

Managing engineering contractors in the UK petrochemicals industry

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Neil Henry Ritson and Mark M.J. Wilson

*Department of Global Value Chains and Trade, Lincoln University,
Lincoln, New Zealand, and*

David A. Cohen

*Department of Agribusiness and Markets, Lincoln University,
Lincoln, New Zealand*

1067

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Abstract

Purpose – The purpose of this paper is to investigate, at the industry level, the modes of governance used by multinational companies in the UK petrochemical industry to outsource maintenance activities to engineering contractors. The study focusses on a form of novel governance structure called an Employer Panel (EP).

Design/methodology/approach – The study applies an inductive case study method to investigate the contractor governance mechanisms in 19 out of the 20 major petrochemical installations located in the UK. Data included interviews, documentary and secondary evidence gathered from the cases and also industry bodies.

Findings – The study uncovered three distinct types of governance mode: market, managing contractor, and EP of contractors. The latter relies on the governance process of “mandated collaboration” to coordinate.

Research limitations/implications – The main limitation is the focus on a particular industry, albeit an important one. The research implications include extending the empirical research into other sectors which use on-site contracted maintenance such as ship and aircraft manufacturing.

Practical implications – The EP structure with its mandated collaboration process is of value to managers of contractual relationships as it gives insights into coordinative process and it may provide an alternative model for managing outsourcing relationships.

Social implications – The mandated collaborative process requires clients to engage its contractors in longer term relationships, thus increasing corporate social responsibility and providing wider job security for contractor employees.

Originality/value – The EP mode, as far as can be ascertained, has not been addressed in the literature before.

Keywords Outsourcing, Governance, Maintenance, Employer Panel, Engineering contractors, Mandated collaboration

Paper type Research paper

Introduction

The underlying context of this paper is the UK economy which has experienced an incessant drive for efficiencies, and, in particular, the case of the petrochemical industry. The OECD (2015) reports that this strategy of efficiency-seeking has seen much outsourcing of former internal activities, where the most likely targets for outsourcing included support services such as repair and maintenance activities. Indeed, the OECD figures show that the UK has experienced an increasing rate of outsourcing with the value of such contracts rising from GBP 9.6 billion in 2008 to GBP 20.4 billion in 2012.

Korczynski and Ritson (2000) have noted that within the UK downstream petrochemicals industry (refining), repair and maintenance work has in large measure been outsourced to contractors in the engineering construction industry (ECI). The maintenance function is vital to the operations of automatic process plants and thence to the supply of energy



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products to the UK economy, and yet its viability now relies more than ever on the governance or control of external contractors.

The UK downstream petrochemicals industry is represented by the UK Petroleum Industry Association (UKPIA) and according to its statistical review (UKPIA, 2015a), the industry is a significant sector in the overall UK economy and is one of the largest in Europe. It employs around 150,000 people, provides over 85 per cent of the energy needs of the country and pays approximately 37 billion GBP, or 6 per cent of the exchequer's total receipts, in tax on gross sales of 96 billion GBP. However, it lacks competitiveness and this issue has been addressed by a government task force established in 2014. The combined financial figures of the major companies in the industry show that over a ten-year period to 2013, the average return on their capital compared very poorly with other industries. There has been a continuing drive to increase efficiency by investment in new plant and equipment, as well as through the merger of companies and rationalisation or sharing of facilities through outsourcing (UKPIA, 2015b). Hence, controlling outsourced work becomes a critical issue. Gall (2012) analysed a series of major labour disputes across the UK petrochemicals industry in 2009-2011. He found that many of these related to disputes over the choice of engineering contractors, and subsequently caused significant disruptions to production. Thus, there is evidence of the importance of the client organisations designing robust governance modes to manage outsourcing.

In the UK, this industry is composed of very large, sophisticated multinational companies (MNCs) who a priori were considered to have innovative modes of governance for contractors. They could choose systems and technologies that allow control over contractual arrangements of various kinds, such as service-level agreements (Goo *et al.*, 2008), gainsharing, penalty clauses, and re-work provisions (Saprai, 2013). A detailed analysis of how this has been achieved so far not been addressed by other research. Hence, this paper adds significant new information by analysing the ways in which the governance of outsourced work has been structured. The remainder of this paper begins with a review of the literature on governing outsourced work in general. Next the research context of subcontracting and controlling maintenance work is defined. The next section details the study, which is a multiple case study of 19 out of the 20 large UK petrochemical installations. Finally, the empirical data and findings are detailed and then discussed with conclusions drawn about the contributions of the research.

