

IMPROVING THE DELIVERY OF SOCIAL HOUSING IN UK- USING THE AMPHION INITIATIVE AS A CASE STUDY

Yamuna Kaluarachchi and Keith Jones

*School of Architecture and Construction, The University of Greenwich
Avery Hill Campus, Mansion Site Bexley Road, Eltham London SE9 2¹PQ, UK*

Amphion Consortium was formed with the membership of 50 Registered Social Landlords (RSLs) as an initiative in implementing the Egan agenda (1998) which championed the use of Key performance indicators (KPI's) and the setting of benchmarks as the mechanism for achieving radical change in the construction industry. This project used this opportunity to develop, monitor and record the performance of 15 housing development projects which accounts for approximately 300 house units. Relevant KPIs, benchmarks, a data collection and site monitoring system were developed. A range of questionnaires were developed and data collection was executed in three stages which closely mirrored the construction project phases. Detailed interviews with key project personnel, examination of site meeting notes and general feed back reviews were undertaken to identify good and bad practices associated with each project. The turbulent path followed by Amphion and their contractors illustrate how the strategic roles played by key players in the housing industry have a substantial effect on the construction process. Communication, co-ordination and long term partnering which lead to continuous improvement of services and products emerge as some of the key drivers for the successful delivery of quality social housing which meet both the time and cost targets.

Keywords: affordable housing, Amphion, benchmarking, key performance indicators (KPIs), social housing.

BACKGROUND

The 'Rethinking Construction' report (1998) brought forward a radical review of the UK construction industry and recommended a number of measures, including the adoption of benchmarking as a method of improving the performance of UK house building. Benchmarking is a method of improving performance in a systematic way by measuring and comparing your performance against others as well as your own year on year performance, and then using the lessons learned to make targeted improvements. The recent surge of interest in benchmarking has been encouraged by the publication of sets of National Key Performance Indicators (KPIs) that allow companies to measure their performance simply and to set targets based on national performance data². A KPI is the measure of the performance of a process that is critical to the success of an organisation. Currently, the Housing Corporation encourages all Social Landlords (RSLs) to comply with the main Construction Best Practice Programme (CBPP) KPIs which can be summarised as Time, Cost, Quality, Client Satisfaction, Change orders, Business Performance and Health and Safety.

¹ ky02@gre.ac.uk & jk01@gre.ac.uk

² Constructing Excellence web site- URL- www.constructingexcellence.org.uk

At the same time as Egan was reviewing the efficiency of the UK construction industry, a number of housing associations were reviewing the way they procured their housing stock and considered their new building stock was both expensive to build, and maintain. The defects that were still apparent, and the waste produced on site, did not seem consistent with a sustainable method of construction. As a consequence of this review, a small number of housing associations concluded that they needed to systematically change their procurement methods if they were to improve both the quality and cost efficiency of their new build programmes³. The required demand was beyond the scope of these housing associations alone and in order to generate more demand and change the procurement methods, the Amphion consortium was formed with 20 housing association members, who collectively agreed to procure 2000 pre-fabricated houses over a four-year period. Once the demand had been established, Amphion set about instigating change in their procurement processes. The key changes that were envisaged included the:

- development of a partnering arrangement with one preferred house builder
- development of a factory based house production facility
- establishment of key performance indicators by which any changes could be monitored
- setting up and managing of whole house building supply chain.

Amphion promoted Egan principles by introducing lean production methods into house construction using modern timber technologies to produce housing in a factory setting⁴. One of the main objectives of the project was to promote volume (450 units year 1, rising to 500 and 550 units in years 2 and 3) and continuity of production for the development of timber framed dwellings. The consortium set themselves the following targets to continue delivering improvements in quality, cost, time and customer satisfaction. In long term, they planned to:

- Achieve a demanding set of targets for incremental improvement in technology with the objective that by year 4 at least 75% of the superstructure will be factory produced.
- Further enhance training, not only for the site and factory operatives constructing and assembling the units, but also training for RSL staff so that they can be effective clients.
- Explore the possibility of external accreditation.
- Achieve significant reductions in construction periods and costs. Fewer defects, fewer site accidents and increasing customer satisfaction.
- Produce different templates to facilitate high density schemes, small site schemes and projects such as nursing homes and sheltered housing.
- Achieve growth through land acquisition.

