ENQUIRY PULL RESEARCH: AN ETHNOMETHODOLOGICAL APPROACH TO LEAN CONSTRUCTION RESEARCH OR A LEAN APPROACH TO ETHNOMETHODOLOGICAL RESEARCH

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ABSTRACT

This paper assembles some principals from three strands of thought: lean theory; ethnomethodology; and Wittgensteinian philosophy. These are considered with a view to their impact on research design and used here as a basis for an initial exploration of a candidate research topic, in order to illustrate this impact. Principles of Lean Theory are considered, along with those from Wittgensteinian social enquiry and Ethnomethodology, in order to suggest a strategy for Lean Research. These are applied to the intial consideration of a candidate research topic, in order to illustrate the argument.

KEY WORDS

research methodology, TFV theory, Wittgenstein, ethnomethodology,

INTRODUCTION

The way we *think about* the production of things (as opposed to the way we produce things) has been subject to sustained critique in Lean Construction, leading to the development of new *methods of organising* production and design. Meanwhile, the production (or construction) of social reality has long been a separate strand of interest. The application of Lean principles to this phenomenon should logically lead to new methods of organising research.

This paper assembles some principals from three strands of thought: lean theory; ethnomethodology; and Wittgensteinian philosophy. These are considered with a view to their impact on research design and used here as a basis for an initial exploration of a

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candidate research topic, in order to illustrate this impact.

Initially, principles from production theory that may have consequences for research design are explored. These principles orient around the analysis of flows and the elimination of waste (Shingo 1988; Koskela 1992, 2000). The way we *think about* the production of things (as opposed to the way we produce things) has been subject to sustained critique in Lean Construction (Koskela 1992, 2000; Koskela & Kagioglou 2005; Rooke, Koskela & Seymour 2007). This critique has been largely framed in ontological terms. This thinking has contributed to the development of new *methods of organising* production and design (Ballard & Howell 1998; Ballard 1999).

These principals are supplemented by others suggested by the production (or construction) of social reality. This has long been a separate strand of interest (Berger & Luckman 1966; Schutz 1973; Garfinkel 1984; Francis & Hester 2004). The relevance of this for Lean Construction has been raised from time to time (Rooke & Crook 1996; Seymour 1999; Seymour & Rooke 2001), but not the relevance of Lean principals for research design. These should logically lead to new methods of organising research.

A parallel exists between Ohno's 5 whys (Womack, Jones & Roos 1990) and a principle of grounded theorising (Glaser & Strauss 1967). In grounded theorising, analysis of data should be simultaneous to its collection, analogous to the principle in line production that the correction of defects should be immediate. A distinction is drawn between empirical and conceptual modes of enquiry: empirical enquiry is concerned with

uncovering of new knowledge; conceptual enquiry, with the examination and clarification of what is already known (Winch 1990). The opportunity to switch between these two modes exists at every point in the course of the research and that this decision should be made in the light of current knowledge. In this way, the analysis can inform the ongoing enquiry, by suggesting further questions. The direction of research is dictated by the emerging findings, rather than by a formal research plan that has been developed prior to the fieldwork.

The comparison between this technique of grounded enquiry and more formal ones such as sampling and questionnaire survey, is analogous to the comparison between plan push and production pull techniques of production control. A key issue, is the extent to which a plan can predict, and thus control, the outcome of a project (Suchman 1987; Senior 2007).

The argument is illustrated with reference to an initial investigation of the reasons for the six week look-ahead period in the Last Planner system.

PRINCIPLES

LEAN THEORY

Koskela (1992, 2000) has identified three contributing theories to a theory of production, theories of transformation, flow and value; pointing out that the dominant transformation view is severely deficient when used alone. Although it has been argued that this 'new paradigm' in thinking about production may give way to some form of complexity theory (Abdelhamid 2004) there is much to indicate that it is still a fruitful source of theoretical insight

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(^{Koskela,} Rooke, Bertelsen & Henrich 2007). Indeed, the consequences of complexity thinking for construction management are still in the process of being worked out (Rooke, Molloy, Sinclair, Koskela, Siriwardena, Kagioglou & Siemieniuch 2008).

It has been suggested (Bertelsen & Koskela 2002) that the three theories have a natural order of application when use to analyse a particular production situation: first value, then transformation and finally flow. In effect, we should first identify our customer and determine their needs (value). We are then in a position to identify or design a product that will satisfy these needs and the resources required to produce it (transformation). Finally, we are able to analyse the system thus created and eliminate waste (flow). One should not, of course assume that this provides a simple temporal order of activities. Rather, the order is logical, an actual analysis of production will involve several iterations of each stage and interactions between them.

