Housing obsolescence in practice; model implementation

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Abstract

Obsolescence is a serious threat for built property. As an often used demolition motive, obsolescence can be regarded as the last phase of the life span of buildings. From a sustainable viewpoint, life cycle extension is necessary to minimize waste. But there are more considerations to carefully maintain the existing stock. Knowledge about the prevention, the diagnosis and the treatment of obsolescence is therefore of growing importance. In previous research publications we combined the available knowledge about obsolescence in a conceptual model for further research on and appliance in the decision making about demolition.

Since evidence based theoretical research references on obsolescence are rare, the model has inevitably an explorative character. As the next step in our research, a series of interviews and case studies were conducted to test and further develop the model. Following our previous paper reporting from case studies in the social rented sector, this paper covers case studies in the commercial rented and owner-occupied sector and an overview of tools to detect and measure different kinds of obsolescence as included in the conceptual model.

Keywords:
obsolescence, life cycle extension, housing management, housing pathology, decision-making
1. Introduction

Obsolescence of buildings is a serious threat for built property and the large physical, economic and societal investments incorporated in buildings. However, knowledge about obsolescence and about the prevention, diagnosis and treatment of it is scarce. The objective of our research project is to contribute to better knowledge of this phenomenon by developing and testing a model that can be used to diagnose obsolescence, and maybe treat and prevent it.

Basis of our research project is a conceptual model based on the available knowledge about obsolescence (Thomsen and van der Flier, 2011).

Obsolescence of buildings can be defined in various ways: by causes, by elements or by effects (Markus et al., 1972; Nutt et al., 1976; Iselin and Lemer, 1993). In our research project obsolescence is defined as the process of declining performance resulting in the end of service life (Thomsen and van der Flier, 2011). Performance is defined as the extent to which buildings meet requirements. The decline of the performance of buildings can be absolute when the actual performance is below the performance on completion. It can also be relative when the performance does not meet growing requirements. Based on the literature we distinguish two dimensions:

- an endogenous or internal vs. exogenous or external dimension
- a physical vs. behavioral dimension

Endogenous aspects of obsolescence are related to the building itself; exogenous aspects are related to the location and context of the building. Physical aspects are related to the physical and/or technical characteristics of building and behavioral aspects are related to the behaviour regarding the building. Combined, a quadrant matrix can be made as shown in figure 1 (Thomsen and van der Flier, 2011).

![Conceptual model of obsolescence](image)

**Fig. 1. Conceptual model of obsolescence**

In previous papers we developed the model and tested it in case studies from the social rented sector (Thomsen and van der Flier, 2012). We concluded that the model was suitable to classify the types of obsolescence found in the cases. We also concluded that the test should be extended to other parts of the stock: the owner occupied and the private rented stock. A last conclusion was that the model was rather crude and had to become more operational and detailed.

This paper reports about the next steps in our research project. It covers case studies in the private rented and owner-occupied sector and gives an overview of available tools to detect and measure different types of obsolescence.

The paper is structured by the following research questions:

1. What types of obsolescence can be found in cases from different property sectors, i.e. the owner occupied sector and the private rented sector; what types are most important and what are the relations between the types?
2. What instruments are available to determine and measure types of obsolescence?
The first question is answered in sections 2; the second one in section 3. The paper ends in section 4 with conclusions and discussion about the further elaboration of the model.

2. Case studies about obsolescence in the owner occupied and private rented sector

2.1. The selection of case studies

The first research question is directed at types of obsolescence related to tenure. Following our previous papers the research field is at first instance limited to the Netherlands. As in this tentative stage representativity is not essential (and beyond our means) the selection of the case studies is based on interviews with the major stakeholders, using general relevancy as main criteria.

The Dutch housing stock includes well over 7 million dwellings (2012). Table 1 gives an overview of the stock according to building type and tenure (2009).