³ Jones, K.G, Palmer S.J.- 'Zethus & Amphion: Change Management Programme For Housing Technology', proceedings of the CIB W70 2000 Symposium: November 2000

⁴ The Housing Demonstration Project Report- October 2000, Improving through Measurement, The Housing Forum.

THE PROJECT

The project was to use the unique opportunity offered by the Amphion Consortium programme of new build homes to develop, monitor and record the cause/effect relationships when introducing the change management tools used for Egan Compliance. The main aim of the project was to set, monitor and compare the KPIs and related Benchmarks to be over and above the national and industry averages. Within this aim, the objectives of the projects were:

- To obtain agreement amongst all interested parties as to what benchmarks and KPIs need to be monitored to ensure Egan compliance;
- To develop a simple, robust method for on-site monitoring of KPI data;
- To calibrate the benchmarks and KPIs;
- To map the cause and effect relationships within the change programme.

The project was funded by the Engineering and Physical Sciences Research Council and the Department of Trade and Industry through the Link MCNS Programme. The main benefit of the project can be stated as, ‘the identification of best practice guidance and the development of simple, robust management information tools that will allow all RSLs the facilities to drive improvements in the procurement of their new housing provision’.

The first stage of the research was the development of a series of performance indicators that could be used to monitor any changes that resulted from the new procurement approach. The project built on the ideas presented in the Egan report in which 7 key indicators were identified and extended to other KPIs which were relevant and specific to RSLs as well as the contractor. These were developed in consultation with the relevant team members with the help of workshops, brain storming sessions and many review meetings and included survey methodologies to obtain both quantitative and qualitative data on current new build performances. In all, about 50 KPIs, related benchmarks (where appropriate) and a robust data collection and site monitoring system were developed by the research team in conjunction with the RSLs, client and the main contractor following consultation with representatives from the Housing Corporation, DTI and the Construction Best Practice Programme. Specific metrics were developed under five thematic areas including Sustainability, End User Enjoyment, Project Performance, Cultural Performance and Respect for People. Following an initial pilot study these were reduced to 34 metrics under six themes (see Table 1) and exceeded those required by national monitoring programmes. In the short term, Respect for people KPIs were limited due to the lack of data from RSLs.

Table 1-Key Performance Indicators and related Benchmarks for the Amphion consortium

Thematic Area	KPIs	Metrics and Related Benchmarks
Construction Best Practice Headline KPIs	Construction	Cost [£759.00 per m ² constructed] & Time [63 weeks (av. Site 20-39 units)]
	Predictability	Cost - Design & Construction [+0.64%] Time - Design & Construction [+6.5%]
	Profitability	Of a construction company before tax and interest [12.6%]
	Productivity	The value-added per employee of a construction company

