

GETTING UK CONSTRUCTION PEOPLE TO THINK LEAN - WHERE TO START? A CASE STUDY

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ABSTRACT

Lean Construction is an evolving body of successfully applied principles and practices. Developing and refining them through application involves talking to, persuading and negotiating with people in a position to try out their efficacy. This paper reports a construction project which, in the writer's opinion, is fertile ground for persuading key participants that LC is relevant to their explicit aim of looking for better ways to do things. The purpose of the paper is to give some sense of the UK cultural context as experienced on this Project which, the writer believes, is germane to how the principles and practice of LC can most effectively be disseminated within UK construction.

KEYWORDS

Lean Construction, culture, change, benchmarking, measurement.

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INTRODUCTION

This is an odd kind of paper. Its oddness owes to the fact that I want to make explicit a number of issues that seem ordinarily to be taken for granted. I will try to do this by reproducing verbatim as the central core of the paper an interim report that I prepared on behalf of a research team that has been asked to evaluate a rather distinctive project (of which more in a moment). In a way, it picks up on a theme that was explored in last year's paper (Seymour et al 1997) - that is, how disseminating LC thinking and techniques is a matter of situated communication and, therefore, in the broadest senses, an exercise in rhetoric and politics. I will use this report as a vehicle to highlight (what for me at least are) a number of practical issues in getting to first base in advertising the virtues of LC.

Thus, the main purpose of the paper is to give a sense of the cultural climate of UK construction which, as I see it, needs to be taken into account in devising strategies for the successful take-up of LC. Frankly, I am looking for some help!

THE ISSUES

The issues highlighted are as follows

- There is a distinctive (probably not confined to the UK) and, as I see it, an unhelpful view of the role of quantification (measurement, statistics, etc) in research and development. In this paper, the issue is exemplified by what is understood by benchmarking.
- There exist powerful cultural and societal forces - in particular, an elitist occupational structure, reinforced throughout the educational system, which inhibits design personnel from taking greater account of process rather than just product design (i.e. how will it be built; that's what 'hairy-arsed' builders do).
- This, in conjunction with the well-recognised contractual splits between designers and builders, inhibits closer consideration of the respective and interactive roles of design and construction personnel.
- While efforts have been made on the Project reported here to foster a culture which involves everybody on the Project, these efforts have been compromised by the sense that there are certain inequities as between design and construction personnel and management and workforce. These relate in the main to working hours and conditions and instances of poor or inconsiderate human relations practices which, as suggested above, have deeper roots.
- There is a need to achieve a balance between flexibility/fluidity and formalization such that problems are solved and decisions made promptly but that all parties thereby affected are properly and effectively informed.
- Management systems have been bypassed in the name of speed with negative consequences for traceability of information at later stages of the project.
- More generally, there is much to be learned about communication processes, information flows and the generation of data to act as benchmarks for continuous

improvement. Rapid and effective problem solving has been a significant achievement on the Project; it can also provide lessons for problem prevention .

A virtue of the Project is that these issues have to some extent been addressed. What is in doubt in my mind is the interaction between deeply rooted cultural attitudes, received ways of thinking and behaving and the willingness to adopt significantly different methods of thinking and working. It is the old problem of altering mindsets. While much does seem to have been achieved on the Project in this respect, I wonder how deep the change is. Since the Project is being carried out within a very benign financial environment (money no object), the commendable effort to articulate a partnership philosophy and to live by it, has not been seriously tested. Furthermore, to the extent that the philosophy informs action, this is more apparent at the top than at the bottom. In short, in my view, much still needs to be done to remedy the habits and attitudes of many years which tend to resurface in circumstances less benign than those encountered here. To do this, will in my view, require the application of LC. What is the strategy for doing it?

THE PROJECT

The Laurence Project was occasioned by the entire destruction by fire of a giant warehouse, vital to the business of a retail chain, in October of 1997. The company—Saperters—realised that they had to design, procure and construct a new warehouse to be operational and in use by October of 1998, ready for the Christmas period. Thus, speed was the overriding driver for the project, this imperative giving Saperters the incentive to be innovative in the construction procurement process.

