than inductive; however, many positivist project management researchers do not work deductively – there is frequently an implicit normative agenda of what *ought* to happen. Furthermore, many management models are developed intuitively and through experiential learning, rather than cognitive learning supported by empirical evidence [42], thereby reinforcing normative agendas. Experiential learning is inductive, and normative application is considered unacceptable in positivism. Positivist claims for objectivity are compromised. This is a problem occurring to some extent in any research where the subject choice is value-laden, as in projects [43].

Normative agendas, which tend towards the search for pre-determined outcomes, are sometimes difficult to distinguish from the instrumental approaches in positivism and empiricism. In such cases particular tools and techniques may be developed for general application, proof of their value being perceived successful application. Although in practice follow-up research to substantiate claims of success is infrequent. As critical management tends to point out, despite many general tools being produced, success remains elusive [19].

Many positivists construct models for general applicability, which may be contingent in practice. Economists, for example, exclude factors to create closed systems. Assumptions are made about such contingencies; models are built and tested; some excluded factors may be introduced one at a time subsequently as variables. Recognition of problems with findings may lead to reintroducing such variables, yet these are often not taken as challenges to

the model. An example is trust. Trust has been excluded from the principles of economics in transaction cost analysis [18], although this view was marginally moderated subsequently [44]. Subsequently game theory reintroduced trust [45], yet retrospective introduction subsumed trust under market forces rather than recognising the importance of some trusting behaviour being central in market exchange. Thus tools and techniques are often applied from theory in ways that are out of balance with reality.

Project management research frequently investigates models and concepts from other disciplines – Supply Chain Management for example – the tendency being to apply the theory to project management without acknowledging the contextual nature of projects. This poses a serious dilemma for positivist methodology. Positivist methodology is simply unsuitable for addressing many project issues, except in the few cases where a simple closed system is in evidence, providing positivism is applied appropriately.

Empiricism acknowledges that insufficient is known about something to conceptualise or generalise, hence the facts are investigated to find the story. Empiricism takes a number of different forms. It places primacy upon observation and data, usually seeking to observe without theory, using evidence to induce generalisations and build theory. As with positivism, there is a strong instrumentalist current, endeavouring to identify practices and tools that may prove useful. Empiricism has been used where researchers are trying to decouple themselves from existing belief systems – theist or paradigmatic. It has been used where little or nothing is yet known, which is not the case concerning the management of projects. The weakness can be an inability to clearly identify causal processes and hence explanations.

Empiricism can address context, and for this purpose has application within any of the paradigms and BOKs. One approach to empiricism is case study research, which is used extensively in research in management and the management of projects [13]. Single cases consider the particular and/or are used to build theory from particular data to apply more generally. Several cases offer opportunity to compare-and-contrast – attention being given to the general and particular. The case study approach can include "war stories" [46], which can introduce perception and interpretation in method and link to hermeneutical or interpretative methodologies. There is a link here to the grounded theory method [47], which also begins to introduce other methodologies by implication.

3.2. Other methodologies

Hermeneutics or interpretative epistemologies, hence methodologies, cover a range of issues and methods, including aspects within grounded theory [47] and case-based methods [46]. Hermeneutics or interpretative methodologies embrace ethnographic methods, phenomenology and other approaches are excellent for understanding perceptions, which are part of the particular, yet poor at addressing the general. These issues, which have been explored to an extent elsewhere [1], are not prevalent in the project research literature reviewed below, hence will not be considered further in this paper. It is worth noting that many critical management theorists have switched from seeking general towards seeking particular explanations. This follows a theoretical shift from theories employing reflexive and dialectic causality that sought general explanations towards postmodern thought based upon interpretative methodologies that seek particular explanations – the "PoMo" flip [48]. Sayer [39] argues that interpretative explanations paradoxically tend to maintain the *status quo* – they ultimately lead to division amongst researchers or indifference amongst onlookers. While other methodologies may embrace the particular and need to do so, it is important not to loose sight of the importance of the general. This raises the question as to whether there is an epistemology and methodologies that not only potentially embrace but require consideration of the general *and* the particular.