A central and fruitful concern of lean construction thinking has been the analysis of flows, leading to the elimination of waste. Shingo (1988) identifies two types of flow:

"*Process* refers to the flow of products from one worker to another, that is, the stages through which raw materials gradually move to become finished products.

Operation refers to the discrete stage at which a worker may work on different products, i.e., a human temporal and spatial flow that consistently centres around the worker." (Shingo 1988:5)

At last year's IGLC it was argued that this dual analysis of flows can be applied to the analysis of organisation. This involves treating organisation as consisting entirely of communication flows. It was suggested that "it is reasonable to analyse the organizational aspects of the production system as a process consisting of flows of communication and as the operational activities necessary to facilitate those flows." (Rooke, Koskela, Bertelsen & Henrich 2007:34). These operational activities are conceived of as centred flows.

In their seminal paper, 'Shielding Production', Ballard & Howell (1998) identify two types of flow process: procurement, which delivers resources; and planning, which delivers directives. Of these, the former may be regarded as a physical flow, the latter as a flow of communication. Subsequently, alternative taxonomies of flow have been suggested, either on the grounds of theoretical cogency or practicality of operation (Koskela 1999; Bertelsen, Henrich, Koskela & Rooke 2007) However, the Last Planner System itself is more properly represented as an operations system, an activity system of centred flows (Rooke, Koskela, Bertelsen & Henrich 2007). Indeed, it is arguable that this is what gives it its generic applicability, in contrast to flow analyses of particular processes.

Howell and Macomber (2003) introduce the Language Action Perspective (LAP) as a necessary conjunction to Production Theory in Lean Construction. They offer a taxonomic dichotomy for communication wastes which includes failure to speak and failure to listen (Howell & Macomber 2004). Speaking and listening may also be regarded as operations. Conceiving of them in this way enables us to see how a flow of communication (process) is

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facilitated by the operations of speaking and listening. Macomber (2004) specifies the nature of promises, which in this perspective are central to the constitution of organization. It is easy to see how the operation of making a promise facilitates the flow of coordinated activity that constitutes the organisation. Howell, Macomber, Koskela & Draper (2004) suggest that this perspective constitutes a viable alternative to the traditional management studies perspective on organization represented by Fayol. They are not alone in regarding organization as a form of linguistic action; this is suggested in the work of Bittner (1965) and Elliot (1999) for instance.

ETHNOMETHODOLOGY AND WITTGENSTEINIAN PHILOSOPHY

Macomber's specification of a promise covers many aspects including *inter alia* a generic structure; logically possible replies to a request; and elements required for reliability. Ballard & Howell (1998) specify a planning process within which the making of promises is a vital element. Our question here is how such prescriptions are arrived at and subsequently validated. To answer it, we draw upon some resources from Wittgensteinian philosophy and Ethnomethodology.

Philosophy

Winch (1990) has shown that Wittgenstein's philosophy can be used as a basis for research into social organization. In order to do so, he draws a distinction between empirical and conceptual inquiries. The former are questions that can be answered by findings in the world. He gives the example: "Do animals with a single horn growing out of their snout exist?" (1990:10) which he points out can be conclusively answered by producing a pair of rhinoceri. As an example of the latter, he offers: "does an external world exist?" (1990:10). This cannot be conclusively answered by producing objects, because the point of the question is to cast doubt on the existence of such objects beyond our immediate sensory experience. What is at issue here, as Winch implies, is what do we mean (or better, what do we seek to achieve) when we talk of an external world existing beyond our senses.

Philosophical questions are of the latter type. For Wittgenstein, they are, as Winch points out, confusions about the nature of language. Thus, one problem of management studies for which Wittgenstein provides a ready solution is the that of achieving adequate definitions (Nyström 2005). However, a search for definitions may itself stem from a fundamental error: the assumption that the sole function of language is to describe the world. It is the realisation that language has a more active function in human affairs that inspires Wittgenstein's philosophy and underlies the LAP.

This is not to dismiss the importance of description. As Garfinkel (2002) points out, a description can be read as a set of instructions. For Garfinkel, this is primarily a device for turning philosophical theory into instructions for empirical research. However, an important corollary for management studies is that an adequate description of an operation can be read as an adequate set of instructions for reproducing that operation. Both Ballard & Howell (1998) and

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Macomber (2004) can be read in this light.