Literature review: the governance of outsourced work

Williamson (1971, 1975, 1979, 1985) argued that there are two polar forms of economic organisation, market and hierarchy. Between the two extremes lies a range of work over which managerial judgement must be exercised. The complexity of market relationships has received much attention, and there is a vast literature on contracting such as open vs closed contracts (Tirole, 2009), relational contracts vs arm's length contracting (Sako, 1992), and the manner in which the various control systems operate (Bygalle *et al.*, 2010). The complexity of the network of relationships (Barthélemy and Quélin, 2006; Hearnshaw and Wilson, 2013) means that the dynamic interaction may be governed by a variety of means, from simple verbal agreements to formal contract documents and the hybrid forms in between (MacKenzie, 2008; Badenfelt, 2010). There is therefore a wide range of governance modes choices available for management to implement when addressing the outsourced function of maintenance work.

The main issue is to understand the ways in which the contractor market has actually been governed by the MNC client firms in the UK petrochemical industry. The classic agency problems of moral hazard and adverse selection arise when internal work is outsourced (Eisenhardt, 1989). Whereas internal supply is subject to employees' duty of care under contracts for employment, outsourcing is based on contracts for services where the

duties are less able to be directly governed by the client. The only recourse for the client is contract termination and seeking damages via courts of law which decide the outcome. Furthermore, Williamson (1979) has identified transaction costs in market supply: *ex ante* contract costs are related to the bounded rationality of client managers seeking information, the underlying opportunism of the contractor and the possible restriction of choice of suppliers resulting in the danger of “small numbers exchange”. There are subsequent *ex post* contract monitoring, opportunism, information and governance costs (Li *et al.*, 2014). Nevertheless, market-based opportunism can be mitigated by appropriate governance strategies such as embeddedness, asset specificity, reputation effects of the contractors, and the threat of market switching by the clients (Davis and Love, 2011).

A typical market-based approach to contracting out work is through the “one-to-one procurement” approach, simply purchasing the service through a single client-contractor relationship. The client can contract all the services/trades they need in this manner. Here, price characterises the exchange, and the inter-firm relationships between a client and a number of single contractors are often “arms-length” instead of “relational”. They are frequently adversarial. Indeed, this adversarial route to efficiency by clients and contractors has long been identified by as a significant issue in the UK ECI (Korczyński, 1993).

Conversely, clients can use a single interface: a “lead” or “prime” managing contractor (MaC) arrangement. Here, the MaC subcontracts the work to a range of single-trade entities and becomes the sole interface with the client firm. It does not carry the risks of ownership for the client and the MaC still must resolve differences in operations amongst subcontractors. These arrangements can persist for some time and the MaC becomes less distinguishable as an independent entity. Hence, this arrangement has been termed a “quasifirm” (Eccles, 1981) and the emergence of competent MaCs became common within the ECI whose efficiency increased significantly as a result (Korczyński, 1994).

The problem for the client managers is of deciding on an appropriate governance mode or structure by which to purchase and control the implementation of outsourced maintenance work. However, confusion still exists over the optimal type of contract to use, which is likely to result in a varied patterning of contracting and internal provisioning across an industry (Makadok and Coff, 2009). Therefore, there is a need to explore the detail as the efficacy of control or governance lies in discovering the fine detail of inter-firm processes and management. By examining such arrangements in operation one can then say a considerable amount about how contracted work is controlled (Hernández-Espallardo *et al.*, 2010; Clements and Wilson, 2009). The essential ingredient in these exchanges is the need for some process of coordination of client needs and contractor actions by collaboration and cooperation between the parties.