	Defects	Number of defects at hand-over
	Safety	Accident Incident Rate (AIR) & Accident Frequency Rate (AFR).[1 incident per 12500m constructed]
	Client satisfaction	Satisfaction with Product 74% & Services 82%
Amphion Project Performance KPIs	Number of defects at DLP	Number of defects during the defects liability period [3.1 call-backs per unit constructed in the 1 st year]
	Design Changes	Client/ Consultants / Contractor
	Waste	3 skips per unit
	External Events	Planning application party & Planning approval time
	Continuous improvement	Monitor and feed back information
	Project Cost & Time	
End user enjoyment	Annual running costs	Gas/ Electricity/ Water
	Response time to repair	Average time taken to rectify a defect
	Customer satisfaction survey	Tenants responses to their home and immediate environment
Partnering	Clients Team	Time- to respond to instructions & urgent matters
	Clients information	Information regarding the nature of site
	Communication & Co-ordination	Consultations with contractor Contractor involvement stage The number of qualifications (financial) presented by contractor
	PPC 2000 Conditions	Pre-contract matrix
	Contractors Cash Flow	Time and payments (Time from possession to first payment & Total number of days late from issue of certificate to payment)
	Partnering ethos	Volume and Continuity of work (% of Amphion work/ Total work load)
	External professionals	Planning approvals Time taken beyond programme
		Auditing of professional work (Number of errors / drawing revisions)
Standardisation	Compliance of template	Repeat house design/ template
	% of standardisation	Percentage value of super structure pre-fabricated in the factory
Sustainability	Housing Quality Indicators (HQIs) & Eco-Homes Assessment	score

METHODOLOGY

The basic plan of work was to utilise the opportunity offered by the Amphion consortium to study the building of 2000 house units across 100 sites located though

out the UK. The live nature of the projects were to allow identification of the current levels of performance of house building to be recorded and more importantly, the effects of changes in work practices on levels of performance to be monitored. This in turn should allow the identification of best practice to support continuous improvements in new social house provisions.

Development of data collection tools

Following detailed discussions with all those involved in Amphion projects a range of questionnaires were developed and data collection was executed in three stages which closely mirrored the construction project phases. A number of pilot studies were carried out to test the effectiveness of the data collection tools and questionnaire reviews were done with the personnel who completed the questionnaire to further refine these tools. Two main questionnaires were developed:

- to collect data from the RSLs in order to monitor the CBPP and the Amphion performance KPIs.
- to collect data from the contractor regarding the process based KPIs that were to be monitored.

Data collection

In all about 15 projects are being monitored, constituting about 300 housing units. In addition to the KPI data, detailed interviews with key project personnel & RSL project managers, examination of site meeting notes and general feed back reviews (workshops, telephone interviews and questionnaires) were undertaken to identify good and bad practices associated with each project and with the Amphion experiment in general. Theses were conducted before the start of the main project as well as the end of the project to gather details about their experiences.

Once the initial data was collected an attempt was made to collect the qualitative data that would give a profile of the overall performance of the project. From the key personnel that were involved good and bad practice issues that affected the performance of the project were gathered. The lessons learnt and the information that could benefit future projects were gathered for the benefit of the Housing Associations as well as other Construction industry professionals.

PERFORMANCE OF AMPHION SCHEMES

Eventhough demand was a key issue to be addressed, the consortium did not reach their target for the selected time period. This was mainly due to problems experienced by the contractor, land supply, the delays associated with section 106 projects and some unsuccessful capital bids to the Housing Corporation. Many shortcomings were identified:

- Factory production was initially working below capacity creating cost premiums at early stages with target cost reductions not achieved.
- Small infill sites were initially brought forward for inclusion in the programme when the product most suited larger sites with predominantly terraced and semi-detached houses.
- Development planning difficulties, including the nature and suitability of Section 106 agreements, could often delay the bringing forward of units in line with the plan.

- The technology was slow to advance and off-site manufacturing only reached a level of 35% opposed to the 75% targeted for the programme.
- Strategic changes in the partnership meant that quality of some projects was poor
- Value chains of the various partners were not sufficiently aligned leading to problems with delivering partnership benefits as intended.⁵

Nevertheless, 12 projects which span over the period 2000-2002 show an average performance in relation to their CBPP headline KPIs. About half of the projects seem to achieve at least 50% as their average benchmark score. For each of the projects (data were limited in some) benchmark scores for each of the headline KPIs were calculated, compared against CBPP benchmarks and averaged in a final Score.