It was decided that the conventional or ‘traditional’ procurement route was inadequate for the task and that a new, faster system was required. Even Design and Build would not provide a new warehouse in the time required. The Hypertrack method (a term coined for this project(?)) was invented (?) and was ‘based upon key partnership principles’ (the words of a senior project manager) to wit:

- An “open and equal” culture.
- A flattened structure of authority.
- Trust and empowerment in decision-making.
- Improved teamwork.
- Improvement in the speed of decision making.
- All participants on site.
- Equality as partners.
- Site based design.
- Suppliers regarded as part of the team.

Saperters contracted (using a much modified NEC form) with a prestigious design and manage company - Andes (with whom they had had past satisfactory relationships) to enter into this arrangement. The design has been done by Andes personnel in close conjunction with Saperters personnel and in close liaison with the design capability of the specialist package contractors who have carried out the work.

THE EVALUATION PROJECT

We began the research in May exactly half way through the Project period, our brief being to find out how the project had gone and what might be learned from it (see below for more detailed description of brief). The public view, fostered by Saperter and Andes, was that the project had gone miraculously quickly and well - articles in national newspapers, features on local TV news - an operational building in a third of the normal time. We were asked to establish why it had gone well, what lessons could be learned and what methods, procedures etc could be adopted for future projects. About one month into the research talk began that the project should be benchmarked against conventional and best practice.

There now follows the Interim Report in *Arial italics*, verbatim—apart from giving fictitious names instead of the real ones. I will gloss the reasons for saying what I do in the Report at various points in the text in square brackets [...].

THE INTERIM REPORT

The occasion for the Report was my being informed by one of my research team that the Andes members of the Steering Group (SG) were concerned about the progress of the research and had called a meeting, not incidentally of the full SG. Word had got round that we were not getting the right kind of data. Would we be able to do a 'proper benchmarking exercise' since we were 'just talking to people'? Would we be able to quantify our findings? Were we getting a representative sample? Were we talking to the right people? Were we being influenced unduly by the opinions of the wrong people?

This is what I wrote:

PROJECT LAURENCE - EVALUATION PROJECT

First Interim Report

1 Introduction

This paper reports on the Evaluation Project (EP) that is being carried out by the School of Civil Engineering, University of Birmingham. Its purpose is to evaluate progress against stated objectives and to reconsider these objectives in the light of progress to date and in particular to consider the form and content of deliverables.

It is emphasised that this a provisional assessment by the present writer. Given that I decided to prepare this paper for the purposes of this meeting, I have not had the chance of checking with my fellow researchers and so it reflects my own partial research involvement to date.

[At this point I had not talked to any construction people, only designers and senior project managers, with the exception of one M&E subcontractor principal. Neither had I talked at any length to the two fieldworkers who were beginning to get a fuller picture of what was going on.]

2 Brief (as agreed with Steering Group May 1998)

To construct process maps of current practice [ie practice on Project Laurence] and identify methods that can be used on future projects

[As was to become apparent, there were different conceptions of what was meant by process maps. As it emerged later, members of the SG had in mind highly generalised comparisons of this Project as against two other more conventional 'routes' to procurement. Relating to seven project stages, the maps would show how Project Laurence had combined and skipped stages so as considerably to expedite the procurement process.]

To analyse the overall effects of the different working methods on the capabilities of individuals and the organizations

To analyse the cost/benefits (financial and non-financial) of these methods

To make recommendations for improvements and future potential

[Notice, no mention of benchmarking]

3 Research Methods Used

Thirteen interviews (of about 1-1.5 hours each) have been carried out. About seventeen remain to be done.

Some shadowing/observation has been carried out, though not as much as we would have liked. This owes partly to the inexperience of the principal fieldworker and the skill required to do it effectively.

A number of meetings have been attended (four?). However, as with shadowing, it is not easy to be in the right place at the right time where something significant is happening.

Process mapping: arrangements are being made for participants to meet to prepare these maps. It is emphasised that the researchers cannot do it by themselves. It is inevitably the task of those directly involved.

I consider the preparation of these process maps very important since they could contribute to the success of the EP in a number of ways. First, the very exercise of collaborating on their preparation and the need to make explicit in what ways the Project is felt to be distinctive has intrinsic value for learning. Second, it may go some way towards resolving some of the research issues and questions of the precise nature of deliverables discussed below.