<table>
<thead>
<tr>
<th>Type</th>
<th>Apartment</th>
<th>Single family</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x 1000</td>
<td>%</td>
<td>x 1000</td>
</tr>
<tr>
<td>Social rented</td>
<td>1.295</td>
<td>58.8</td>
<td>1.064</td>
</tr>
<tr>
<td>Private rented</td>
<td>317</td>
<td>14.4</td>
<td>200</td>
</tr>
<tr>
<td>Owner occupied</td>
<td>590</td>
<td>26.8</td>
<td>3.531</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2.202</strong></td>
<td><strong>100</strong></td>
<td><strong>4.794</strong></td>
</tr>
</tbody>
</table>


In a previous paper we reported about some first tentative case studies in the Dutch social rented sector (Thomsen and van der Flier, 2012). The reason for this being the case of a first approach as the Dutch social rented sector is relatively extensive and consistent regarding type and tenure and - due to a limited number of owners - easily approachable. In this paper we complete our survey with case studies in the private/commercial rented and owner-occupied sector.

Table 1 shows that almost 60% of the Dutch housing stock is owner occupied. 85% of the owner occupied stock consists of single family dwellings; 15% are dwellings in apartment blocks. The most recent housing stock survey shows a further growth of the owner-occupied sector to 60% (Ministerie BZK, 2013).

It is difficult to select representative cases of obsolescence from the single family part of this stock. The detection of problems related to obsolescence in owner occupied single family dwellings and the activities to remedy them are not so much related with the quality of the dwellings but with the life cycle of the households living there, e.g. the birth or the departure of children or partners (Priemus, 1969; Baum and Hassan, 1999). So the detection of defects and initiatives to remedy them vary widely in time and magnitude. As a consequence, instead of separate owner-occupiers, the case studies were focused on the scale of representing collectives. In urban renewal areas the owners have a collective interest in the improvement of the neighbourhood and as such a common understanding may be presumed. In owner occupied dwellings in apartment blocks the owners, their behaviour and interventions are more closely connected and the detection of obsolescence and the activities to remedy it are closer related to each other and to the actual quality development of the dwellings. That is why we decided to select the following cases. To limit variation in context both cases are situated in the Hague region.

Both cases regard renovation projects; demolition cases are almost absent in the owner occupied sector (cf. Thomsen and van der Flier, 2008).

A small part (7 to 8%) of the housing stock is private rented, of which the larger part are apartments in blocks. This sector consists of two different parts: a pre-war part of mainly privately owned small mainly low quality dwellings in larger cities, and a post-war part of modest size and quality owned by institutional investors (i.e. insurance companies, pension and property funds; Meijer and Thomsen, 2006). Though relatively small, the sector is relevant for this survey because of the specific profit-directed goals and management.
2.2. Owner occupied dwellings in apartment blocks

Dutch law makes it mandatory for owners of dwellings in apartment blocks to establish an owners association (Vereniging van Eigenaren). The association is responsible for the communal parts: main structure, envelop and foundation, of the block. The owners of the individual apartments remain responsible for the inner parts of the dwelling. In 2012 129,000 associations had been established, 90,000 of them with less than 10 apartments. In the past a lot of these associations were sleeping and did not function well. The situation grew worse because of speculative bifurcation of small apartment blocks in inner cities and, more recently, the sale of former social rented dwellings. In the process of selling off, the responsibilities of the various types of owners in one block were often unclear. After 2005 new regulation came into effect to activate the associations. They are obliged to have regularly board meetings, to put aside money for maintenance and to draw up a long term maintenance plan. Recent research showed that in 2010 85% of the associations had a maintenance fund, although in 60% of the cases the size of the fund was insufficient. Only 50% of the associations had a long term maintenance plan (Companen, 2012 and Oomen, 2012).