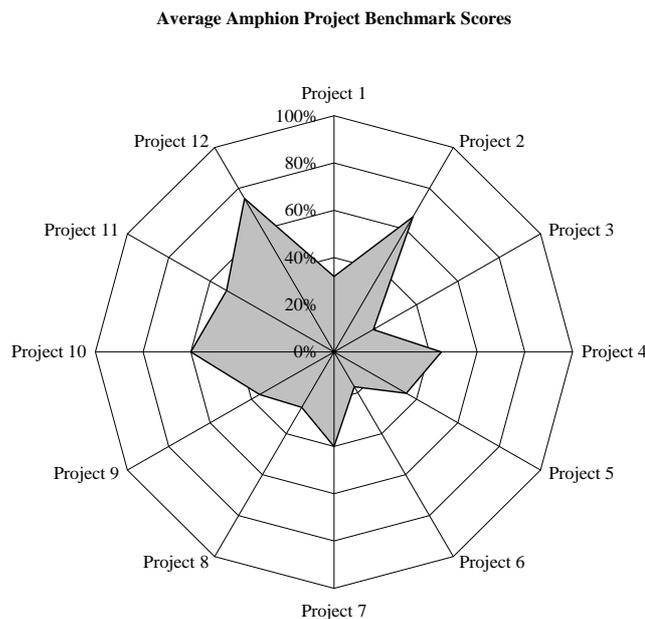


Figure 1

Project 1 commenced on site in the beginning of year 2000 and Project 12 at the end of 2002. From Project 1 to 12 an improvement in performance can be observed and illustrates how continuous improvement in product and services influence the overall performance of projects (see Figure 1).

This result is again emphasized compared with each of the construction Best Practice Headline Benchmarks (see Figure 2). Most headline KPIs seem to have achieved more than a 50% Benchmark score. The product seems to be performing well in its environmental impact as well as client satisfaction which could be the result of research and development that has gone into the award winning Tee-U-Tec timber frame system. In comparison, the predictability KPIs have not performed well due to the new applications of this product. Construction time seems to be the KPI that is suffering most. With the experience of application on site, these Benchmarks have the potential to be improved to a higher percentage.

⁵ Harper Barry- Tomorrow's Homes- modern methods of construction, procurement and finance - Davis Langdon and Everest Report

Average Project Performance Against Construction Best Practice Benchmarks

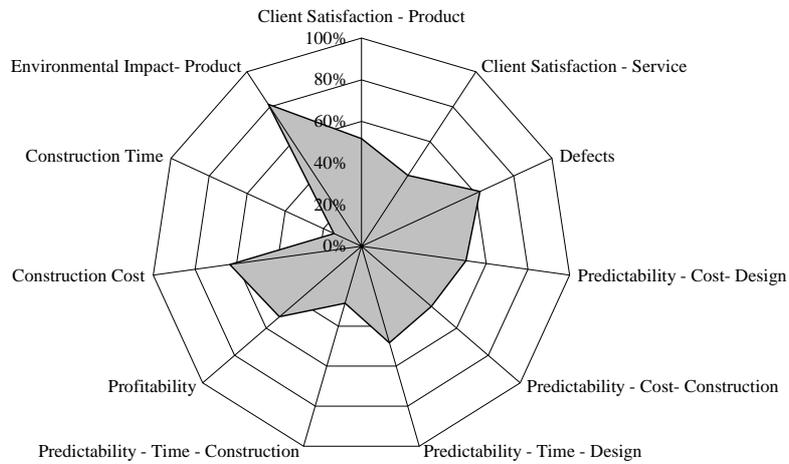


Figure 2

Where Amphion appears to be doing best is in an assessment of tenant satisfaction. For the three completed developments reviewed to date it is clear that, across a range of issues, tenants are very pleased with their Amphion houses (Figure 3).