Collaboration

To some extent, the complexity of the client-contractor relationships can be mitigated by collaboration between the actors. Collaboration has been described as an “interorganizational relationship that relies on neither market nor hierarchical mechanisms of control” (Lawrence *et al.*, 1999, p. 481). Collaboration has been addressed extensively in the inter-firm exchange literature, and it does subsume a large number of behaviours and types of partnering (Bemelemans *et al.*, 2012). Thus, much of the exchange literature focusses on the evolution of cooperation or collaboration between organisations that still wish to exercise their sovereignty to a degree under various forms of governance. Collaboration is however offered as a viable governance mechanism in its own right (Barratt, 2004).

If collaboration is a governance mechanism, it is necessary to differentiate the terms often used to describe degrees of collaborative control in client/contractor arrangements, in particular, “coordination”, “cooperation” and “collaboration”. Indeed, “coordinative” type

relationships can be considered initial/embryonic transactions with the intent of aligning operations and reducing inefficiencies of practice, but without the risks and expense of investing in relational-specific assets (Mann *et al.*, 2011). Given the need to move beyond simple coordination of operational activities, “cooperation” on the other hand, implies the need to incentivise parties to invest in a degree of customised processes and assets that would benefit both. A key feature of cooperative contracting is the promise of longer term relationships and forms of embeddedness in the governance (Davis and Love, 2011). Finally, collaboration builds on and includes the previous two forms of behaviour, but takes it to the strategic level (Handfield and Nichols, 2002). Collaboration is the coming together of minds to create shared plans and meaning and is marked by voluntary investments, information sharing, integrated business processes and trust (Halldorsson *et al.*, 2007).

While there are some differences between these three relationship forms, they share many common traits. These similarities are perhaps the main cause of confusion. Hence, perhaps the best way of differentiating these three relational archetypes is by thinking of the “relational magnitude” present in each. This sums the extent or degree of closeness, working together and strength of the relationship. Thus, the relational strength or closeness increases from coordination as the earliest form, through the intermediate stage of cooperation to the highest form of collaboration (Golicic *et al.*, 2003). Another similarity is that all three forms are voluntary requiring firms to surrender a degree of independent latitude and sovereignty.

Lewis *et al.* (2009) note that collaboration is easier in environments where resource issues are clearly defined between the contracted actors. Collaboration is the dominant behaviour at the fluid interfaces between firms, specifically among contractors. In such arrangements, the boundaries of the firms become indistinct. This is the case where such collaboration is “mandated” by the client. Rodríguez *et al.* (2007) used the term “mandated collaboration” to describe a situation where the roles of the interacting organisations have already been defined, collaboration, when mandated, can actually flourish in an asymmetric power situation, and indeed, asymmetric power/dependence ratios may be an essential element for the development of mandated collaboration (Crook and Combs, 2007). Once mandated by a third party, collaboration can lead to a high degree of informal inter-firm flexibility and cooperation, thus having positive effects on a project’s schedule and cost-related efficiencies. Where a client demands or mandates collaboration *ex ante* in the contract structure, contractors are hence directed to work flexibly in cross-functional teams comprised of other contractors. This aspect of real time teamwork also differentiates collaboration from the simple form of cooperation, which implies a more distant relationship. Subsequently, repeated iterations of the contract over time with the same group of contractors facilitate informal socialisation and normative governance formation. This is in addition to bureaucratic and hierarchical controls and is ultimately beneficial to all parties. So, underneath the mandate, is a more voluntary system, which can be enforced if one party decided to opportunistically use tactics such as a “hold up”. There is of course the distinct possibility of adversarial serial game playing where there are different sources of power and when divergent values and interests occur (Hearnshaw and Wilson, 2013; Choi and Wu, 2009). Thus, while the key issue of the structure of control mechanisms has been outlined, we need to explore the nature of the interaction between the separate interfaces.

