

# **AUTOMOTIVE FACILITIES PROCUREMENT AND THE NEW CONSTRUCTION PARADIGM**

**John Atkins<sup>1</sup> and Alan Wild<sup>2</sup>**

<sup>1</sup>*Ford Land Europe, Germany.*

<sup>2</sup>*University of Central England Business School (UCEBS), Perry Barr, Birmingham B42 2SU, UK*

This article evolves ideas about ‘conventional wisdom’ on the role of construction clients, reporting research on large, recurrent automotive clients. It is based on MBA projects and a dissertation by Atkins; research by the Business Round Table; a survey of high level managers from construction; ideas about the incorporation of manufacturing supply chain practices into procurement and comparisons of large car companies. Criticism of Latham and Egan is developed into a “New construction Paradigm”. The complexity of the large manufacturing client justifies retention of a Construction Engineering Organisation to manage the instabilities and uncertainties of projects and processes. The distinction between consulting to the uncertainty in the client and managing the uncertainty in the project is accepted but large clients need to internalise these processes.

Keywords: procurement, manufacturing, automobile industry, project team, client, supply.

## **INTRODUCTION**

Car manufacturers are major users of complex facilities previously procured as an extension of production. Today changes within and around car firms raise questions as to the appropriate paradigm for securing production facilities. Many assets are at the end of their economic life and inappropriate to world class manufacturing. Customer and Shareholder Value and Environmentalism add pressures for more efficiency. World class manufacturing has provoked debates about the relevant construction procurement model: facilities are a service supporting production rather than an extension of production. Different reorganisations of construction procurement amongst car firms reflect this. Self-evident answers are absent given: the complex, expensive facilities required; uncertainty and instability amongst internal stakeholders and the extension of supply chain innovations into construction. Production as a competitive weapon involves complex strategic choices for the organisation of construction procurement. The article reports from all of its sources in a balanced way. It uses data for manufacturing clients especially Ford; and interprets a survey of clients, designers, construction managers, professionals and researchers. It defines the evolving role of the client emphasising: interrelationships between, construction demand, the construction supply chain and the project team; exploring the diverse interactions of the project team and how these relate to performance improvement; examining the evolution of the project team in Manufacturing since 1960; analysing why successive changes in procurement systems and project structures have not produced expected performance improvements.

## **METHODOLOGY**

The article is qualitative, derived from reflection (Schon 1983) on career experience by a senior construction professional from Ford Motor Co. in MBA assignments, extended projects and a dissertation. The work is a practitioner-researcher initiative, a “Broadening concept of what constitutes R+D in the building industry” (Groak and Krimgold 1989). Internal corporate sources and professional initiatives (Atkins J. 1998 and Atkins J/ Ford Land 1998) imply an interpenetration of Action Research and Participant Observation (Easterby-Smith, Thorpe and Lowe 1991 and Groak 1995) representing a ‘Creativity Cycle’ in the writer’s personal constructs (Boyd and Wild 1996).

## **THE INSTABILITY OF CONSTRUCTION DEMAND**

Construction is reactive to an unstable cyclical / speculative demand pattern, partly a result of government economic regulation, which renders construction firms under-bounded to clients. Poor levels of profitability, innovation and contribution to GDP comparing the EC to Japan (W. S. Atkins 1994) have resulted. The process is cyclical: construction’s performance retards economic development and is retarded in turn. Cut-throat competition and fragmentation in the supply chain, relying on sub-contracting to reduce risks increases responsiveness to clients. Poor cost and time management; defects; poor attention to detail; low and reducing skills and poor adoption of new skills, reflect low investment in training, research and marketing and recruitment problems due to industry image, result (WS Atkins 1994). The situation is most advanced in the UK: contractors bid for little profit margin and analysts view construction as a poor investment. Immediate profit and survival relate to industry fragmentation and reputation for poor service. Divergent interests in profit and future work undermine team aspirations for success and conflict with functional leadership roles. Projects become adversarial with a high propensity for instability and value conflict: designers focus on fee income through unnecessary changes; contractors focus on profit rather than project success, ‘squeezing’ sub-contractors, being ‘claims conscious’, shifting cost overruns onto clients. Subcontractors cut corners, compromising quality and client satisfaction.