2.2.1. Case study Voorburg Noord

Description

The town of Leidschendam-Voorburg with 40,000 inhabitants is situated directly east of The Hague. The neighbourhood Voorburg Noord comprises 3500 dwellings. The major part of the housing stock are three layer portico blocks built between 1920 and 1940. Originally built and managed by private enterprises a large part of the dwellings were sold to residents in the past 15 years. In conformity with the law 680 owner associations were established. Before 2007 only small part of them - approx. 80 associations - were functioning (well). In 2007 the municipality of Leidschendam-Voorburg commissioned an investigation of the quality of the housing stock in Voorburg Noord because of indications of back repairs and because of the fear for deterioration of the neighbourhood. This deterioration was not reality yet. The Leefbarometer, the instrument that monitors the liveability of Dutch neighbourhoods, gives positive scores for Voorburg Noord during the whole period from 1998 to 2010 (www.leefbarometer.nl).

The result of the assessment of Voorburg Noord were twofold:
- Based on a visual inspection of the front side of the blocks over 700 deficiencies were detected in structural elements like the façade and the balconies
- Only 80 of the 680 owners associations turned out to be active in the management of the communal parts of the properties.

Given these results the municipality decided in 2008 for a multi-track policy. A large information campaign was started to make the owners aware of the problems. All owners associations got an offer for:
- free professional inspection of the structural parts of their property. This resulted in the detection of over 3000 deficiencies in the communal parts of the estates.
- free guidance by an independent advisor during the process
- subsidy for repairs up to 50% of the costs with a maximum of E. 8,000 per dwelling
- low interest loans to cover the other part of the costs.

If the associations were not willing to accept the offer and / or make the repairs the municipality would use its legal power to have the repairs made and recover the costs from the owners. In 2012 almost 80% of the repairs have been made. Although the budget for subsidies was running out in 2010 the owners who were too late to apply for subsidy proceeded with the works and financed the repairs themselves. Another result of the policy was that in 2012 over 600 of the 680 owners associations were active and started to put aside money for maintenance periodically and to draw a long term maintenance plan (van Well, 2012 and Gemeente Leidschendam-Voorburg, 2010-2012).

Analysis

Based on the description of the estate the first research question can be answered as follows:
- Voorburg-Noord is primarily a case of physical building obsolescence (A). The common parts of the blocks showed structural deficiencies. The state of the building deteriorates because of insufficient maintenance due to inactive owners associations. This inactivity might be inter-
interpreted as behavioral building obsolescence (C). The municipality took the initiative because of fear for degradation of the neighborhood. However, the data from the leefbarometer show no real deterioration of the livability. The (fear for) decreasing livability can be interpreted as fear for behavioral location obsolescence (D). There have been no reports about physical location obsolescence (B). The neighbourhood is located in the centre of the region with a lot of services in the environment and does not suffer from environmental nuisance. All the problems mentioned can be classified by means of the model
- The main type of obsolescence in this case is physical building obsolescence (A) reinforced by inactive owners associations resulting in insufficient maintenance (C)

There is a clear relation between the age related physical problems underlying type A and the inability / unwillingness of owners associations to maintain their property (C) which leads to increasing physical building obsolescence.

**2.2.2 Case study Rustenburg Oostbroek**

*Description*

The Hague with 500.000 inhabitants is the third largest city in the Netherlands. In the southwest part of the city the neighbourhood Rustenburg Oostbroek is situated. On the border of the centre but lying under the lee of the main urban structure the neighbourhood is well equipped with services but does not suffer from environmental deficiencies, like noise and low physical safety. It is sometimes characterized as a ‘village’ in the city.