The research context: subcontracting and controlling maintenance work in the UK petrochemical industry

Cibin and Grant (1996) have demonstrated that at the global level, this industry had adopted a strategy of generic outsourcing so as to reduce the size of the core business, and move from fixed to variable costs or from static to dynamic efficiency. Subsequently, Korczynski and Ritson (2000) surveyed the 20 installations in the UK industry and confirmed that the predominant way of making efficiency gains was by rationalisation of maintenance activities, as these are the largest cost after the purchase of crude oil. Each installation had

rationalised by outsourcing on average some 500 maintenance jobs to contractors, around 10,000 in total. The outsourced work was contracted to ECI firms which are a significant part of the overarching UK construction industry. There have been few studies at an industry level in the ECI such as strategies for increasing skills (Abdul Wahab *et al.*, 2008), and generic supply chains (Akintoye *et al.*, 2000), and partnering (Gadde and Dubois, 2010; Crespi-Mazet and Porter, 2010). However, to date there has been no in-depth study of how the overall structuring of the client-contractor interfaces is managed.

Further, to understand the importance of managing the interfaces between the clients and the maintenance contractors, it is necessary to realise that petrochemical production is an automated continuous process run at capacity. As a consequence, maintenance interruption or production unit “downtime” is so significant that it can lead to large financial losses for the entire UK affiliate (Ritson, 2007). Maintenance work comprises a complex combination of discrete skills and technologies consisting of numerous inter-trade demarcations among craft trade unions. These typically comprise; instrument, general mechanics, electricians, plumbers, pipefitters, scaffolders and insulation/lagging specialists, for example. Client MNCs in the industry have attempted to reduce these demarcations through bargaining efforts focussed on increasing flexibility. They have derecognized internal unions, moved the higher skilled trades to staff status, and have outsourced the lower skilled trades to local contractors (Ritson, 2011). Despite the predominance of this strategy, knowledge of the control of maintenance contractors and operations has been seen as inadequate or even “highly neglected” (Cooke, 2002).

The theoretical issues described above, coupled with the lack of empirical research on the governance arrangements of contractors in maintenance, stimulated the present study. Given the size, abundant resources and the importance of maintenance to the industry, petrochemical MNCs were chosen to provide the data for this study. As generally large competitors in the industry, with problems of competitiveness and extensive outsourcing of maintenance, they might engage in a wide range of practices worthy of investigation. From the literature it is expected that market-based and MaC/quasifirm are the main governance modes, using reputation and market switching as ways of limiting opportunism.

The study

Though the general factors in governance of contract work are known, the ways these are applied in this industry are not known in advance. Given this uncertainty around the governance types and modes, an inductive methodology was applied. As the overall aim of the research was to discover how the interfaces between the clients and the contractors were being managed, it was not feasible to investigate the efficacy of these modes in depth as the information was both internally highly sensitive and externally it was strictly client confidential. The objective then was use the inductive approach to detail each installation’s structures and processes, and by analysing and categorising these, to link them to appropriate theoretical positions or to discover new dimensions of the issue if applicable.

The industry bodies UKPIA and the Energy Institute (which incorporates the former Institute of Petroleum) both publish lists of all the companies in the UK petrochemical industry. There were 20 major petrochemicals installations identified in these lists. This relatively small population meant that field work, on a case by case basis of MNC client/contractor strategy was possible – as opposed to an industry-level survey. First, a pilot case study was used to identify the major factors underlying the interfaces which included trade union issues. To provide adequate representation of the industry’s member firms, all 20 petrochemicals installations were contacted and 19 agreed to on-site interviews: hence this sample represents a near census of the industry. Each case identified key respondents, defined as “the managers most directly responsible for maintenance contractors” (see Table I). Generally, they were the maintenance or engineering managers

themselves, but also in some cases the employee relations (ER) managers were identified. As noted earlier, trade union interfaces had been issues in the industry, and so some cases identified as key respondents managers from a human resource/employee relations function.

Data collection and data analysis

Data collection consisted of unstructured interviews with key respondent managers at their place of work. Once the aims of the study were explained and confidentiality and anonymity guaranteed, the respondents were asked a broad opening question: “what are the ways under which your maintenance contractors are managed?”.

Respondents explained their systems in detail, offering documents such as the site agreements and contract outlines. Responses were recorded in note form, word processed, and to ensure respondent validity were sent back to the respondents for verification. Follow-up interviews were arranged as necessary to clarify data gathered. Any suggested changes were made and the final version returned.

In the data analysis stage, all of the interview and documentary data collected were analysed by extracting the details of the systems from the interview notes and documents, then these were categorised and then diagrammed. Finally, the summated and anonymised final report was distributed to all the respondents.