3.3. Applying critical realism

In this section, *critical realism* is briefly introduced. It is not intended to explore this in any depth here – that is for future exposition within the context of research projects. The aim is provide a few pointers to (i) show the possibility, and (ii) stimulate consideration of this option amongst researchers pending further exposition.

Realism is a philosophy used in natural and social sciences [49], which along with *critical realism* [50], includes an emphasis upon contextual conditions. Realism as a philosophy also offers a methodology that neither seeks the particular nor the general, instead measuring causal powers in the essence of the object of study, according to structure and mechanisms or processes. These powers are triggered according to the contingent relations or contextual conditions that are external to the object. The strength is its ability to engage with causality and complexity in context.

Objects of study are viewed *ontologically*, that is, in terms of their essence, which is understood as structured and embodying powers and liabilities. These powers and properties of liabilities are causal in the sense that they have the capacity to *cause* certain sorts of effects – events or outcomes. They are *necessary* for the events to be manifested. The structure of the object of study is the first major departure from the deductive or inductive cause–effect relation. The object is structured in terms of concrete and abstract elements and internal mechanisms or processes that trigger the necessary powers and liabilities. Examples of such structuring include material or physical relations, physical–social relations, social relations, language as a structure and process [39]. (Indeed, language has been cited as a structural barrier to moving away from linear and rationalistic thinking in managing projects [51].) Specific abstract project-related elements might include guidance from BOKs as abstract constructs. A specific project mechanism or process might be how a BOK might influence method statement development.

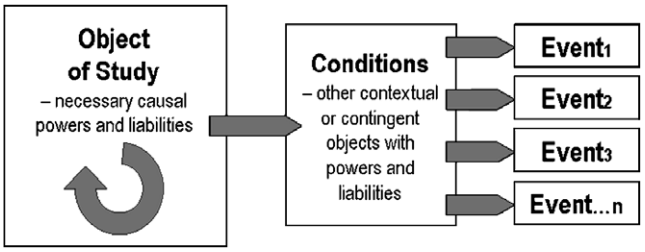

Fig. 2. Realist causality.

Realism recognises the role of the external forces: the *contextual conditions*. These mediate and filter the enacted causal powers and liabilities of the object of study in its environment. Hence final outcomes can be changed or affected by these conditions, each of which may have their own ontological states. If outcomes occur, the forms they will take depend upon the powers and liabilities of the contextual conditions (see Fig. 2). Thus a range of events or outcomes are possible:

- General events that are not always replicated.
- General events with particular features according to context.
- Particular events that are not replicated.

Critical realism recognises the value-laden nature of all science and the interpretative nature of scientific endeavour [52], and incorporates a normative viewpoint [53] for optimising and addressing critical factors [54]. Realism asks in context how processes work, what produces change, and what agents do [55].

Critical realist methodology accords closely with the working environment of projects. BOKs are trying in their distinctive ways to outline the *necessary* knowledge required for managing projects, yet application of this knowledge cannot guarantee precise and predictable outcomes – *effects*. The intentions are sound and doubtless efforts will continue to get closer to the 'ideal' set of guidance and 'best practice'; yet the 'ideal' will remain illusive, because projects typically carry uniqueness, asset specificity, and high levels of uncertainty. These contextual conditions are critical.

A primary weakness of critical realism is the way in which researchers interpret its emphasis in application, not least to research. One realist who tends towards 'structuralism' may critique others for being too 'empiricist' and *vice versa*. Whilst there are weaknesses, this section has provided pointers to the possibility of critical realism as an alternative for project research.

4. Recent research on projects

To what extent does our analysis have foundation? The coherence of the epistemological analysis hopefully provides part of the answer; but, what evidence is there to suggest whether researchers themselves pay sufficient (epistemological) attention to the selection and application of methodologies in research about projects?