According to the liveability monitor the liveability in the Rustenburg part increased from moderate positive in 2006 to positive in 2010. The Oostbroek part remained moderate positive in that period ([www.Leeftbarometer.nl](http://www.Leeftbarometer.nl)). The housing stock comprises 8000 dwellings. The major part, 7000 dwellings (86%), are three layer portico apartments built between 1925 and 1935. A small part (14%) are single family dwellings, especially in Rustenburg. The average surface of the dwellings is 70m². Over 60% of the stock is owner occupied, 30% is private rented and 10% is social rented. The 7000 owner occupied dwellings are managed by 1450 owner associations, consisting of on average 4.8 owners. The majority is even smaller, comprising only three dwellings (SEV 2006). Compared with the owner occupied stock in the Hague the dwellings are rather cheap, so the neighbourhood functions as entrance to the housing market for first time byers (Van der Zijden 2013).

Because of large scale back repairs, the municipality of The Hague proposed in 1997 to demolish parts of the housing stock of Rustenburg Oostbroek and replace them with new dwellings. The residents rejected the scheme and got support from the city council. After debate the demolition scheme was withdrawn - in reality the municipality would never been able to expropriate the 6300 private owners - and the policy was replaced by an ‘intensive management’ scheme focussing on the removal of back repairs. In the following five year period the back repairs were addressed by a multi-track policy. An agency was created in the neighbourhood:
- to activate the owners associations
- to offer free professional inspection of the condition of the dwellings and help in drawing maintenance schemes backed by threat that the municipality would use its legal powers
- to offer subsidy for repairs

The policy has been successful and resulted in activation of a large number of the owners associations and in sharp reduction of the back repairs.

In 2006 the intensive management scheme was complemented with one focussing on differentiation of the stock by enlarging dwellings. The housing stock in the neighbourhood was rather homogeneous with portico dwellings of 70m². This size is too small for families and hinders housing careers in the neighbourhood. To create a more differentiated stock the ‘Service organization Enlarge your dwelling’ was established. It was funded by the EU, the central government and the municipality. The objective was:
- to enlarge dwellings by joining adjacent dwellings and / or by adding extra space by rooftop extension.
- to offer and allocate municipal subsidies for enlargements, and as turned out to be an essential prerequisite for the scheme
- to once again activate and scale-up the owners associations.
The service organization offered advise by an independent advisor and subsidy of 20% of the construction costs with a maximum of Euro 25,000. Between 2007 and 2012 the scheme resulted in 70 dwellings with extra layers and 30 joined dwellings.

The main reason for this moderate success are the costs. The value of the joined dwelling is usually lower than the purchase price of the two old dwellings. The same goes for the extra layer; it is usually not possible to recover the cost from the increase in value. That is even more important in this neighbourhood that functions as starting point for first time buyers who often want or have to move after a relatively small number of years. So they have to recover the costs in a relatively short period of time.

The fact that the previous major repairs scheme had resulted in many renewed roofs caused an extra hinder as it turned out that the previous investment kept a number of residents who were potentially interested in the enlargement scheme off from once again investing in the renewed roof. Another burden was initially caused by the strict preconditions set by the municipal architectural commission, resulting in roughly 20% extra costs.

In 2009, halfway the programme, discussions were started to include thermal insulation in the targets, as combining the environmental benefits with the financial profits of energy reduction at limited additional costs would have added an extra attractiveness to the enlargement scheme.

As a result of severe municipal budget cuts following the economic crisis, the funding of the service organization ended and it was closed down in 2012.

Since the start of the economic crisis in 2008/9 a decline of the neighbourhood is signalled. A growing number of residents have lost their jobs and are having problems paying their mortgage. This results in many for sale signs. However, due to the stagnation on the housing market only small numbers of dwellings are actually sold. If they are sold they are sometimes bought by rack renters who rent them out to immigrants or other people seeking for as cheap as possible housing (Van der Zijden 2013).