Findings and discussion

The interview question above was freely answered by all of the respondents and so it illuminated the management of interfaces in each of the 19 installations. The cases and our analysis of their methods of maintenance governance are presented in Table II.

The categorising process, which arose naturally from interviews and documents, revealed that the cases can be grouped into three distinct modes of governance. While in theory these need not necessarily have been mutually exclusive, in reality they were reported as such by the respondents themselves. For example, they reported that they used the “market based” or had a “managing contractor” as was expected and this conforms to literature. Among these

Respondent plant	Respondent(s)
Case 1 (pilot case)	ER manager Production manager Technical manager
Case 2A	Engineering manager
Case 2B	Maintenance manager
Case 2C	Maintenance manager
Case 2D	Maintenance manager
Case 3	HR manager
Case 4	HR manager
Case 5A	HR advisor
Case 5B	Maintenance manager
Case 6	Maintenance manager (x2)
Case 7A	Engineering manager
Case 7B	Engineering manager
Case 8	Maintenance manager
Case 9	Engineering manager
Case 10A	Maintenance manager
Case 10B	Maintenance manager
Case 10C	Maintenance manager
Case 10D	Maintenance superintendent
Case 11	Maintenance manager

Table I.
Sample frame
and respondents

Table II.
Governance
mechanisms

Respondent plant	Maintenance governance method
Case 1 (pilot case)	Employer Panel of 6 contractors
Case 2A	Managing contractor
Case 2B	Employer Panel of 9-10 contractors
Case 2C	Employer Panel of varying number of contractors
Case 2D	Employer Panel of 12-13 contractors
Case 3	Market based (no formal structure)
Case 4	Employer Panel of 50 contractors
Case 5A	Employer Panel of 20 contractors
Case 5B	Managing contractor
Case 6	Market based (no formal structure)
Case 7A	Managing contractor
Case 7B	Employer Panel of 5 contractors
Case 8	Market based (no formal structure)
Case 9	Market based
Case 10A	Employer Panel of varying number of contractors
Case 10B	Employer Panel of 8 contractors
Case 10 C	Managing contractor
Case 10D	Employer Panel of varying number of contractors
Case 11	Employer Panel of varying number of contractors

two modes, no novel contractual forms were recorded. However, of wider interest, the majority of the sample used a governance structure known in the industry as the contractor's "Employer Panel" (or EP) which, as far as we can tell, has not been documented in the literature. We next address the three forms of governance, and focus more intently on the most numerous and most unusual form – the EP.

Market-based sourcing

Surprisingly, traditional market-based sourcing, with the client contracting several single-trade contractors, was confined to only four cases (3, 6, 8 and 9) where clients relied solely on the market for the purchase of maintenance services. Here the client managers direct the all necessary daily tasks and inter-trade coordination. As maintenance requirements arose due to one-off production problems, this was described by respondents as a "one-to-one procurement" approach. There is no central hierarchical mechanism for control, only the individual client department heads who issued the contracts and the bureaucratic contract provisions. These were often followed by an audit. Each contractor was required to complete its tasks independently, the schedule being arranged by the client contract manager to fit in with other trades (typically scaffolding) if necessary. This approach spreads the risk of market failure across the market. It has however the potential to be subject to various forms of opportunism, the most dangerous being "hold-up" tactics. Here a small contractor with specialist skills can withhold these skills in order to renegotiate the contract, which can delay entire maintenance projects. These cases rely partly upon contractors' reputation (and for repeat business from the client and other firms) but also reflect a more adversarial arms-length market approach to outsourcing work, where competitive forces act against and the threat of switching as methods of governance. However, respondents in these installations stated that they were confident that the number of alternative firms available in the market in which they operated mostly mitigated the threat of such tactics. One respondent concluded:

We need to keep the market-place reasonably healthy as we are not close to other major installations and bound-in costs may defray the positive effects of a learning curve for the contractors. Cosy, incestuous relationships build in complacency.

Hence, collaboration between the contractors/client interface and amongst the contractors themselves was not encouraged nor supported by the contract incentives. Rather, the treat of market forces enforced the necessary compliance.