To help answer this question, a sample of papers from this journal was reviewed, namely those published in 2005. The findings may be marginally biased through the selection of this journal, but it is assumed the choice of this journal is both relevant, appropriate, and of interest to readers. The review covered 68 papers, 8 editions, including a special edition: the Sixth Biennial Conference of the International Research Network for Organising by Projects (IRNOP). The review considered:

1. Whether the authors were looking for explanations that were *general*, *particular* or both;
2. What research *methodology* was selected and whether this was made *explicit*;
3. What research tools – the *methods* employed – were mobilised within the choice of methodology;
4. Whether the authors explicitly *reviewed* their choice of methodology or methods to reflect the extent to which their research was epistemologically robust and their analysis and findings contribute to the understanding of projects and their management.

The findings are shown in Table 1. We found the majority of authors – over 90% – did not make their methodology explicit. This rendered categorisation difficult and some may contest our assessment, however, this difficulty is simply a reflection of poor research practice (recognising many of us have fallen into this trap for practical reasons, such as word length). Many authors used the term 'methodology' to mean 'method'. The resultant focus on tools and techniques as 'methodology' serves to obscure the philosophical, particularly epistemological, requirements of rigorous research, such as addressing context, causality and general–particular explanations, relations to paradigms and knowledge frameworks (such as BOKs). It also encourages by default researchers to omit reflecting upon methodological choice and appropriateness as part of the review of their findings and analysis.

Positivism appears to have been the dominant research epistemology – over 66% in the sample. Positivism seeks *general* explanations, yet some authors simultaneously acknowledged context specificity, for example Crawford [57]:

> Another important issue in considering project management competence is the nature of projects and the context within which they are conducted.
> Although a wide range of contextual, qualifications and experience factors were screened in logistic regression analysis, only the level of organisational project management maturity, country, role, application area of project and industry sector of organisation appeared in the best reduced models.

Table 1
Review of methodology used in IJPM articles, 2005

Authors	Edition	Topic	Context specificity	Epistemology					
				General or particular	Methodological basis used	Explicit	Method	Post-review of method	Post-review of methodology
Crawford	(1):7–16	Perceptions of competence	Project managers	General	Positivist	No	Multiple choice test[a]	No	No
Garcia et al.	(1):17–24	Decision-making	Meeting efficiency	General	Interpretative Positivist	No	Ethnographic Game theory methods	No	No
Bing et al.	(1):25–35	Risk allocation in PPP/PFI	Public sector, UK	General	Positivist	No	Survey questionnaire	No	No
Sing and Tiong	(1):37–44	Life cycle costing	Bridges in Myanmar	General	Positivist	No	Case study[a]	Yes	No
Xu et al.	(1):45–53	Contractor collaboration	China	Both	Empiricist	No	Pilot interviews[a]	No	No
Shore and Cross	(1):55–64	Culture	Science projects	General	Positivist-cum-interpretative	Yes	Semi-structured Interviews[a] Case studies	No	No
Deakins and Dillon	(1):65–74	Product/service innovation	e-commerce	General	Empiricist	No	Case study	No	No
van Donk and Riezebos	(1):75–83	Knowledge inventory	Project knowledge	General	Positivist	No	Case study Survey questionnaire	Yes	No
Partington et al.	(2):87–95	Management competence	Programme Management	Particular	Interpretative	Yes	Phenomenography Observation, interviews	Yes	No
Shi et al.	(2):97–107	Human decisions	Simulation	General	Positivist	No	Conceptual modeling Case study	No	No
Wang and Liu	(2):109–120	Subcontractor management	Schedule control	General	Positivist	No	Conceptual modeling Case study	No	No
Mavrotas et al.	(2):121–133	Cash flow forecasting	EU Programme in Greece	General	Positivist	No	Public data	Yes	No
Eden et al.	(2):135–139	Project cost overruns	Time and delays	Particular	Empiricist	No	Comparative	No	No
Winch and Kelsey	(2):141–149	Project planning	Negotiation	General	Empiricist-cum-critical social theory	No	Case study Interviews	No	No
Cheah and Ting	(2):151–158	Value engineering	Southeast Asia	General	Positivist	No	Survey questionnaire[a]	No	No
Labuschagne and Brent	(2):159–168	Sustainable management	Project life cycle	General	Structural	No	Conceptual abstraction	No	No
Wang et al.	(3):173–180	Leadership	Team performance	General	Positivist	No	Survey questionnaire	Yes	No