Average Tenant Satisfaction Scores

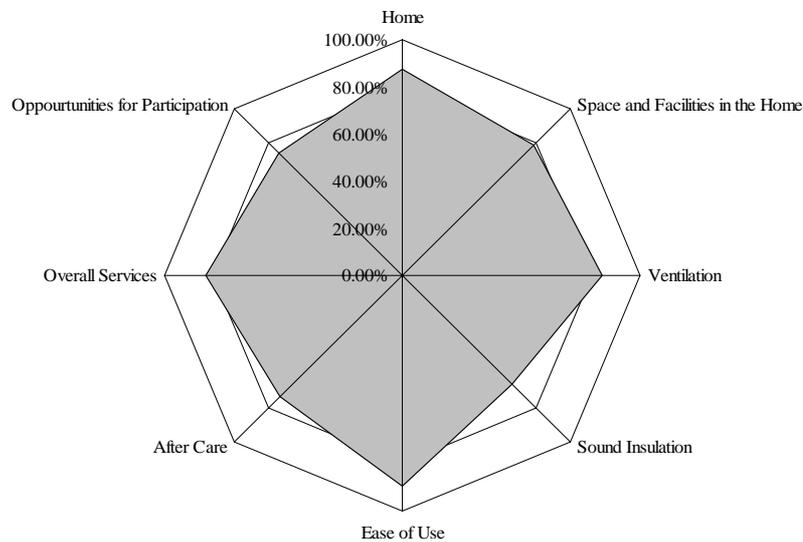


Figure 3

LESSONS LEARNT FROM THE AMPHION EXPERIENCE

Amphion has now reached the final year of the partnering process. The group had set up policy groups who met regularly to look at issues such as technology and innovation, benchmarking and partnering the supply chain. Without the commitment of the key RSLs to push forward with the Egan ideal, Amphion would have ceased to exist, another example of a bold initiative that faltered at the hands of a very

competitive UK construction market. However, having survived these problems, Amphion has moved forward. As the lessons learned by all those involved with Amphion begin to work their way through the system, significant improvements in performance can be observed and enable the consortium to continually value engineer the process and seek continuous improvement (Figure 1, Improvements in benchmarks scores for Projects 10, 11 & 12, started on site two years after Project 1)

The relationship with the contractor provides some key issues which can be beneficial to the industry as a whole. It was easy to see that in projects where the contractor got involved at an early stage many problems were solved before the project went on site for construction, thus saving on valuable construction cost and time. The more information that was provided to the contractor by the client at preliminary stages made it possible for the contractor to make more realistic feasibility sums regarding the project, allowing for problems in site to be dealt with speed and a minimum cost.