**Analysis**

Based on the description of the neighbourhood the first research question can be answered as follows:

- Rustenburg Oostbroek was a case of physical building obsolescence (A). At the end of the nineties large scale back repairs could be found. The state of the dwellings deteriorated because of insufficient maintenance due to inactive owners associations. This inactivity might be interpreted as behavioral building obsolescence (C). After some debate the successful initiative was taken to stimulate owners associations to remedy the back repairs. In 2006 the homogeneity of the stock was signaled as problem, which hindered growing households to make a housing career in the neighbourhood, behavioral building obsolescence (C). The service organization tried to stimulate differentiation but was only partly successful. The limited success of the effort to differentiate the stock, the growing costs of the bad energy performance of the dwellings and the impact of the economic crisis lead to a declining market position of the dwellings (C) and possible decline of the neighbourhood (D). However, the data from the leefbarometer show no real decrease of the livability and the neighbourhood has strong location qualities. The strict architectural preconditions can be seen as hinder factors for the enlargement projects causing physical location obsolescence (B).

All the problems mentioned can be classified by means of the model.

- The main types of obsolescence in this case are physical building obsolescence (A) reinforced by inactive owners associations resulting in insufficient maintenance and households not able to enlarge their dwellings in a cost effective way (C).

- There is a clear relation between the age related physical problems underlying type A and the inability / unwillingness of owners associations to maintain their property (C).

### 2.3. Private rented dwellings

As stated before, a division can made between two different owner groups: related to specific parts of the stock: private owners and institutional investors. The private owners can be further divided in small landlords with a stock of less than 10 dwellings, mid- size owners with a stock between 10 and 200 dwellings and large mainly institutional owners with a stock of over 200 dwellings (Konings, 2012. Corresponding with this difference in scale a variation in objectives can be seen, ranging from dwellings owned and maintained as pension for the owners to dwellings owned and managed as investment that has to yield a return comparable with the return of other types of investments. Because
of this variation we selected cases of a large owner with property all over the country and abroad, a case of a mid-size owner in Amsterdam and a case of a small owner in Hilversum. All the cases are renovation projects; demolition cases are almost absent in the private rented sector (cf. Thomsen and van der Flier, 2008).

2.3.1. Case study De Omval Amsterdam
Van der Vorm Vastgoed is a relatively large private real estate investor. The portfolio includes 1500 apartments and single family dwellings in among others Amsterdam, Delft and Rotterdam, 15 shopping centres in Delft and other cities and 10 office blocks. Van der Vorm also participates in property funds. The total assets amount to Euro 600 million. Besides property in the Netherlands van der Vorm owns two apartments blocks with shops in Paris (www.vormvastgoed.nl). Two projects of van der Vorm are described to show the way large owners perceive obsolescence (Ammers, 2013).

Description
Van der Vorm owns an office block of 65.000 m2 next to the Amstel Station in Amsterdam. It is rented by the institute of higher education Hogeschool van Amsterdam. The building is situated in the Omval area, a piece of land alongside the Amstel river. In the eighties a large part of the area was transformed from a dilapidated industrial area into an area with high end functions: up market apartments and head offices of large companies like Philips. The area also comprises 5 portico apartment blocks with social rented dwellings, owned by the housing association Stadgenoot. The rental contract with the Hogeschool will end in a few years and the institution will move to another building. For this reason Van der Vorm reconsiders the future of the investment. The building is situated in an attractive area and within easy reach of the Amstel railway station. So there is an option to profitably reposition the building again on the rental market, possibly after renovation, after the departure of the present tenant. However, this option is hampered by the presence of the social rented dwellings. Due to regulation and arrangements with the municipality they cannot be demolished and replaced by more attractive functions. Demolition would enable redevelopment with new dwellings or offices. That would increase the rental value of the building.

