Performance-based maintenance procurement by Dutch housing associations

- Working paper –

Ad Straub
OTB Research Institute for Housing, Urban and Mobility Studies, Delft University of Technology
P.O. Box 5030, 2600 GA Delft
T +31 (0)15 27 82769
F +31 (0)15 27 83450
A.straub@tudelft.nl

Henk-Jan van Mossel
OTB Research Institute for Housing, Urban and Mobility Studies, Delft University of Technology
P.O. Box 5030, 2600 GA Delft
T +31 (0)15 27 83101
F +31 (0)15 27 83450
H.J.vanMossel@tudelft.nl

Summary
Maintenance works are component services that are part of the final housing service to the tenant. Because main building maintenance works are designed each time again, it can be compared to product (service) development. With different types of cooperation with maintenance contractors, the degree of interference of them in the product development phases varies. In a performance-based maintenance process, the integration of maintenance contractors is higher than in traditional arms-length relations. It leads to an adapted division of tasks between the housing association and the maintenance contractor. Moreover, risks are moved to the contractor, which ought to lead to improved processes and improved quality.

Keywords: Performance contract, building maintenance, supplier involvement

Introduction
As a result of changes in housing policy in the 1990s, Dutch housing associations have to manage their housing stock in a more commercial way. They have to anticipate market developments and formulate a strategy for the development of their housing stock (Gruis and Nieboer, 2004). It has forced housing associations to critically review their core-business activities. This has lead to a flow of outsourcing of maintenance works, which is therefore currently mainly executed by the building industry. Further, until recently, housing associations were not responsive enough to the demands of informed citizens (Priemus, 2003). These developments mean two points of special interest for procurement of maintenance. (1) Customer preferences and tenant satisfaction should be considered, and (2) total costs of ownership should be taken into account. With the development of performance-based maintenance contracts for (long-term) maintenance of housing blocks, an attempt is being made to include total costs of ownership in the decision process, while increasing the quality of process and service and therefore increasing customer satisfaction.

Despite the fact that model contracts exist for many years, the development of performance-based maintenance contracts is still in its early stages. Progress varies greatly according to the type of maintenance concerned. The results of a survey by the Economic Institute for the Construction Industry (EIB), together with findings of a recent OTB survey, indicate that most professional housing managers still contract
out maintenance activities in the traditional manner, but the market share is growing (EIB, 1998; Vijverberg, 2004). In 1997 only 3% of housing associations granted maintenance work in a performance-based manner. For paintwork this figure counted 12%, while for installation maintenance it was 18%. In 2003 more than one third of all housing associations concluded performance contract for paintwork. For associations managing more than 4,000 dwellings this percentage is 44%.

Research project

The OTB Research Institute for Housing, Urban and Mobility Studies, which is part of Delft University of Technology in the Netherlands, examines the application of performance-based maintenance contracts by Dutch housing associations. This research is entitled “Performance-based cooperation in the technical management of housing stock”. Main Dutch housing associations, real estate maintenance contractors and branch organisations contribute to this project, which consist of two studies and a PhD-research.

The first study is into performance-based contracts for several building components and organization’s maintenance activities and involves seven large, innovative housing associations and the Dutch Building Research Foundation (SBR). The housing associations involved in the study have entered into performance-based contracts with maintenance contractors. The second, parallel, study is into performance-based approaches and involves input from contractors specializing in exterior surfaces. Both studies hope to promote mutual learning and to establish guidelines for performance-based maintenance concepts. The first phase involved literature reviews and case studies into the housing associations’ current procurement and outsourcing methods. Performance-based contracts covering the maintenance of central heating systems and lifts, flat roofing and work to exterior surfaces and paintwork have been examined and compared. Maintenance processes were modelled. In 2004 performance-based processes and contracts for exterior surfaces were further elaborated. In coming years the Dutch situation with regard to innovative performance-based concepts will be compared to that in other countries, and that current in the refurbishment and new-build sector. There has been considerable prior research into the performance-based concept in new construction (e.g. Pries, 1997). The results of our study indicate that the preconditions that exist here also apply for parts of maintenance and improvement work.

The PhD-research deals with the commodity strategy development of technical management services as conducted by Dutch housing associations. It aims to provide insights in development opportunities enabling housing associations to make choices in balancing customer value (to tenants) and financial yields to the housing association.

The paper starts with some theoretical foundations and reasons for the development of performance-based contracts for building maintenance. Through the product development process perspective, performance-based maintenance procurement find connection with the existing literature. Simultaneously, it clearly visualise the variables that discern performance-based maintenance procurement from traditional (fixed priced) procurement. Finally, flow charts are presented to depict the process steps that have to be taken by housing associations and maintenance contractors when pursuing performance-based maintenance cooperation in building maintenance.
The outcome of the research will assist in discussions around the transition of the building sector from a one-dimensional orientation on costs, to process and value maximization. Therewith, impetus to unwelcome cooperation between building contractors in tendering processes can decrease (Dorée, 2004).