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Table 1 (*continued*)

Authors	Edition	Topic	Context specificity	Epistemology					
				General or particular	Methodological basis used	Explicit	Method	Post-review of method	Post-review of methodology
Milosevic and Patanakul	(3):181–192	Standardized project management	High velocity firms	Both	Empiricist Positivist	Yes	Case study Survey questionnaire Interviews	No	No
Danilovic and Sandkull	(3):193–203	Project uncertainty	Relationships	Both	Interpretative-Social constructionist	Partial	Dependency matrices[a] Action research	No	No
Parker and Skitmore	(3):205–214	Management turnover	Project life cycle	General	Positivist	No	Survey questionnaire	No	No
Cioffi	(3):215–222	Project management tool	Ecological S-curve	General	Positivist	No	S-curve application	Yes	No
Maheswari and Varghese	(3):223–230	Project scheduling	Dependency	General	Ontology	No	Example/Analogy Structure Matrix	No	No
Willoughby	(3):231–236	Process improvement	Owner-supplier relationships	General	Empiricist-cum-interpretative	No	Interviews	No	No
Diallo and Thuillier	(3):237–252	Trust and communication	African perspective	General	Positivist	No	Survey questionnaire[a]	Yes	No
Dvir	(4):257–265	Handover	Defense projects Israel	General	Positivist	No	Survey questionnaire[a]	No	No
Trietsch	(4):267–274	Project buffers	Estimation bias	General	Positivist	Yes	Conceptual modeling	No	No
Yang	(4):275–282	Cost estimations	Elements of offices	General	Positivist	No	Historic data	Yes	No
Iyer and Jha	(4):283–295	Cost performance	India	General	Positivist	No	Survey questionnaire[a]	No	No
Dillibahu and Krishnaiah	(4):297–307	Cost estimation	Software	General	Positivist	No	Survey questionnaire[a]	Yes	No
Al-Reshaid and Kartam	(4):309–320	Prequalification and tendering Public sector	D&B Kuwait	General	Empiricist	No	Case study	No	No
Olander and Landin	(4):321–328	Stakeholder management	Sweden	Both	Empiricism with positivist	No	Case studies	No	No
Teo et al.	(4):329–341	Site safety	Project management	General	Positivist	No	Survey questionnaire	Yes	No
Artto and Wikstom	(5):343–353	Definition of project business	Firm	General	Positivist	No	Bibliometric[a] Network analysis	No	No
Cova and Salle	(5):354–359	Marketing-project management	Interdisciplinary	General	Interpretative	No	Conceptual synthesis	No	No
Brady et al.	(5):360–365	Integrated solutions	Value creation	General	Empiricist	No	Interviews Case studies	No	No
Gemunden et al.	(5):366–373	Project autonomy	NPD	General	Positivist	No	Survey questionnaire	No	No