MaC

In another four cases (2A, 5B, 7A and 10C) the clients opted for the MaCs mode. Here, a single contracted firm carried out the majority of the outsourced work but also employed numerous subcontractors and took the lead in managing these subcontractors. In each of these cases, the clients had opted to engaged large and well-resourced national firms as is typical in the ECI. This contrasts sharply with traditional market-based maintenance contracting in the previous four cases. However, it is a highly efficient form of governance in comparison to using market-based sourcing as there is only one client/contractor interface. Respondents asserted that MaCs were used because the sites' requirements were complex and involved supply-based uncertainties over the use of certain specialist trades, as these would hinder the market-based approach of negotiating a one-to-one procurement. The nationally-based engineering firms could require these trade craftsmen to transfer from other sites to the client in case of emergency and so this flexibility was seen as essential by these installations. However, this creates potential problems of small numbers exchange and one of the respondents said:

[...] so as to mitigate the power of the single managing contractor, we changed to a market supply format [...].

As this form of contracting has been well covered by literature, we move on to the final form.

EP

Interestingly, in 11 cases (the large majority of the sample), there is a governance structure that we believe differs from the MaC mode in some significant areas. The respondents themselves referred to this form of control as the contractors' EP, as shown in Figure 1. The diagramming of the generic model of the Client-EP-Contractors system was developed in conjunction with the respondents. The EP structure is mandated by the client in that all of the single-trade contractors are required to join the site's EP, there being only one EP per site. The EP acts as a MaC, but interestingly it is comprised of both client and contractor staff in a unique mix.

The individual contractor has a term contract with the client of several years' duration (usually three or four). These contracts are very open, usually specifying only the trades required, the service-level expected and requiring collaboration under the EP. This means that individual daily direction of work tasks comes from the EP whose chair or secretary liaises with the client to produce the schedule. Contractors then file invoices to the client via the secretary, often via an audit officer, who pays out directly to the individual contractor on a monthly basis. While a term contract is necessary to tie the contractors to specific tasks and costs for a defined period, their integration with the other trades cannot be specified in advance. This is because maintenance work systems typically are flexible and loosely coupled. Such flexibility is a necessity as they are frequently involved in emergency work such as night time working and weekend call-ins. Hence, collaboration is mandated under this unusual, contractually defined power/dependence arrangement. It falls to the EP, composed of client and contractor staff, to coordinate the daily work required for ongoing contracts and deliver a one-stop-shop service to the client. Contractors work under a common regimen across the plant in that they collaborate in the same areas and time frames, so reducing the number of interfaces. The EPs are able to resolve the small numbers exchange problem as each individual contractor works in a cross-functional team setting