## **THE NATURE OF THE CONSTRUCTION PROJECT TEAM**

These arguments imply the importance of the population of projects as a focus for improvement. High client influence under-bounds construction projects enhancing value conflicts over economic objectives. The project team interaction is unique not the industry. A construction project team may be like an IS/IT project team for the same client, than a construction project team of a different client. IS projects also reflect Chermans and Bryant’s (1984) view of the client. Project teams reveal complex economic interests coexisting with psycho - social complexity in personal constructs (Boyd and Wild 1996). This and the complexity of the client lowers the threshold of instability and value conflict in the team. Identical teams respond differently to different clients. A project team successful for Toyota may fail at Ford. Car producers procure similar projects differently shaped partly by different purchasing cultures (Walbridge Aldinger 1993). GM use competitive tendering; Chrysler outsource; Toyota have strong in-house organisation with partnering; Ford lacked a consistent approach in adopting new methods.

Ford typifies such internal conflicts of interest over work in progress worth \$1bn per annum. End users focus on time or exceeding requirements seeking to influence scope, creating uncertainty and changes. Purchasing focuses on procurement, seeking reduction of funding, conflicting with end users. Finance focuses on capital expenditure, setting tough return hurdles and questioning elements of projects. This conflicts with other interests and may alter the overall project approach. Design fees are questioned if listed separately but not when hidden in contractor's costs. Treasury focuses on various sources of project finance. Alternative financing is viable if risks transfer to a third party. Environmental quality focuses on adherence to legislation conflicting with project' scope. Local plant or union representatives focus on opportunities for improving the plant and the welfare and prospects of members, influencing scope. Group staff focus on process installation to prevent construction causing delay or impinging on quality and scope of works conflicting frequently with project teams. Ford Land manages stakeholders and construction processes to ensure end user satisfaction and maintain cost, time and quality requirements.

External project managers add economic and psycho-social complexity interposing an economic transaction between the client and team without ensuring a coping response to the uncertainties of clients due to lack of knowledge and long term relationships with or access to key financial decision makers. The CCEO internalises this transaction and it's system of constructs and grounds it in an appreciation of client and construction. Latham (1994) typifies experts who recognise the importance of personal constructs in the team but not in the client. This explains why procurement changes have produced poor improvements. Partnering, by focusing on mutual objectives builds upon common elements of individual or personal constructs within the team; Alliance Based Construction, by fostering long term relationships enables the project team to understand client culture and decision making. Outsourcing weakens the influence of clients on the constructs of project teams causing project incoherence.

## **EVOLUTION OF PROJECT TEAMS IN MANUFACTURING**

The 60s onwards saw a sequence of innovations in procurement away from professional hierarchies to resolve problems of co-ordination including: an adversarial climate in which CCEOs and designers faced contractors over variation costs and changes in scope related to products; restricted possibilities of improving project performance by exclusion of contractor influence on project buildability. The system performed well in time and cost shielding designers and contractors from client uncertainty but at the expense of project team integration. Cultural conflicts of project teams between the Power cultures of large contractors and the Professional Role/Task cultures of CCEOs, designers and sub-contractors caused personal and professional constructs(Boyd and Wild 1996) to diverge creating time and cost overruns. Manufacturing clients increasingly rejected this system. From 1970, onwards the proportion of large projects procured completely by CCEOs fell from 29% to 12%. Internal hierarchies were downsized, earlier in the USA than Europe, reflecting recognition that early internal definition of projects influenced 80% of costs. Japanese competition reduced product life cycles and prices, increasing client uncertainty and reducing CCEO's ability to define projects, due to frequent product changes. In the 1980's and early 1990's clients moved to D and B and Full Service.

European clients copying Japan, chose Design and Build contracting directly for complete works from a CCEO brief. This achieved a single point of responsibility

previously lacking. Two key features of Japanese procurement were absent: it is well developed construction supply chain (Bennett and Jayes 1995); and cultural consistency (Wild 1995) creating alignment of interests and constructs. European D and B contractors were general contractors buying design. Interactions of teams with clients had not changed and the cultural coalition resurfaced with variations. Although earlier contractor participation occurred the Japanese practice of freezing the design, was alien to European clients. D and B projects performed poorly in handling changes in scope as the Ford /VW AutoEuropa project in Portugal indicates (Atkins 1999a).