Ruuska and Vartiainen	(5):374–379	Knowledge sharing	Project organisations	General	Positivist	No	Case studies Survey questionnaire	No	No
Alderman et al.	(5):380–385	Sense-making within projects	Complex project	Particular	Empiricist-cum-interpretative	No	Single case study Qualitative Narrative	No	No
Dietrich and Lehtonen	(5):386–391	Strategic intention	Project success	General	Positivist	No	Survey questionnaire	No	No
Hellstrom and Wikstrom	(5):392–397	Modularity	Instability	General	Empiricist	No	Case studies	No	No
Muller and Turner	(5):398–403	Principal-agent problem	Contract type	Both	Structural	No	Conceptual linkage	No	No
Kujala and Ahola	(5):404–409	Customer satisfaction	US and Finland	Particular	Empiricist	No	Case studies Triangulation	Yes	No
Manning	(5):410–414	Organisational forms	Stability–flexibility	General	Positivist/ empiricist	No	Structural network Case study	No	No
Linderoth and Pellegrino	(5):415–420	IT	Change projects	Particular	Interpretative	Yes	Ethnographic	No	No
Wadeson	(6):421–427	Information search	Solutions	General	Positivist	No	Conceptual model	No	No
Yu et al.	(6):428–436	Project value	Execution and operation	General	Positivist	No	Conceptual modelling	No	No
Taylor	(6):437–444	Risk management	IT project Hong Kong	Both	Positivist-cum-empiricist	No	Interviews	No	No
Eskerod and Jepsen	(6):445–453	Staffing renewal	Project teams	General	Positivist	No	Survey questionnaire[a] Interviews Case study	No	No
Zwikael et al.	(6):454–462	Cultural differences	Japan and Israel	Particular	Positivist	No	Survey questionnaire	No	No
Chen and Chen	(6):463–473	Supply chain payment	Taiwan	General	Positivist	No	Case studies Survey questionnaire[a]	Yes	No
Uher and Brand	(6):474–482	Adjuication	Payment legislation	Both	Positivist	No	Survey questionnaire	Yes	No
Dzeng and Wen	(6):483–491	Project teaming	Taipei 101	Particular	Positivist	No	Case study[a] Fuzzy Delphi survey	No	No
Eskerod and Blichfeldt	(7):495–503	Changing team membership	Project life cycle	General	Empiricist with positivist	No	Case study	No	No
Fung et al.	(7):504–512	Safety	Culture, Hong Kong	General	Positivist	No	Survey questionnaire[a]	No	No
Gutierrez and Friedman	(7):513–523	Managing expectations	Information systems	Particular	Empiricist	No	Case studies	No	No
Reyck et al.	(7):524–537	Portfolio management	IT projects	General	Positivist	No	Survey questionnaire[a]	No	No
Elhag et al.	(7):538–545	Tendering costs	Quantity surveying	General	Positivist	No	Survey questionnaire[a] Interviews	No	No

(*continued on next page*)

Table 1 (*continued*)

Authors	Edition	Topic	Context specificity	Epistemology					
				General or particular	Methodological basis used	Explicit	Method	Post-review of method	Post-review of methodology
Yand and Chang	(7):546–553	Repetitive projects	Resource constraints	General	Positivist	No	Case studies	Yes	No
Wu et al.	(7):554–563	Design change	Change management Taiwanese highways	Both	Empiricist-cum-positivist	No	Case studies	No	No
Mahdi and Alreshaid	(7):564–572	Procurement routes	Client type	General	Positivist	No	Survey questionnaire Analytical hierarchy Process	No	No
Whitty	(8):575–583	Knowledge processes	PM paradigm	Both	Positivist	No	Evolutionary memetics Reductionist	Yes	No
Barber	(8):584–590	Internally generated risks	9 projects	General	Positivist	No	Group workshops Interviews	No	No
Kutsch and Hall	(8):591–599	Risk management	IT projects	Both	Empiricist	No	Semi-structured[a] interviews	No	No
Wang	(8):600–610	Project duration	Soft activity links	General	Positivist	No	Simulation	No	No
Beach et al.	(8):611–621	Partnering	Supply chains	General	Positivist	No	Survey questionnaire	No	No
Bryde and Robinson	(8):622–629	Project success	Past research	General	Positivist	No	Survey questionnaire	No	No
Chan and Yu	(8):630–639	Design management	D&B, Hong Kong	General	Empiricist	No	Survey questionnaire Structured interviews	No	No
Wierschem and Johnston	(8):640–649	IT projects	Universities	General	Positivist	No	Survey questionnaire[a]	No	No

[a] Method incorrectly labelled 'methodology' in the article, the definition of methodology being, "a *system* of methods that is informed by philosophy, particularly epistemology", and method being, "the detailed approach and tools used to undertake specific research" in this article. [56].