Analysis
Based on the description the first research question can be answered as follows:
- The building shows only little regular physical building obsolescence (A). The state of maintenance is up to date. The owner is unwilling or unable to invest on a larger scale (C) because of the nearby social rented dwellings. So there is a tension between physical building obsolescence (A) and the high location quality. Behavioural location obsolescence (D) is present in a small part of the area but absent in the major part; in this part one may speak of behavioural location flourishing. In the view of the owner the most profitable use of the building is hampered by the context (municipal policy and regulations) that prevents replacement of the social rented dwellings (apparently the housing association owning these dwellings does not consider a change in the present situation). This view is not obsolescence in itself but finds expression in the behaviour of the owner who will not invest on a larger scale (C).
- All the problems mentioned can be classified by means of the model.
- The main type of obsolescence in this case is behavioral building obsolescence (C).
- There is a relation between the behavioral building obsolescence (C) expressed in the inability or unwillingness of the owner to invest and the behavioral location obsolescence (D) in one part of the area which hinders the most profitable use of the building.

2.3.2. Case study apartment block in central Paris
Description
A few years ago Van der Vorm acquired an apartment block in Paris. It is well situated on a boulevard in the city centre. It includes profitable shops on the ground floor and large and attractive apartments on the other floors. The top floor was used as living space for servants but lost this function with the disappearance of this type of employment. The last years the top floor was empty or used for storage. The former owner did not alter this situation because he was satisfied with the actual direct (rent) and indirect return (increase of value) and had no need to invest energy and capital in the redevelopment of
the top floor. Van der Vorm obtained the building and took over the rental contracts for the shops and the apartments. They cleared the top floor and constructed studios in the empty space. Studios are sought-after in the centre of Paris. Due to the conversion the rental value of the block increased by Euro 1.5 million.

Analysis
Based on the description the first research question can be answered as follows:
- The example is interesting because it shows both obsolescence and efforts to remedy it. Regarding the goal of our study, the first is most relevant. The upper part of the building showed a tension between behavioural building obsolescence (A) and behavioural location obsolescence (D). The decreasing demand for rooms for servants meant that the top floor lost its function. The fact that the previous owner did not react to this changing demand can be characterised as behavioural building obsolescence (C). Due to the inactivity of the previous owner the physical quality of top floor deteriorated, being physical building obsolescence (A). The inactivity of the owner caused a tension between this and the high quality of the location (D) because the building was not used in the most profitable way. Van der Vorm countered the obsolescence by transforming the top floor into studios (reducing C) thereby increasing the physical quality of the building (reducing A). After the transformation there is a balance again between A and D.
- All the problems mentioned can be classified with the model.
- The main type of obsolescence is behavioural building obsolescence (C). The previous owner did not invest in the upper floor to get the return possible on the location.
- There is a relation between behavioural building obsolescence (C) causing physical building obsolescence (A) and a tension between physical building obsolescence (A) and behavioural location flourishing (D).

Both cases show a tension between the actual behaviour of the owner expressed in behavioural building obsolescence and the most profitable use of the building given the quality of the location. Sometimes the owner succeeds in relieving the tension (Paris); sometimes he does not succeed (Amsterdam). Both cases also show the importance of contextual factors like regulation or financing requirements of the banks influencing the behaviour of the owner.

2.3.3. Case study Amsterdam Edisonstraat
Vastgoedbelang is the Dutch branch association of private investors in real estate property. As a part of their support and consultancy services, one of their activities is participation in several programmes to encourage private landlords to invest in the energy performance of their property. In the framework of these programmes Vastgoedbelang provides advice and free support in projects of its members. The programme Samen energie besparenō is financed by the central government and enables Vastgoedbelang to give advice and guidance in 10 pilot projects each year (Jonker, 2013). The project description of this and the following case are based on interviews with the project manager of Vastgoedbelang (Jonker, 2013).