Winch's contribution is to show that questions about human social organisation are principally philosophical and conceptual in nature, rather than empirical and scientific. Thus, a question about the nature of a feature of organisation calls for an understanding of the language use that constitutes that feature. Winch illustrates this with the example of military organisation. Thus, the best way to investigate parade ground behaviour is not to subject it to a causal analysis, but to understand the meaning of military orders.

Ethnomethodology

EM investigates how, on a day-to-day, moment-to-moment basis, orderly conduct is achieved and displayed. In order to do this, the *a priori* assumption of social order is suspended. This is a device that has been widely misunderstood. It is not the case that EM represents a particular theoretical or philosophical stance such that social order does not exist. On the contrary, it is proposed that the production of the social order within particular settings should be the focus of study. This is done by conducting an analysis of the setting that corresponds to the methods used to produce it (Garfinkel & Weider 1992). In order to perform an analysis, it is necessary that the end point, in this case the social order, is treated as unknown (Codinhoto, Koskela, Tzortzopoulas & Kagioglou 2006). To put the matter as plainly as possible: for the analysis cannot be supported by its product, but must consist entirely of known logical elements that render its end point as a product of the analytic procedure.

The purpose of an EM analysis, then, is to show how people produce the social order of the setting in the course of their activities. Procedures that have been developed for conducting such an analysis include:

- the requirement that the analyst acquires competence in the setting to be analysed;

- the cultivation of an agnostic attitude towards theoretical interpretations of the setting to be analysed (Garfinkel & Wieder 1992; Rooke & Kagioglou 2007);

- the treatement of all human activity within the setting as analysable as method(s) for the production of that setting;

- the detailed examination of the method(s) thus identified under the rubric that they are constituent(s) of the analysis (Garfinkel 2002).

These procedures are suitable for the analysis of operations performed by human beings. They may be applied to activities such as promising and planning and also to the processes of developing and testing instructions and descriptions such as Last Planner or Promise Based Management. The reported product of EM procedures stands as an explicative description of a particular research setting; i.e. a description which clarifies 'what is going on here'.

In addition, EM provides some specific procedures, including that known as using Sacks' gloss. This consists of taking a formulation and treating it in the following manner: "*find* a work group [...] who, *as their day's work*, and because they know it as their day's work, will be able to

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teach me what *I* could be talking about as *they* know it as their day's work." (Garfinkel & Wieder 1992:185).

LEAN RESEARCH

In this section, we explore an approach to Lean Research based on the above principles. As a means of illustrating the approach and avoiding too great a departure into abstraction, a possible research topic is considered. Thus, the focus is on possible reasons for the six week look-ahead period in the Last Planner system. There is no obvious theoretical reason for this period, it may be compared to a similar planning period in Agile Project Management. Why six weeks? Why not four? Or ten? There is no attempt to answer this question here, but merely to ask what kinds of explanations are possible; which would be useful; and how might we best go about finding an answer (if at all)?

TFV theory provides us with, among other things, a structure for our analysis. In order to achieve this structure, we adopt an order of analysis which proceeds from value to transformation and then to flow, allowing each theoretical component to pose a different question for us. This would seem to be a naturally logical way to proceed, beginning with the customer, then analysing the transfromation of resources into products, before finally examining the processes necessary for this transformation. Thus, we ask: first, who is the customer and what do they want? (Value); then, what do we have and what can we deliver (and how)? (Transformation); and finally, how do we eliminate waste and achieve maximum efficiency? (Flow).

WHO ARE THE CUSTOMERS FOR RESEARCH AND WHAT DO THEY WANT?

It has previously been suggested that research can be treated as a customer-supplier relationship (Seymour, Rooke & Crook 1996). As an initial conceptual analysis, we can establish three different categories of customer for research: industry; academic readership; and funding bodies. An initial sketch is offered of the demands of these three customer categories. Industrial customers require clear practical guidance at the time and place that it is needed. By contrast, an academic audience demands findings with a more generic relevance. Funding bodies often attempt to balance these competing demands, sometimes resorting to metrics in order to do so. These metrics tend to become attainent targets in their own right, taking priority over the requirements of other user groups, since funding is an essential pre-condition of research. This can lead to a situation similar to that faced by construction contractors in competetive tendering situations where economic values come into conflict with technical ones (Rooke, Seymour & Fellows 2003).