I am concerned that sufficient time should be made available for project personnel to participate in this exercise recognising that they are busy men!

Perhaps further thought should be given to the timing and arrangements for preparing these maps.

[It had become clear to me, at least, that there was great scepticism about the value of process mapping in the sense of detailed descriptions of practice. This view was, admittedly, based to some extent on the general impression I have gained over the years that, insofar as UK construction people know about flow charts at all, they have never tried to use them to map and understand their own processes. A standard comment is that they have their uses at a high level of abstraction or for setting out instructions for highly routine procedures but cannot capture the vagaries of the design and construction process—things are far too complicated for that.]

4 Findings to date

There is general consensus about the positive features of the Project which amounts to an implicit contrast with respondents' experience of 'conventional' projects—a kind of personal benchmarking (this will be considered below).

[The attempt here (trying not to sound too cynical about it) was twofold i) to reassure the people who, not unnaturally, wanted to come out looking good and ii) to try to begin to demystify this whole benchmarking thing to which so much importance was being attached. I wanted to get some mutual understanding about how the word 'benchmarking' was being used. The issue is raised more fully later in the Report.]

These positive features may be placed under the following headings:

[adapted from Bob Miles (1997) without acknowledgement!!mea culpa]

Commitment: efforts have been made (largely successfully) to get all stakeholders and participants to share the vision and goals of the project;

Equity: all stakeholders feel their interests are considered and that they have been dealt with fairly;

Communication: open and honest at all levels. The 'no blame' culture has been successfully fostered and has encouraged all to make positive and constructive contributions to the process;

Timely responsiveness to issues: work groups at all levels have been authorised to make decisions;

Issue resolution: requests for decisions have had speedy response; people have pro-active attitude to informational needs;

Organizational learning: a number of working principles are crystalising. The following summaries are inevitably somewhat speculative at this stage, but attempt to capture what respondents have said.

Participants should have mutual respect and make the assumption that people are acting from honest and honourable motives; (contrast: Theory X; they'll take you to the cleaners given half the chance)

Participants should feel secure and have their confidence built; (contrast: the mushroom theory)

Errors are to be treated as lessons learnt and remediation shared; (contrast: he dropped a goolie, he pays)

Incentives are to be built into project success not sectional success; (contrast: if people do not have personal incentives they trade on the success of others)

5 Status of findings

A number of questions arise as to the status of these findings. In broad terms, these are: how can they be validated? how should they be reported? what use can be made of them? I will attempt to address these questions below.

[This relates to the earlier concern to which I referred above. There is an obsession with the holy truth which numbers automatically confer on data. I am continually mystified by the fact that these are intelligent men who know perfectly well that numerical data can be manipulated to show many things and that they are, on this occasion, precisely vetting our research to make sure the data tell a story consistent with their experience or even to tell a story which they want told whether they believe it or not. In recognition of this, here I am asking what story do they want the data to tell. Note, as discussed below, measurement is indispensable so long as there is agreement on what is being measured, how and for what purposes.]

5.1 General remarks on findings to date

Critical observations have been few. Those that have been made, however, are worthy of examination with respect to the context about which they were made. For example, a contractor reported that they (i.e. his firm) had been messed about; too many people had been involved in various aspects of the design process. The result, he thought, was that Saperaters were paying more for his input than they might have done and he stressed that he was not losing out financially. This may be taken as an example of what Senge calls the 'fix mentality', the tendency to think of things in terms of immediate and personally experienced circumstances and without taking into account the total picture. It can also be seen as evidence of what Ballard and Howell call the 'product mentality' (as opposed to the 'process mentality'). He sees himself capable of installing a product which could be bought more cheaply. He chooses to ignore the fact that he is involved in a quick and complex process where many different workflows have to be combined and orchestrated.

Many questions are raised about the practical and future implications of this example. Do we ignore it? Do Sapersters/Andes screen out people who have these attitudes? Do they look for ways of getting people to think differently? If so, how?

Other respondents have expressed views on these matters (the great majority trying to take the process view) which are similarly the results of their experiences and amount to a basis for recommendations . A challenge the EP faces is combining such observations into a coherent whole.

Suggestion: The EP prepares an account of issues raised and proposals made, as indicated above, and the S G (plus whoever else they choose to invite) edits it to their satisfaction.