Description
The Edisonstraat project is situated in the Eastern part of the city of Amsterdam. The owner is a midsize private landlord. The portico apartment blocks are well situated next to a green zone with sport facilities. The liveability of the area is positive (www.leefbarometer.nl) The project includes two blocks with 64 apartments, built between 1960 and 1965. The surface of the dwellings ranges from 80 to 120m2. The rents are moderate due to the fact that a part of the tenants is living there for a long time and because the owner did not seek after the highest profit. At the beginning of 2011 tenants came up with complaints about back repairs: draught, bad isolation and an obsolete heating system. Supported by the neighbourhood organization they set up a tenant organization and started talks with the owner. The project was also adopted as pilot in the municipal program to increase the energy performance of the private stock and at the beginning of 2012. Vastgoedbelang was hired to provide support within a covenant with the municipality of Amsterdam to bring the energy performance of the private rented sector up to label C in 2020. Together with the owner and the tenant organization a plan
was made to carry out the back repairs and to improve the energy performance by replacing the window frames and adding double and triple glazing and by isolating the roof and the ground floor. This could be done with the tenants remaining in their dwelling and with a moderate increase of the rent of €20-30. Besides this package the tenants could opt for a new kitchen or bathroom for a larger rent increase of €150-200. All the parties involved accepted the proposal. However, in the second half of 2012 the project came to a standstill because the ownership was transferred and the new owner had to be convinced of the need of it. After some debate the new owner agreed on the plan. However, the implementation stagnates due to a changing political context. The new Dutch administration announced a program which included a levy on rental dwellings and a another way of including energy efficiency in the rent setting.

**Analysis**

Based on the description the first research question can be answered as follows:

- The Edison project is a case of physical building obsolescence (A). The building blocks show back repairs and a bad energy performance. All the participants were willing to tackle the problems and agreed on the scheme developed under the guidance of Vastgoedbelang. Initially there was no behavioural building obsolescence (C). However, due to announced changing regulation the project came to a standstill and the owner is not willing or able to proceed given the changed conditions. That can be interpreted as behavioural building obsolescence (C).

  There is no mention of location obsolescence (B en D); the project is well situated in an attractive area and the liveability is positive.

  All the problems mentioned can be classified by means of the model.

- The main type of obsolescence was physical building obsolescence (A); at this moment also behavioural building obsolescence occurs due to changing external conditions (C).

- There is a relation between A en C in the sense that the signalled physical problems (A) led to an initiative to catch up with the back repairs but this initiative came to a standstill (C).

**2.3.4. Case study Hilversum**

**Description**

The Hilversum project is an example of a small project of one building. It was built in 1935 and includes a shop on the ground floor and three apartments on the upper ones. It is situated in the eastern part of the city, just outside the centre. There is no mention of problems regarding liveability. Only one of the apartment was rented out so the owner had the opportunity to (re)develop it without bothering tenants. The owner had the objective to remove back repairs and to bring the building up to energy label A or A++ (energy neutral). The motives of the owner were both idealistic, the importance of a sustainable stock, and economic, the belief that the building needed a very good energy performance to keep up its market position. Vastgoedbelang was invited to give advice and support within the frame work of the Samen energie besparen programme. A scheme was developed including isolation of the façade, the floor and the ceiling, a new heating system and, to bring the dwelling up to energy neutrality, add solar panels for electricity and heating. The owner accepted the scheme and a moderate return of 5%. However, the implementation of the scheme stagnated because of the refusal of the municipality to agree on solar panels on this building situated in a conservation area. Moreover, the announced change in regulations on rented dwellings and on inclusion of energy efficiency in the rent setting led to a reconsideration of the project by the owner.

**Analysis**

Based on the description the first research question can be answered as follows:

- The Hilversum project is a case of physical (A) and behavioural building obsolescence (C) in the sense that the building showed a low energy performance (A). The owner was able and willing to improve this performance and took steps to implement measures to do so. However, due to a possible conflict with regulations about conservation areas, physical location obsolescence (B) and changing regulation regarding the rent setting and the conditions for private renting the owner does not want to proceed. This can be interpreted as behavioural building obsolescence (C).

All the problems mentioned can be classified by means of the model.
- The main type of obsolescence is A; after the development of the plan conflict arose with regulation regarding conservation areas (B) and with proposed regulation on rent setting (C). There is a relation between A and B and C in the sense that the owner is hampered to proceed with the plan (C) to solve the existing physical problems (A) because of conservation regulation (B) and regulation on rent setting.