Reasons for performance-based cooperation

Housing maintenance as provided by building contractors contains the works, and besides it may include some advice service to housing associations. These works have some service characteristics and some product-related characteristics. As maintenance works usually have many ‘service’ characteristics, from here on we will call them maintenance services. Axelsson and Wynstra (2002) posit that de application of a business service, as seen from the customer’s perspective, is one of the main factors affecting the appropriate design customer-supplier interfaces and interactions. Four types of services resulted from classifying them according to the way they were used through the buying company: as a component that becomes part of a final product, a piece of equipment or as a consumable. These services are: component services, semi-manufactured services, instrumental services and consumption services. Component services are passed on to the end-consumer unaltered and can add value to the buying company’s offering. We consider maintenance works as component services that becomes part of a final housing service to the tenant. Consumption services are used within the buying firm without becoming part of the offering of the final customer. We consider all accompanying consultancy activities by maintenance contractors as consumption services.

As we conclude that maintenance services are part of the housing service to tenants, making them component services being passed on to the end-customer unaltered, the importance of the valuation of these services by tenants is clear. Product or service quality is being considered as a main contributor to customer satisfaction. Service quality is a measure of how well the service level delivered matches customer expectations. Delivering quality means conforming to customer expectations on a consistent basis (Lewis and Booms, 1983). Thus, when a housing association gets a better grip on the quality of the outcomes of maintenance processes, tenant satisfaction can be improved. The Dutch Housing Quality Survey (Ministry of Housing Special Planning and the Environment, 2000) has indeed evolved that in dwellings with high scores on maintenance conditions, people are generally more satisfied than in dwellings with comparatively low scores. Procurement of maintenance services should therefore include an investigation of all attributes to customer satisfaction. For example, in selection decisions this means that previous experiences of the concerning contractor with tenant contact could be assessed. At the same time, improvements on the durability of technical maintenance interventions have positive influences on total costs of ownership. Performance-based maintenance procurement encompasses both aspects.

Traditional maintenance contracting versus performance-based contracting

The objectives of traditional maintenance contracting are to achieve the lowest price or best price-quality ratio by means of competitive tender. The maintenance contract is based upon a detailed specification of work to be performed. The objectives of housing associations for performance-based cooperation are to improve quality, to achieve budget certainty and cost savings, to simplify the maintenance management
process and to promote innovation on the part of maintenance contractors. Maintenance contractors are acting as consultants. They advise about strategies, performance and maintenance activities. A housing association cooperates for the maintenance of its housing stock in the long-term with a selected group of maintenance contractors. Contractors are consulted at an early stage of the process, and are therefore able to contribute their ideas concerning the best maintenance strategy within the constraints of the performance requirements, the expected exploitation period and the financial aspects applying to each housing complex. The contract duration is a maintenance scenario covering several maintenance intervals, eventually lasting the expected exploitation period of a housing complex.

**Performance-based maintenance**

For a performance-based approach to maintenance work the Performance System Model of CIB TG37 Performance-Based Building Regulatory Systems (Tubbs, 2004) can be used. This model can be divided into a qualitative component and a quantitative component. Qualitative is where the building owner needs are expressed in general language usually in the form of goals and objectives. Derived from that are functional statements and operative or performance requirements. Quantitative are criteria and standards. Standards contain verification methods.

For maintenance work functional statements, (decisive) performance requirements and performance criteria suffice. Performance requirements are not just technical, but can also hold performance of service delivery, e.g. response time. Performance requirements, even on the long-term, can be considered as output specifications. In case that the use of the component strongly influences performance, output specifications do not satisfy. Client and contractor need ‘output measure’.

**Maintenance contracts**

Based on two criteria, maintenance contracts of Dutch housing associations can be distinguished: The extent of issues to be fixed beforehand, and the degree of applied performance-based management. The different forms of contract can (roughly) be placed on a continuum ranging from ‘fixed price’ until ‘no fixed arrangements’ (see figure 1).

Fixed variables can be a tariff per man-hour, a tariff related to used materials, a tariff related to the needed time to finish the project(s), a tariff related to the perceived customer satisfaction, etc. Furthermore, the contracts can be put on a continuum ranging from ‘activity-based’ until ‘performance-based’ (see figure 2).

If a contract is performance-based, the contractor has contract-related incentives to improve its way of working in terms of performance. If a contract is activity-based, the contractor does not have them. Open order and fixed price contracts can be activity-based or performance-based.