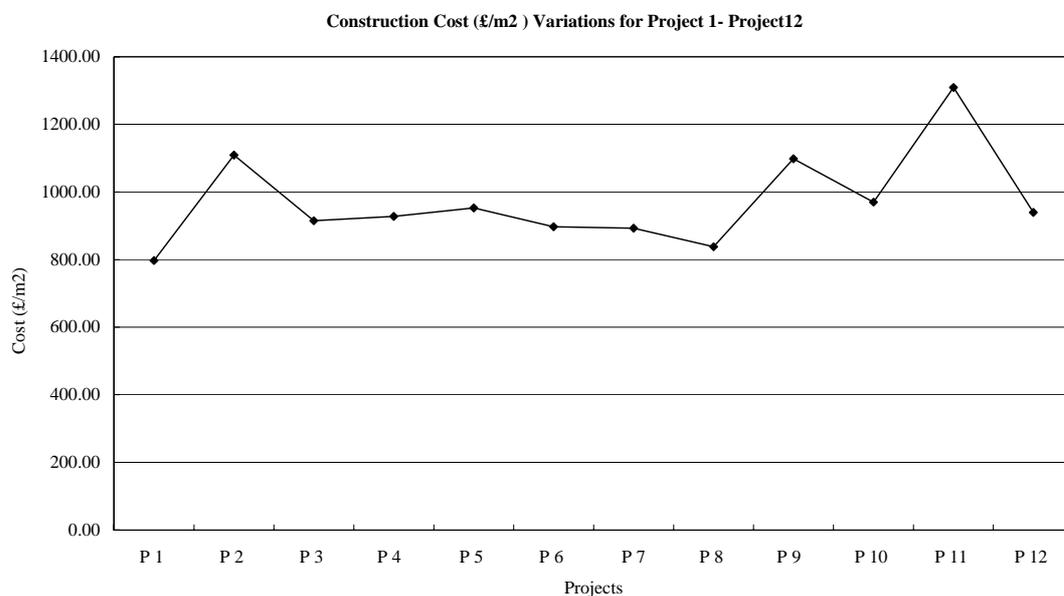


Figure 4

Figure 4 illustrates the construction cost (per m²) rate for the 12 projects range from £800 -£1300. A detail look into various external forces that influence the cost exemplify that a close relationship with the contractor, especially pre-initial feasibility stage, has benefited most projects in bringing their construction cost down. Project 2 and Project 11 had few or no meetings with contractor prior to initial feasibility stage and very little information was provided to the contractor in terms of site boundaries, site access, soil investigations and party wall arrangements which hindered the work on site thus increasing the construction cost.

The importance of partnering the whole supply chain also emerged as a key issue in the process. If the contractor cannot co-ordinate his sub-contractors and suppliers, the whole partnering process ground to a halt affecting the cash flow of the contractor and the whole construction process. There were many good and bad practice issues that were identified by RSLs as important from the Amphion experience. The good practice issues were; increased health and safety measures, reducing the environmental impact, achieving the sustainability targets while the bad practice issues include defects not being attended on time, lack of communication and co-

ordination and complicating the construction process by the introduction of many middle agents. From the data that were available, the number of defects were reasonably high. These figures were expected to come down as the product was continuously improved from the feed backs from the site but this process never got off the ground due to poor demand. Also, most projects are within their defects liability period and the available data is limited regarding the details of the defects and their rectification.

The main lessons that can be learnt from Amphion are not only from the data that was collected but by the interviews which gave an insight to the way that the key personnel felt about the whole partnering process. Many short comings in terms of communications between parties, distributing the knowledge gained by managers among the site and factory personnel, discrepancies in key management decisions among parties were commonly sited as drawbacks. In most cases decisions that were important to the process was not discussed or shared with the main personnel on site agents resulting in resentment among the lower ranked staff. From the workshops it was concluded that a new initiative like Amphion need a good backup programme in terms of technical help, assistance and a quick method of problem solving rather than a long drawn process involving many hierarchical management systems. A central data base where information is stored and easily accessible to all concerned is also of crucial value.

CONCLUSIONS

In general, the study illustrates how the availability of land (which was a key issue in the changes in the contractors profile) and the strategic roles played by key players in the housing industry have a substantial effect on the delivery of social housing. Communication, co-ordination and long term partnering which lead to continuous improvement of services and products emerge as some of the key drivers for the successful delivery of quality social housing which meet both the time and cost targets. The key players in the team including the RSLs, the contractor and the consultants and professionals have to be committed the partnering process. The lessons learnt from this project will benefit other RSLs, Government housing authorities, and industry professionals as they seek to address the challenge of achieving best practice and continuous improvements in new social housing development.

REFERENCES

- Constructing Excellence web site- URL- www.constructingexcellence.org.uk
- Department of Trade and Industry (1998) Rethinking Construction
- Harper Barry (2004) *Tomorrow's Homes*- modern methods of construction, procurement and finance. The Challenge and Benefits of Partnership: The Amphion Project. Davis Langdon and Everest Unpublished Report
- Jones, K.G, Palmer S.J. (2000) 'Zethus & Amphion: Change Management Programme For Housing Technology'. Proceedings of the CIB W70 2000 Symposium: Providing Facilities Solutions to Business Challenges-Moving Towards Integrated R4esource Management, CIB Publications ISBN 1 86435 497 6
- The Housing Forum (2000) The Housing Demonstration Project Report - Improving through Measurement.