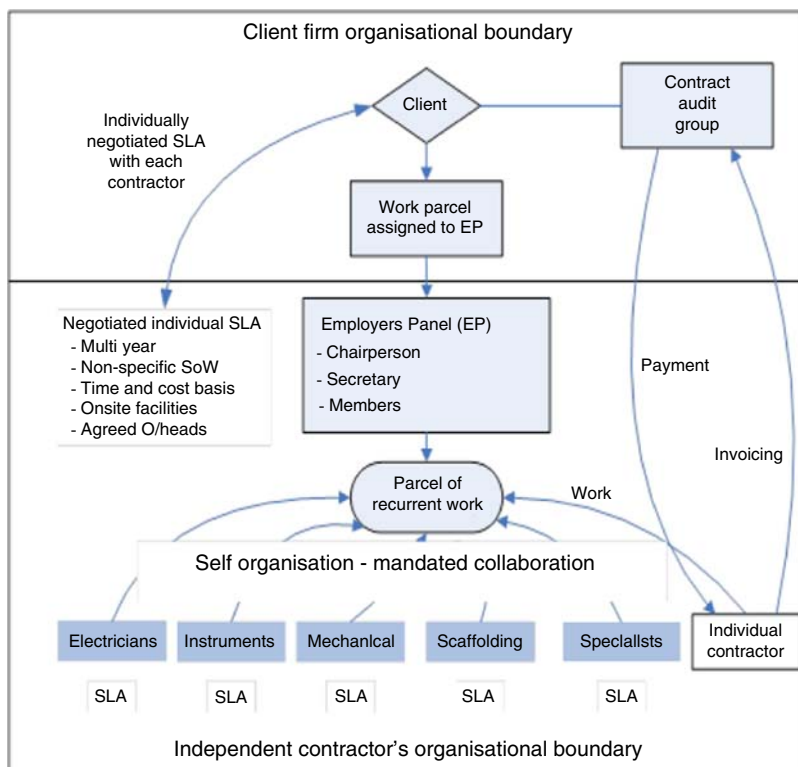


Figure 1.
The client-employer
panel-contractors
relationship

which, along with peer pressure, keeps performance up to standard. Ultimately a contractor can have its contract terminated by the client.

However, the threat of market power to control the contractors was limited by the nature of the maintenance tasks themselves. This limitation also reflected the difficulties associated with switching providers. One key client respondent stated that:

[...]as many contracts were ongoing, they had to screw up big time before we [the client] banned them.

One key informant, a manager for a large oil company, stated:

We could not [...] play hard ball with the bigger contractors as we had with the smaller ones.

One respondent who had installed the site's EP said:

[...] spot contracting' [market based or MaC] leads to opportunism by the contractors or their employees.

Some respondents were acutely aware of the danger of the small numbers exchange problem and the associated cost of switching suppliers, even within an EP structure. Another respondent noted that:

The type of contracts used (labour plus materials) allows contractors to "extend" the duration of some jobs in order to inflate the income of both the contractors and their employees.

The EP comprises a formal structure: a chairperson and a secretary from the client, and appointed representatives from most or all of the contracted firms, and in some cases an

ex-officio auditor. In addition, the EP is provided with its own separate offices and other facilities on the client's site where the contractors store vehicles and other equipment. This extends the notion of the quasifirm as it is a separate, well-resourced structure within the client premises. Such a relationship means that EPs negotiate on behalf of the client, and EPs are thus pivotal and powerful actors in this type of mandated relationship. As the main variable in the performance of maintenance contracting is labour, the EP is also responsible for negotiating the terms and conditions of the contractor employees under a local site agreement with the trade unions. The EP is responsible for creating a formal site agreement, where interestingly the client is not a signatory. The agreement specifies the obligations and expected activities of the contractors. Nevertheless, the client who is ultimately paying usually meets with the EP before the negotiations and agrees in principle with the proposed offer. Thus, the client, while not a signatory to the contract, still significantly influences the execution of it. Downtime critically affects the throughput of the plants and is a clear productivity – time on tools – issue. As seen in Table II, several respondents were ER managers. The resulting site agreement was of course an on-cost to the client who ultimately had to pay for the terms and conditions negotiated. One respondent stated:

We would meet them [the EP] before every Site Agreement negotiation and review what they intended to say/offer to the unions. If there was something we did not like they would withdraw their position.

EPs varied in size depending on the size and complexities of the client installations themselves. Large plants have processing capacities of up to 300,000 barrels of crude oil per day and these plants have large EPs. For example, Case 4 has an EP comprising 50 contractors, and Case 5A4 has 20 individual contractors. With a small capacity of only 190,000 barrels, Case 1 is supported by an EP of only six contractors. Other smaller plants had EPs of five to ten members. There were also four cases where the number of contractors varied from six to eight at any one time.

In a subsequent report back to the respondents one HR manager said:

Your concept of the [employer] panel is right – their involvement is normally managing the interfaces.

Another of the respondents even referred to the EP as:

[...] permanent resident contractors [...].

This more resembles an employer/employee relationship of service than a strictly worded, tightly controlled contractual agreement. This is due to its duration, the open-ended nature and the permeable organisational boundaries. Due to the mixing of the client and contractor interest within the EP and its primary role in site negotiations and work coordination, the EP is an unusual mechanism of governance.