**Figure 1 – Forms of contracts from ‘fixed price’ until ‘no fixed arrangements’**

<table>
<thead>
<tr>
<th>Fixed price contract</th>
<th>Cost reimbursement contract/ Service level agreement (SLA)</th>
<th>Open order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed price</td>
<td>Fixed variables</td>
<td>No fixed arrangements</td>
</tr>
</tbody>
</table>
Based on these two continuums, table 1 shows a clear classification of the different forms of contract. As the outcome of the open order is not yet clear from the beginning, it is not decided as well if it is activity-based or performance-based. The outcome will depend on the contents and the characteristics of the contacts between the contractor and the customer. Fixed price contracts can be both activity-based and performance-based too. A fixed price contract forces a contractor to work performance-based if the contractor, within the scope of the contract, is responsible for the work in the longer run (more than one term). In the latter situation, the contractor does have an incentive to improve, next to cost-related issues, quality-related issues. If a fixed price contract is a performance-based contract, it is a result contract. If a performance-based contract is based on fixed variables including an incentive to improve (quality) performances, it is an incentive service level contract. In the actual practice often no distinction is being made between both types of performance-based contracts, and both types are just called performance-based contracts.

<table>
<thead>
<tr>
<th></th>
<th>Fixed price</th>
<th>Fixed variables</th>
<th>No fixed arrangements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity based</td>
<td>Fixed price contract</td>
<td>Cost reimbursement</td>
<td>Open order</td>
</tr>
<tr>
<td>Performance-based</td>
<td>Result agreement</td>
<td>Incentive SLA</td>
<td>Open order</td>
</tr>
</tbody>
</table>

Setting up specifications: a product development process

For critical commodities in maintenance services, performance-based contracts, and the accompanying (long-term) cooperation has a lot to offer. Critical commodities are packages of maintenance services that essentially influence either customer value to tenants or yields on real estate or both. In other words, these are the packages that have essential impact on the aim of housing associations. At the same time, possibilities with regards to supply are restricted. In terms of e.g. Olsen and Ellram (1997) and Kraljic (1983), these are the strategic items.

Because of main building maintenance works are designed each time new, it can be compared to product (service) development. With different types of cooperation with maintenance contractors, the degree of interference of them in the product development phases varies. In a performance-based maintenance process, the integration of maintenance contractors is higher than in traditional arms-length relations.

Handfield et al. (1999) introduce five possible supplier integration points in the product development process. The new product development process, as presented
in figure 3, is “a series of interdependent and often overlapping stages during which a new product (or process or service) is brought from the ‘idea’ stage to readiness for […] production or service delivery” (Handfield et al., 1999: 62).

**Figure 3 - New product development process (Handfield et al. 1999, Monczka et al. 2000)**


In the first stage (idea generation), the strategic housing stock policy is developed, aiming at matching demand and supply of dwellings. The housing association constructs a picture of the composition of the dwelling portfolio considered desirable and sets up market strategies for the desired products. In the second stage, technical solutions to the customer’s requirements are identified. In the strategic housing stock policy, the intended quality levels of dwellings for different customer segments are determined. This is further refined to functional statements of building components. At the same time the housing association determines the desired quality of existing building blocks and sets up a programme of requirements for these blocks. The programme of requirements set out the general objectives, guiding principles and preconditions for the envisaged partnership form, as well as the desired exploitation period of the housing blocks and the functional statements for the technical maintenance interventions. In case of performance-based cooperation, the interference of suppliers starts at the third stage. Housing associations put out works to tender using output specifications derived from the functional statements. Based on the programme of requirement contractors are selected. In this stage, concepts for problem resolution are developed. Contractors assess the actual technical state of the housing blocks. The performance criteria for the service are already ‘frozen’. In the next stage, detailed blueprints – technical specifications – are designed. Performance-based cooperation makes the maintenance contractor responsible for the technical problem resolution. The maintenance contractor instead of the client is responsible for the technical specifications. The fifth stage does not reflect processes for building maintenance, except in cases that new maintenance methods are being developed, e.g. repair systems for wooden window frames. Usually, experience from past performance is sufficient to assess the viability of the new maintenance project. Random checks are sufficient for the housing associations to control the process.

In traditional procurement of building maintenance, the maintenance contractor is scarcely involved within the product development process as presented. It just has to perform accordingly to the technical specifications, which are the outcomes of the product development process.

To conclude, from the perspective of product development, performance-based cooperation has two important characteristics: (1) the degree of supplier involvement is relatively high, and (2) output specifications are used to specify the buyer’s needs towards the supplier(s). This causes a higher responsibility for the maintenance contractors towards housing associations.
Organising performance-based cooperation in building maintenance

Now the discerning characteristics of performance-based building maintenance are known, flow charts have been developed that enable parties to take the right steps in entering and pursuing performance-based contracts. Figure 5 gives a picture of the procurement process model of traditional (fixed priced) contracting-out of maintenance activities, used as a reference model. Figure 6 gives a picture of performance-based cooperation for maintenance.