5.2 Need to understand the contextual nature of respondents' observations

Understanding the contextual nature of comments cannot be overstressed particularly in the case of what might be construed as negative comments, but not only them. The principle of contextuality (i.e. understanding what people say depends on understanding the context in which they say it) has important implications for the kind of deliverables that this research can usefully produce.

Two examples.

It is said that the prayer meetings [early morning coordination meetings] have become largely redundant. At the beginning they served a useful purpose—providing the opportunity for and encouraging people to talk to each other. Now people do this anyway and, besides, site management are on top of the job providing the necessary linkages. Supposing that this is an accurate assessment, what inferences can be made about good practice? Regularly scheduled meetings must be continually reviewed as to the purpose they are serving. They must not just become a habit. (?)

Roles and responsibilities. It is generally held to be a principle of good management practice that people need to be given some idea of the scope and nature of their duties and responsibilities but not to the extent that it leads to inflexibility and to the 'not my problem' attitude. Here, the practice was developed of people sitting round and jointly evolving an organogram. Is this a principle to be recommended and guidelines developed as to how such meetings should be run?

5.3 Framing general principles

Drawing general principles of good practice is difficult; there is the constant danger of overgeneralisation and inferring too much on the basis of the particular circumstances.

For example, meeting target dates and using whatever methods are required to achieve them have taken precedence on the Project over how much it will cost. Contractors are not troubled, as they usually are, by whether what they are paid fairly covers their efforts. Prompt payment (on this Project) is also a relief from a standard worry. The atmosphere of being fairly treated in the reward/effort bargain seems to be the bedrock of equitable relations and makes people willing to be flexible, responsive to the requirements of others etc . No evidence of anybody exploiting this has been reported. Is this the main explanation for what has been observed on this Project? I see no way of proving it one way or the other. It seems to me to be the case but it is not for the EP to make this kind of inference. It is for Saberters and Andes to do so and to make whatever policy recommendations they choose to on the basis of it.

6 Benchmarking and the role of metrics

The concept benchmarking is applied to many different practices and there are several ways of classifying them. There are two major variants.

First, 'Thinking outside the box' refers to looking at another, often very different, organization to see what specifically can be learnt from it. For example, Granite Rock, a \$90m vendor of crushed rock, compared their own operations with Domino's Pizza! They learnt that they needed better geographical maps. This major breakthrough owed to the fact that Granite Rock's own existing data revealed problems with on-time delivery. A direct comparison of performance data was not made with Domino's Pizza. By adapting actual practices (preparing better maps) and using their own internally devised metrics, Granite Rock were able to set up improvement methods and monitor them.

Thus, second, continuous improvement requires analysis of processes and devising internal metrics for evaluating performance. How exactly the way other organizations measure performance can be learnt from must be adapted to internal use.

The implication is that while firms may compare themselves with others on the basis of any number of indices, which may signal the need for change and improvement, the measures will not in themselves reveal how this improvement can be accomplished.

*In short, inter-organizational comparison can **signal** the need for change. What change is necessary and effective can be assessed only by organizationally specific measurement.*

To illustrate what I mean by 'organizationally specific measurement', at a meeting I attended two contractors were asked how long they would take to finish an assignment. They answered respectively "It should take us about three days" and "I can't say for sure but [name] should be able to get in on Monday." Now, to the extent that these answers were appropriate on this project and testify to the good

give-and-take attitude amongst contractors, it falls far short of best practice. Best practice insists on 'plan reliability', that is, a given assignment is not undertaken without a firm and recorded assessment of how long it will take. The record acts as a benchmark against which work actually achieved can be assessed in terms of planned percentage completed (PPC). Reasons for plan failure can then be identified (e.g shortage of materials etc) and steps taken to eliminate the causes and where they can't be eliminated allow appropriate buffers to ensure the harmonization of the different workflows that need to be coordinated . At the meeting in question, reference was made to the 'buggeration factor'—an allowance against the unpredictable. However, best practice insists that much of the so-called buggeration factor can, in fact, be calculated if commitment to the use of measurement and analysing its significance for better practice is accepted.