Projects remained TMO's with a D and B Contractor to whose Power culture the client had surrendered. Success depended on contractor performance but contractor led teams remained re-active to clients, not necessarily in the client's favour (Mather and Cornick 1999). The uncertainties of manufacturing clients, political and market driven such as production volumes and processes affected project definition outside the project team. The AutoEuropa contractor displayed all the characteristics of an under-bounded team. Ford CCEO managed the cultural conflicts arising from the construction consortium to create an overall success. Growing dissatisfaction with D and B led to Full Service Contracting. The supplier would 'design out' changes earlier since they were committed to a Guaranteed Maximum Price avoiding the 'blame culture' that existed in teams. This enabled the complete outsourcing of CCEO organisations. These supply side innovations redistributed and reproduced the previous problems and created difficulties because of client distance. Under-boundedness in the project transferred to the Full Service supplier which still had a reactive, subcontracted team.

### **Ford's Experience**

Ford experience procuring facilities at Mahindra, India and Bangkok, Thailand confirms the superior performance of client leadership. Mahindra operated a full service contract and Guaranteed Minimum Price using American project managers in a fragmented local construction system. Ford Land was a member of the Ford project team. Product uncertainties led to such frequent changes to scope that the contract was changed to cost plus. Bangkok was built more cheaply and quickly, managed by Mazda's CCEO and constructed by Kajima of Japan. Ford Land bench-marked the projects. The key features were: separation of Construction from process installation; D and B fee based contract with Kajima; established supply chain relationships; collaborative team work by Mazda with Kajima and early freezing of design. Market conditions in Thailand before the Asian crisis assisted. Design and construction management fees with no external expatriate fees were reduced. Mazda team cost was an overhead outside the project. Benchmarking recommended an increased role for the CCEO on future projects (Atkins 1999) confirmed by an office project at Dunton, Essex procured using Partnering, Open Book and pre-determined fee arrangements covering certain costs and profit evolved in the USA. Ford Land who took over Global Plant Engineering creating an exchange of best practices adopted 'Partnering' seconding American managers. Poor understanding by contractors Laing of GMP contracts required a workshop to establish collaboration. Greater site presence and decision making from Ford Land reduced contract administration. The project met objectives of cost, time and quality and set new space and office standards.

Ford success paralleled Latham (1994) and 'Trusting the Team' (Reading Construction Forum 1995). Other clients achieved cost and time reductions through partnering but

BAA was seen as the pioneer (and publicist) achieving improvements measured at 30%. Initial success was attributed to the 'Style' of contract arrangements agreeing: mutual objectives; how problems will be resolved and actively seeking continuous improvement (Bennett and Jayes 1995). This obscures the results of clients taking a more strategic approach to projects and their supply chain. Partnering successes reflected re-alignment of economic interests and personal constructs. Fixing contractor profit and sharing savings aligns contractor's profit motives to client 'cost certainty' constructs. Fixed design and standardisation reduces changes of scope aligning designer and contractor to project completion. Sub-suppliers maintain quality to create long term business.

Open book partnering was a step to long term collaborative arrangements with the construction supply chain, from 'first generation' through 'second and into third generation' partnering (Bennett and Jayes 1998). In manufacturing, it was driven by competition with cost reduction purchasing strategies reducing suppliers by a factor of ten. Ford rethought construction as supply chain management. The 'Ford Alliance Based Construction System' (Derkowski 1999) reduced 'preferred contractors' and 'tiered' suppliers for their significance. Established relationships with designers were turned into the Architect /Engineer Alliance Partnership with a particular plant serviced by one designer on a contract of five years, with agreed fee scales and rates. This abolished the use of different designers in one plant; created consistent maintenance of as-built records. In project by project contracts, such information was a source of competitive advantage. Designers take responsibility as planning supervisor for a plant and share best practice.

The Component Supplier Initiative (Atkins 1998a) resulted in agreements with suppliers accounting for 40% of project value but 13% of order volume improving cost, time and quality. Such components are manufactured independently from construction before installation. Contractor led procurement created an exaggerated focus on the 'Tier 1 General contractor' and poor understanding of the role of suppliers in the construction chain. Ford entered the construction supply chain directly for orders valued at \$100m p.a. using benchmarking and earlier supplier participation in the construction process. The SGB Transformers contract saved 20-30% improving quality and design; removing costs associated with tendering, specification, inventory and spares. The initiative integrates designers, contractor's, component and facilities management suppliers in one system.