Conclusions

The broad research question has been answered by 19 out of the 20 MNCs in the UK petrochemical industry. We feel that the research was therefore timely and of interest to the managers. We were surprised that there were only three governance modes in which the clients managed contractors: four cases of market supply, four cases of MaCs and 11 cases where the EP was observed. There is some confusion as to the name EP. In the literature, "panels" are usually advisory bodies comprising a representative set of advisors at one level removed from the organisations they advise. EPs often exist to advise on training and other general issues in various industries, not to manage contractors themselves. In our case, the construction industry has an overall EP advising on skills and productivity (Abdul Wahab *et al.*, 2008). However, the EP structure as a mode of governance in this area is unique. Unlike other EPs

which are removed largely at the industry level and advisory, the EP we found here is a local, site-based executive body which furthermore provides capital and labour to the client MNC. It is a legitimised discursive authority, despite asymmetric power, between participating contractors while simultaneously exhibiting elements of market and hierarchical control. The EP is partly an administrative service, but where the contractors form an enduring, stable EP over time, the members become assimilated and socialised through these processes, thus, creating a degree of ongoing social cohesion that would be difficult to produce with simple market-driven or MaC type relationships. This stability and security in contractor selection and development is an important ingredient for the evolution of collaboration, even if originally mandated (Rodríguez *et al.*, 2007). Additionally, though in theory it does not need to be, we found only one dominant type of contractor governance in each case. In other areas of the client firm, there may well be other types of governance system in use, but this was beyond the scope of this study. Thus, the EP as outlined in this paper represents a solution not previously described in the literature to the problem of market-based complexity.

Though one manager admitted to changing from MaC to market supply due to opportunism of the MaC supplier, the other cases consisted of surprisingly stable entities. This was perhaps due to the significant transaction costs of change, and to the managers' own bounded rationality. They did not always see dangers inherent in market failure or of small numbers exchange, nor did they anticipate the selection of contractors from the market would create labour disputes as Gall (2012) reports. They did not investigate alternative structures for the contract itself, for instance involving new technology.

There are of course implications for further research. The main limitation is the focus on one particular industry, all be it a significant contributor to GDP. A further study could extend the empirical research of the EP type of structure into other industries that use on-site contracted maintenance such as; container terminal operations, shipbuilding and repair, aircraft manufacturing and maintenance, and large infrastructure projects such as construction of power stations and water facilities. It is argued that cross-functional team-based governance such as the EP working in such a structure might enhance productivity.

It would also be valuable to examine the extent of the process termed mandated collaboration by focussing on different situations in the private sector. To date the research on mandated collaboration, as far as can be ascertained by literature searches, has been limited to public sector agencies (Lewis *et al.*, 2009; Dunlop and Holosko, 2005). For example, Cross (1995) demonstrated that a project for outsourcing IT services operated with the same kind of distancing of the client from the three major contractors. Though he did not use the term "mandated", he noted that the client required the collaboration of suppliers in order to produce a seamless one-stop service – a single client interface. There is also recent evidence, for example, that a "cooperation-based type of collaboration" can enhance the resilience and coordination of supply chains in the food sector (Scholten and Schilder, 2015).

Furthermore, the EP structure may be of value to managers of contractual relationships in general with its mandated collaborative process. Indeed, it may provide an alternative model for managing outsourcing. In particular, the results of this research can be used by managers in the eight cases identified earlier which have not as yet adopted the EP type structure. Given the problems of productivity and competitiveness detailed in the introductory section, this should be investigated. The issues related to the other two types of contracting are far more problematic. Opportunism in market-based contracting and small numbers exchange in the MaC structure, both militate against a secure and stable form of governance which is necessary in this industry.

As the EP and its mandated collaborative process requires new practice where clients engage the contractors in longer term relationships, it provides increased job security for contractor employees hence increasing the client's own legitimacy as MNC employers (see Ritson *et al.*, 2015 for a discussion). This has the economic, commercial and wider social

effects of increasing the localisation of industry away from nationally-based entities and so assists regional development. It also facilitates the development of local skill bases which in practice can react more quickly to maintenance outages and other emergencies locally (see Phelps, 1997 for a discussion on this topic). The EP with its mandated collaborative processes more tightly aligns the incentives of the client and its contractors. It stands then in contrast to the other two more adversarial forms of contractor governance, and is hence worthy of further research.

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Corresponding author

Neil Henry Ritson can be contacted at: Neil.ritson@lincoln.ac.nz