The question arises: is it possible to estimate/measure the extent to which the positive features observed on Project Laurence have been achieved in contrast to the experience of, say, conventional projects? Some measures might be devised but any such measures are notoriously difficult to achieve (basically the problem of comparing like with like) and therefore can be disputed by anyone who chooses to disbelieve what they purport to show. Therefore, whatever measures are devised must be agreed upon as valid by those subject to them or in some way affected by their use.

Thus, how/whether such measures should be sought depends on what they are to be used for. As noted, they may be used for general rhetorical purposes, that is, to signal that something significant has been achieved and to persuade initial acceptance that this is so.

If they are to have the necessary credibility the EP team will need to take advice from the S G. However, I do not see anything that can be viably measured on the basis of the data we are currently accumulating that will serve this purpose.

[Under pressure, I have relented on this point. Prior to face to face interviews, respondents were given a handout stating the questions they would be asked in the live interviews, the intention being simply to forewarn them of the kind of thing we wanted to know. In fact, many people provided written answers and handed them over. The SG will chase those who haven't done so to date, to do likewise. I have agreed to code these 'questionnaires' and extract some measures—such and such percentage thought this, such and such percentage said that etc. My comment as before: the power of numbers regardless of what they mean.]

What I think we can do is to compare data from Project Laurence with existing data on other (conventional) projects that Saberters and Andes have been involved in. The precise nature of the indices used will depend on what is available in the way of data. There are similar considerations relative to evaluating the Project against current best practice. Achieving the first objective,

it is hoped, will be helped considerably by the process mapping exercise noted in the Methods Section above.

The more important questions (it seems to me), however, remain:

Exactly how what has been achieved on this project has been achieved? What practices/ methods/procedures/techniques have been used and how can others learn from, be taught to use them?

In what ways is measurement (benchmarking) relevant to organizational learning?

7 Identifying practices, recording and measuring their effectiveness

Methods/practices etc used on the project have been briefly referred to above e.g. the concern with commitment, equity, communication and so on, and I have suggested ways in which these can be described and recorded. I have pointed out that this is not an easy task and have tried to show why. However, I have suggested a way of ensuring that Saberters and Andes receive what they require relative to the nature of good practice and what lessons can be drawn from this Project.

There are two issues relating to the use of measurement.

I distinguished above between the use of measurement as a way of signalling that attention needs to be given to practices and processes with the view to improving them, and using measurement in the improvements themselves.

Any kind of measurement requires that an adequate description be provided of the thing to be measured, in order to ensure that what you are counting is indeed one of the things that you are aiming to count. Adequate description is therefore at a premium if we are to be able to develop any methods of quantitative analysis.

The same two uses of measurement are at issue: signalling that something needs to be done and doing something about it

Trying to come to grips with and adequately describing what has gone on (is going on) on the Project; establishing what practices/methods, etc. are used, respondents inevitably tend to provide summary or generalised accounts and find it difficult exactly to 'put their finger' on quite what it is they have experienced. In response to such questions as "In what ways is this Project distinctive?" answers are of the sort: "It depends on the kind of people you are dealing with. Some people are more conservative in their attitudes and don't take kindly to having their normal patterns disrupted". Such replies make obvious common sense. To push people further on them: e.g. "What exactly do you mean by conservative? How do you judge what is normal? verges on the impertinent.

In short, it is not possible to have a sufficiently exact referent to be able to aggregate what people are referring to when they describe their experience and what they have found to be the case and then to provide some kind of statistical count. And, of course, if you are not specific and exact it is anyone's guess what you are counting refers to.

However, one line of questioning that we have begun to follow is to ask respondents what they would propose as an index of whatever they thought was a positive feature of practices on the Project. Thus, for example, since it is observed that people are generally cooperative, what might be an index of cooperativeness? This effort conforms to a general principle of successful benchmarking—that people become actively involved in devising suitable measures and are committed to their significance. This, it will be noted, has an altogether different purpose from trying to provide generalised measures.

On the basis of these specific indices (should respondents be able to provide them) it may be possible to establish benchmarks for future projects; to evaluate the extent to which the methods employed to achieve the successes on this project are being employed on others.

8 Confidentiality

It is vital that the confidentiality of respondents be preserved. Only in this way can we expect frank and honest answers to our enquiries .

[This point is made because I had heard that some/one (?) of the Andes managers wanted the tapes of our interviews.]