The 'Contractor Alliance' completes the 'Alliance Based Construction System'. Ford's previous supplier strategy was standardised under different conditions with equal priority offered to all. It suffered from splits among internal purchasers and lack of modern tools and systems. Application of strategic purchasing matrices identifies the salience of services for business innovation and customer importance. Construction managers and designers are highly salient. Next year, with certain European construction managers, fee levels will be agreed adapted to particular projects and subject to open book arrangements based on a guaranteed maximum prices with competitive tendering to sub-contract the majority of work. Projects less than \$250,000 will be single sourced locally on agreed rates. This approach depends highly on Ford Land but may not last. Many clients see alliances as a means to outsource construction completely (Ford 1997) although no evidence exists that this will bring tangible benefits.

### **The Business Round Table Study**

Business Round Table's (1997) financial study of capital projects worth \$300bn (60% from USA, 40% international), shows no correlation between the use of alliances and project results. Analysis of failures identifies poor performance originating from weak clients with no in-house construction expertise in alliances as often as non alliance situations. BRT details the risks run by weak owners: inability to define alternatives often selecting the wrong projects; over-dependence on contractors, placing themselves in a weak bargaining position; inefficiency in small projects without a core process for major projects. Lack of internal competence eventually puts the business person across the table from the contractor in an unstable interface in which lack of communication skills generates wasteful lawsuits, arbitration's and claims.

BRT shows that Alliance Based Construction Systems improve performance when combined with an integrated team. The best project systems maintain in-house resources to develop and shape projects in advance aligning owner functions to choose the right project and prepare it for efficient execution. In construction this is attained when the CCEO brings in the contractor with its functional lead early. Companies that perform at least above average in capital efficiency have "maintained some form of central organisation for providing the organisation of the work process"(BRT 1997). The CCEO's role within the Alliance is critical. Strong clients achieve better performance improvements in terms of cost, cycle and operability, and significant competitive advantage. The 'Front End Loading Process' is critical for Business, Facility and Project Planning. One in three projects failed to meet one or more objectives: "...49 out of 50 that achieved best practical front-end loading met all objectives...". Capital efficient companies have central expertise to translate objectives into projects and view construction as a "...principal means by which the corporations capital asset base is created." Capital Project Management is a core competence. The best project systems transform average ROI for Capital projects from 15 to 22% (BRT 1997)

Absence of correlation between alliances and improvements inverts Egan (1998) who reports successes not failures and lacks controlled comparison of results. Alliance Based Construction Systems improve performance when combined with an integrated team in which clients define their own requirements. Alliances are appropriate but too quickly adopted will not attain the benefits seen by those with strong in-house management. Full Service contracts the option many clients prefer perform worse than owner led projects.

### **RESULTS OF THE SURVEY**

This section reports survey data from clients, construction professionals, academics and researchers and creates two scenarios to: clarify the effect of changes in the manufacturing environment on projects; establish when the client should lead alliance based construction systems; define the nature and 'optimal' level of competencies required. Salford and Loughborough Universities' 'Generic Design and Construction Protocol' defines the Pre-project, Pre-construction and Construction phases of construction and the 'Gateways' between them, underpinning the questionnaire and clarifying the CCEO's leadership role.

The majority of clients agreed that the CCEO should lead the pre-project phase. Most industry respondents concurred to a lesser extent except in the field of Project Feasibility Studies and Estimates. Respondents disagreeing were from consultant

organisations offering these services. Ninety-three per cent of clients agreed that their CCEO should lead feasibility studies, implying that it requires deep understanding of a Client asset base to decide whether to build, lease, acquire or refurbish assets. In the pre-construction phase of the Process Protocol which BRT calls 'Project Planning' such skills are also required.

The majority of respondents agreed that the CCEO should lead preparation of the design brief and to a lesser extent outline conceptual design. The majority disagreed when it came to cost planning and full conceptual design confirming functional leadership in the team.

Project procurement strategy in Manufacturing is typically determined in the pre-project phase, since the route taken directly influences feasibility and costs. Generally decisions are finalised at the 'pre-construction phase' where the BRT established that in the best systems a CCEO was responsible for organising the front end loading and for integrating outside suppliers, manufacturing operations and business engineering. Seventy per cent of clients agreed that the CCEO should lead selection of construction organisations. The rest of the industry did not consistently confirm this view. Sixty per cent agreed that the CCEO should determine project approach. 48% agreed over selection of designer. Construction consultants who see themselves as 'procurement experts' disagreed. Clients and the rest of construction agree that the CCEO should lead in appointing sub-suppliers. This is contrary to many of Egan's recommendations but supports the findings of Ford's Component Supplier Initiative. Clearly, the designer and Construction Manager should influence choice of sub-suppliers since their performance is affected.