Figure 4 - Process model Traditional contracting-out (by tender) of maintenance activities

<table>
<thead>
<tr>
<th>Housing association</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeting</td>
<td>Collecting project information</td>
</tr>
<tr>
<td>Formulating</td>
<td>Submit tender</td>
</tr>
<tr>
<td>technical specifications</td>
<td></td>
</tr>
<tr>
<td>Invite tenders</td>
<td></td>
</tr>
<tr>
<td>Assessing tenders</td>
<td></td>
</tr>
<tr>
<td>Select contractor</td>
<td>Lay down definitive tender</td>
</tr>
<tr>
<td></td>
<td>Conclude Maintenance agreement</td>
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<tr>
<td></td>
<td>Drawing up project plan and work planning</td>
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<tr>
<td></td>
<td>Execution work</td>
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<tr>
<td></td>
<td>Completion work</td>
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<tr>
<td></td>
<td>Work consultation</td>
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<td></td>
<td></td>
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<tr>
<td>Supervision work</td>
<td></td>
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<tr>
<td>Final acceptance control</td>
<td></td>
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<td></td>
<td>Settle work guarantees</td>
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<tr>
<td>Evaluation maintenance commission</td>
<td></td>
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</tbody>
</table>
Figure 5 - Process model Long-term cooperation for maintenance

Housing association

Specify decisive performance requirements

Conclude general contract

Conclude Partnership agreement

Collecting project information

General project assessment and calculation work

Condition assessment

Drawing up maintenance scenarios and activity plans

Working out activity plan

Drawing up project plan and work planning

Execution work

Completion work

Periodic performance measurements

Adaptation maintenance scenario and activity plan(s)

Specify provisional performance criteria

Determine starting points

Lay down maintenance scenario and performance criteria

Budgeting
Formulating maintenance project

Collecting project information

General project assessment and calculation work

Condition assessment

Drawing up maintenance scenarios and activity plans

Working out activity plan

Drawing up project plan and work planning

Execution work

Completion work

Periodic performance measurements

Adaptation maintenance scenario and activity plan(s)

 Specify decisive performance requirements

Conclude general contract

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Conclude Partnership agreement

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General project assessment and calculation work

Condition assessment

Drawing up maintenance scenarios and activity plans

Working out activity plan

Drawing up project plan and work planning

Execution work

Completion work

Periodic performance measurements

Adaptation maintenance scenario and activity plan(s)
Traditionally technical specifications are formulated by the housing association, being the basis of the multi-tendering process. The housing association supervises the maintenance work in detail. A final acceptance control also involves an examination of performance directly related to the quality of the workmanship. Measurement of client satisfaction might be done by the housing association.

In a long-term performance-based cooperation form the housing association and the maintenance contractor jointly specify decisive performance requirements for several housing blocks, concluded in a general contract. The contractor works out the desired performances, fitting them into the actual technical state of the housing block and the desired exploitation period. The technical solutions are laid down in maintenance scenarios and activity plans. A maintenance scenario covers several intervals of returning maintenance interventions, for example paintwork. The best maintenance scenario is chosen, based upon net present values and total costs of ownership. The scenario and the performance criteria are laid down in a performance agreement. In a performance-based partnership form the primary purpose of control and supervision by the housing association is to review the performance achievements and to identify problems with the necessary action. The contractors themselves monitor the degradation processes of building components by performing performance measurements. In case of paintwork this may for example concern the cracking of substrates and the degree of blistering of paints. They also monitor the process and especially the client satisfaction during maintenance interventions and thereafter. They keep responsibilities for laid down performances and client satisfaction during the contract period. Performance control by independent third parties, may take the form of a random check rather than a full inspection of all performance criteria. During the contract period the maintenance scenario might be adapted. The housing association’s objectives are likely to change over time, just as external circumstances may change.

Conclusions

When housing maintenance services can be perceived as strategic purchases, performance-based cooperation between buyers (housing associations) and suppliers (maintenance contractors) is recommended. It gives the housing association tools to effectively control the outcomes, leading to an increase of customer satisfaction. At the same time it enables contractors to take part in the product development processes of designing solutions for maintenance problems. From the perspective of product development, performance-based cooperation has two important characteristics: (1) the degree of supplier involvement is relatively high, and (2) output specifications are used to specify the buyer’s needs towards the supplier(s). The division between responsibilities and execution of the maintenance work seems to be one of the most important hindrances for essential innovations in maintenance product and service development. Suppliers should be made responsible for design, materials, construction methods, standards of workmanship and the execution of the work, instead of just executing the measures that are stated by the principal. Buyers can focus on their core business and the planning and control of the technical management process. A performance-based approach could make this real. As maintenance contractors in general have more knowledge on the essential technical issues than housing associations do, it is expected to lead to a reduction of costs from the perspective of total costs of ownership and to an increase of control on service quality.
References