In terms of our proposed research question, then, what customer needs does it express? These might include:

- Simple satisfaction of curiosity about a curious coincidence;

- Shedding light, depending on the approach adopted, on the nature of human psychology, Modern Western Culture, or current forms of industrial organisation;

- Guidance for the future development of novel planning systems;

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- Rhetorical resources for the promotion of Last Planner etc.;

- Detailed knowledge of the demands of the settings in which these planning systems are used, which can act as a guide to implementation.

WHAT DO WE HAVE AND WHAT CAN WE DELIVER?

The resources available to us include the research question itself and the principles outlined above. These latter lead us to ask of the research question: first, what does 'a six week look-ahead period' mean?   Some subsidiary questions are: How is this period constituted on actual occasions of its use? What counts as six weeks (29 days, 28 days, 24 days?)? What, in detail, counts as an adeuate look ahead plan? In what ways is it similar to, or different from, the planning period adopted in Agile Project Management?

These questions can be answered through the employment of Sacks' gloss. Thus, they must be answered through fieldwork, but not through observation and causal modelling. Rather, the researcher must adopt the role of student. The work group will instruct the researcher as to the meaning of 'look-ahead period'. Given the active role of language, such instruction will include not simply describing, but also showing.

ACHIEVING FLOW

The chief processes in the research, indeed in any research, then are thinking and observing. However, the relationship between these two activities that is suggested here is different to that usually adopted.

A parallel exists between Ohno's 5 whys (Womack, Jones & Roos 1990) and a principle of grounded theorising

(Glaser & Strauss 1967).   This is a procedure for generating theory from research, rather than the more usual procedure for testing theory through research.   In grounded theorising, analysis of data should be simultaneous to its collection analogous to the principle in line production that the correction of defects should be immediate. Thus, the analysis can inform the ongoing enquiry, by suggesting further questions. The direction of research is dictated by the emerging findings, rather than by a formal research plan that has been developed prior to the fieldwork. In this way, the distinction between conceptual and empirical work is collapsed; the two types of enquiry are pursued simultaneously. A comparison between this technique of grounded enquiry and more formal ones such as sampling and questionnaire survey, is analogous to a comparison between plan push and production pull techniques of production control. A key issue, is the extent to which a plan can predict, and thus control, the outcome of a project (Suchman 1987; Schmidt 1999).

Thus, a conventional approach to research is to assume that the enquiry is principally empirical in nature. The conceptual part of the work is concerned with achieving adequate definitions and designing a research procedure. The enquiry then proceeds according to design.   By contrast, fieldwork conducted according to Sacks' gloss is opportunistic. Conceptual and empirical enquiries proceed simultaneously, as is the case in grounded theorising.

Under the plan push approach, an upstream fault, say an error of definition, has consequences similar to those generated by a fault in a

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production line, distorting downstream activities. However, in a project management setting such as a research project, the unpredictable nature of events compounds the difficulty, demanding a more flexible planning approach, similar to the Last Planner in construction. As in a construction project, these contingencies go beyond difficulties to encompass opportunities also. Opportunities to conduct interviews or observations, or to ask particular questions may arise and yet be precluded by formal interview or sampling strategies.

Thus, conventionally, establishing the meaning of 'planning period' or 'look ahead' might be done by formulating a definition and a theory as to the conditions under which these defined periods would be found. It would then be possible to search for actual examples that fulfilled this defintion and test hypotheses generated from the theory. In this case, the conceptual work would all be done at the front end of the project. Using Sacks' gloss, the meaning of these terms is itself achieved through fieldwork. In this way the people the researcher interacts with become collaborators, or teachers, rather than research subjects. The distinction between conceptual and empirical enquiry is collapsed. Morover, the research strategy becomes a product of the findings of the ongoing enquiry in an iterative process.

While planning a research project is different in many ways to planning a construction project, the principle of leaving final planning decisions in the hands of those closest to the value adding activities remains one which has much to recommend it.

CONCLUSION

We have proposed an approach to research which collapses the distinction between conceptual and empirical research. Using the examples of grounded theory research and ethnomethodology, we have proposed the simultaneous collection and analysis of data, as an alternative to more formally planned research strategies, which we have compared to plan push project organisation.

The plan push analogy is exact, it is not argued that plan push will always be wrong, but that it has certain drawbacks regarding flexibility. In plan push situations, the researcher is focused on fulfilling a pre-determined prin the latter, rather than reacting to contingent findings in the light of overall aims.

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