The Process Protocol defines the construction phase as lasting from the finalised product of information to the management of construction and those involved. BRT establishes that the most effective capital projects are those in which project management is carried by an integrated team led by a CCEO. The survey results largely concur with 71% of Client's agreeing that the CCEO should lead in project management and 64% in change management. Less than 50% of the rest of the industry agrees. Clients and the rest of the industry agree that the CCEO should not lead the details of implementation including detailed design and 'on-site' management. One item of significant difference in thinking is Health and Safety Planning. A field according to the BRT the CCEO leads in the most effective systems. Only 43% of clients agreed with the rest of the industry at 26%.

When the client funds the facilities operated, the CCEO is the logical manager of this asset base. However with competitive pressures and shareholder value clients are currently turning their back on asset ownership and paying for facilities as they are required. This questions the role, skills and competencies of the CCEO. Two scenarios of global economic boom and downturn, and their effects on Ford Land show a pendulum demand pattern for Ford Land services. For high demand leadership and teamwork skills relate to multiple large scale projects. For downturn skills include Business Planning, Financial Engineering and Leadership for decisions to buy, acquire, refurbish or sell assets. Ford Land cannot cover all competencies at all times and it's engineering and construction management skills overlap with it's Alliance functional partners highlighting it's business leadership role.

There are no easy market solutions to construction problems. Performance of manufacturing facilities is a source of competitive advantage to meet the demands of: financial agents for shareholder value, customers for improved quality and

environmental regulation. Strong clients more easily resolve problems around: the under-boundedness of construction by developing project organisation and aligning diversity within it; performance contracts, their specification and management; integration of supply chain methods into procurement; performance of facilities and environmentalism, quality and safety in projects. Clients need to lead to achieve capital efficiency leaving functional responsibility with the various teams as an extension of their organisation. This parallels Boyd and Wild(1999). Construction managers require OD skills to consult to the uncertainty in the weak client. Manufacturing clients can minimise uncertainty by resourcing CCEOs as 'Organisational Developer' of their network of projects.

## **CONCLUSION: CRITICISING CONVENTIONAL WISDOM**

Conventional Wisdom(Boyd and Wild1999): is a variant of supply side economics and a critique of the supply side performance of construction; assumes separation of both sides of the construction market while demand and supply interpenetrate in the project; focuses inappropriately on construction organisations and away from client instability; assumes an unproven coherence within and amongst the parties to construction: a desired state of more stable projects and the outcome of 'reform'. Leading client successes in moving towards 'Alliance Based Construction Systems' reveal "...the importance of the Client's role in linking the demand and supply sides of the industry in one virtual and networked organisation"(Atkins 1999a). Reform of supply requires a change in client competencies in managing construction from the demand side. Conventional Wisdom 'prescribes' solutions to construction problems such as the intention of many practitioners of collaborative approaches, once they have helped construction to modernise itself "...to concentrate on their core business and 'outsource' construction."(Bennett and Jayes 1998). This discounts the successes of strong clients and the effects of client demand cycles on the industry and it is adversarialism. It implies that style: equity stakes in projects or adopting 'generic partnering processes and procedures', will improve teamwork and that an external project manager is required who seeks 'responsiveness to the client' in the team.

Atkins' focuses on the recurrent, strong, corporate capitalist client. Such clients have concerted action available in Construction Round Table and it is corporatist relationships with major construction suppliers. This provides a political dimension to the reform of construction missing from conventional wisdom but enforcing it's prescription of a sequence of project leadership roles for each of the parties: the client, designer, construction manager and specialist subcontractor. Reforms to project systems and procurement have aimed to ensure that team members assume such pre-defined roles at the right time. Previously the organisational power necessary to enforce this has been absent. However, the 80% of non recurrent projects for whom conventional wisdom prescribes an external project manager who seeks 'responsiveness to the client' in the team cannot represent a force for reform of construction from the demand side. These lack the internal cohesion necessary limiting the possibilities of client/demand led reform and undermining the unwarranted credibility Conventional Wisdom receives when endorsed by prestigious figures and interests, presently Egan (1998).

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