9 Conclusions

Returning to the questions with which I began:

How can findings be validated?

The EP research team can only try to provide a balanced account of what they have seen and been told. They cannot see and hear everything; they cannot describe some objective reality. An attempt has been made through the examples given to provide an indication of what such an account will look like. I have suggested a mechanism by which the Steering Group can ensure that the account coincides with their perceptions and which will give them the opportunity to bring it in line with those perceptions.

I have stated my views on the role of quantification. I do not see any way that the quantification of the data we can get will remedy the fact that the EP team can only provide a version of what they see and hear.

With regard to the role of quantification in benchmarking I have made the distinction between numerical indicators that signal something of note that can be learned from and the process of learning itself. Thus, I would advise that benchmarking in the former sense draw upon existing data for any such comparison but that there are no data they we could generate that would serve this purpose.[As noted above, I have relented on this point] We, in turn, will take advice on what data to use for this purpose.

[And again, as before, I am saying that they can direct us to tell whatever story they want, 'strengthened' with numbers for rhetorical purposes.]

With regard to benchmarking in the second sense , how participants on the project think their experience can be translated into metrics for use on future projects, we look forward to pursuing this line of enquiry.

How should findings be reported?

The above comments may indicate what I have in mind as the main contribution to the main deliverable, the overall report. As I see it, this would 'flesh out' and illustrate the themes indicated in Section 4 above, and any others that emerge as the research continues. Recommendations will be offered but I would expect a major input from the Steering Group on this regarding what they see as practical and feasible.

With further regard to how findings should be reported: one of the findings seems to be that people have enjoyed working on the Project ('it has been fun' as one respondent put it) and would like to work on projects in the future where the same atmosphere prevails. [At this point I hadn't talked to any of the construction people] This points to two possible deliverables: first that participants be enabled and encouraged to 'propagate' what they have learned as good practice on future projects, second, that case material be prepared for use in learning workshops.

What use can be made of findings?

My comments above have largely anticipated what I see as the answer to this question. It is hoped that all deliverables from the project, including the human capital it is producing, will persuade the executive levels in both Saperters and Andes that it doesn't require a catastrophe to discover there are better ways of doing things.

SUMMARY AND THE WAY FORWARD

The unusual form of this paper has been intended to convey a sense of the context in which I am trying to negotiate a role for ourselves (the Evaluation Team). Our aims are:

1. to confirm through the research what the designers and senior project managers feel to be the case it has been a successful project. On the basis of existing hard data (time, cost, etc) held by Saperters and Andes about more

conventional projects, it should be possible to show that however Project Laurence did it, they did something worth imitating on other projects. It is the how and why parts that will more difficult - getting people to accept any explanations that might be forthcoming and their acting upon them. Thus,

2. in writing the Final Report and Recommendations, a fine balance will need to be struck in presenting pro's and con's in order to prepare the ground for my ultimate objective which is:
3. to advertise the relevance of LC to the project.

With respect to the second aim, as stated in the Report above, making inferences about cause and effect is hazardous. Thus, the word at ground level (how extensive I don't know), for example, is:

“ What do you expect with all this money sloshing around? Of course, people are nice as pie. I wish a bit more of the money had come my way.”

My hope, as may be apparent from the Report, is to get the Steering Group members to buy into the principle of practically testing in some controlled way anything that they think 'worked'. Of course, I would expect this to run into the problem that I have noted regarding prevailing attitudes to testing and measurement and will have to deal with it as best I can.

With regard to the third aim, I am particularly hopeful of being able to go back to the designers and, if it is not already too late, to get them (or one of them) to retrace exactly what happened with respect to the design and subsequent construction of some element. The Steering Group has given the go-ahead for this despite the objection of at least one member who said that it can't be done because it is too complicated and anyway how were we to know if it was typical (!!). What I have in mind will follow up on the comments of one designer. Thus:

“There have been several times when I've responded to the subcontractors' requests for some design work only to find that when I get out there with it they've already done it. That's OK by me and sometimes their solutions have been really quite good so long as I keep a check on the engineering side.”

The comment was made very positively as evidence of the flexible, give-and take relations that have prevailed. And, of course, it is, but there ought to be some way of getting rid of the waste implied.