Examination of other contextual variables in tree analysis revealed indications that those project personnel working on projects that are quite different from one another and where either the goals or the methods or both are not well defined at the start of a project, are more likely to be perceived by supervisors as top performers.

This shows that analysing context and attributing causality is difficult using positivism. Across a number of papers there was a lack of evidence of understanding or integrity of methodological application. For example, positivism was applied in six papers taking a case study approach [58]. Several articles applied positivism using a single case [59]. This is methodologically contradictory. Many authors using positivism generated questions and hypotheses geared to improving practice, hence the research was conceptually underpinned by a normative agenda [53], which goes beyond the scope of instrumental methods within the tradition and hence contradicts the methodology. The majority of authors using positivism tested propositions or hypotheses in the affirmative, perhaps wishing to feed their underlying normative agenda [59], although the boundary line with determining instruments and normative agendas are sometimes unclear and authors fail to make their epistemology and methodology explicit. Whilst we do not have a problem with a positive approach, nor with normative theory, positivism as an approach has a problem with both, as it is primarily concerned with what is rather than what ought to be, as we saw above: it is not possible to assert absolute proof deductively, but only absolute proof of what is not – falsification.

Empiricist-based methodology was used in about 22% of the papers, although some papers could be classified as instrumental variants of positivism. As would be expected there was variation in seeking general and particular explanations. Theory building and conceptual development, however, was not a prevalent outcome, affirming an instrumental leaning. Table 1 also shows that other methodological bases appeared in less than 10% of the papers, for example critical realism did not appear in 2005.

Not one author addressed epistemological issues by conducting a post-review of the methodology applied, and only 22% reflected upon methods, however, partial, bringing into question the rigour used in project research.

5. Conclusion and summary

It has been found that the research methodologies are being selected and applied in ways that are often inappropriate, both to context and to issues concerning general–particular explanations. It has also been found that the majority of research from the papers reviewed failed to articulate explicitly their choice of research methodology. This renders the research difficult to locate within an epistemological and paradigmatic context. As a result the task of relating different research outputs is made more difficult. Similarly it can be difficult to relate research within paradigms and evaluate how outputs contribute to paradigmatic development, and hence to the theories and concepts being drawn upon. It also hinders relating research to the BOKs and using findings to develop BOKs. The combined effect is to potentially to hold back progress in developing the fields of project research and practice, whether operating within the paradigms of theory and practice or offering an external critique, as given by critical management.

These conclusions have been demonstrated epistemologically and through review of a selection of methodologies and methods evidenced in the review sample. There is a lack of epistemological care taken in the selection and application of research methodologies.

Epistemological issues that address context, and which seek both general and particular explanations, are not typically found in the positivist or empiricist traditions, so it is perhaps surprising that they remain so dominant. It is relatively easy to apply positivist and empiricist methods mechanistically once learned. It is perhaps surprising that critical realism, which addresses both the general and the particular, seems so under-applied. Critical realism philosophically places research endeavour in context in theory and practice, hence encouraging critical evaluation and reflection on research endeavours.

We conclude that while one of the current features of research output is its diverse nature, which is to be theoretically welcomed, the current absence of transparent and robust methodological application is hindering progress and tending to obscure weaknesses in methodology selection and in integrity of application.

Acknowledgement

We wish to thank John Kelsey from the Bartlett at UCL for valuable comments on an intermediary re-draft.

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