2.4. Summarized results
The results of the case studies, including the social rented sector as reported in our previous paper (Thomsen and van der Flier, 2012) are resumed in table 2.

Table 2. Types of obsolescence in three sectors of the housing stock

<table>
<thead>
<tr>
<th>Tenure</th>
<th>Project</th>
<th>Renovation (R) or Demolition (D)</th>
<th>Obsolescence: types found</th>
<th>main type</th>
<th>relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner occupied</td>
<td>Voorburg Noord</td>
<td>R</td>
<td>A + C</td>
<td>A + C</td>
<td>C ↔ A</td>
</tr>
<tr>
<td></td>
<td>Voorburg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rustenburg Oost.</td>
<td>R</td>
<td>A + C + B</td>
<td>A + C</td>
<td>C ↔ A</td>
</tr>
<tr>
<td></td>
<td>The Hague</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private rented</td>
<td>Omval Amsterdam</td>
<td>?</td>
<td>C + D</td>
<td>C</td>
<td>D → C</td>
</tr>
<tr>
<td></td>
<td>Amsterdam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paris</td>
<td>R</td>
<td>C + A</td>
<td>C</td>
<td>D → C</td>
</tr>
<tr>
<td></td>
<td>Edisonstraat Amsterdam</td>
<td>R</td>
<td>A + C</td>
<td>A + C</td>
<td>C ↔ A</td>
</tr>
<tr>
<td></td>
<td>Amsterdam</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hilversum</td>
<td>R</td>
<td>A + C + B</td>
<td>A</td>
<td>C ↔ A</td>
</tr>
<tr>
<td>Social rented</td>
<td>Dr Schaeppmanstraat, Delft</td>
<td>R</td>
<td>A + C</td>
<td>A</td>
<td>C ↔ A</td>
</tr>
<tr>
<td></td>
<td>De Mijerstraat, Delft</td>
<td>R</td>
<td>A + C</td>
<td>A</td>
<td>C ↔ A</td>
</tr>
<tr>
<td></td>
<td>Snoekenveen, Spijkenisse</td>
<td>R</td>
<td>A + C + D</td>
<td>C</td>
<td>C+D → A</td>
</tr>
<tr>
<td></td>
<td>Verspyckweg, Bergen a/Zee</td>
<td>D</td>
<td>A + C + D</td>
<td>A + D</td>
<td>D → C (+ A)</td>
</tr>
<tr>
<td></td>
<td>Boendermakerhof, Bergen</td>
<td>D</td>
<td>A + C + D</td>
<td>A + D</td>
<td>D → C (+ A)</td>
</tr>
</tbody>
</table>

The differences in table 2 show correspondence with the differences in objectives of the various tenure types.

In almost all cases regular or large physical building obsolescence (A) is observed:
- In the social rented sector the owner, the housing association, usually reacts (sometimes after a long period of time) with maintenance or renovation. If there is large tension between the actual return of the building and possible more profitable functions, demolition comes into view as option (the projects in Bergen). Snoekenveen shows that social problems (C+D) can increase physical problems or hinder an effective approach of them.
- In apartment blocks of owner occupiers there is an interplay between A and C but it is not always clear where the obsolescence starts. Defects and quality are usually signalled by the municipality - responsible for the quality of the stock or from fear for filtering down processes - or by residents faced with decreasing comfort. As the coordination of physical intervention initiatives turns out to be difficult (C), the municipality (or resident organizations) often play a stimulating or enabling role.
- The private rented sector, in particular small and mid-size owners, generally shows the same pattern as can be seen in the social rented sector, be it that the limiting condition of sufficient return is much more important. The Omval and Paris case show another pattern of private investors, acting as developers looking for opportunities to increase the return on their property or on property that can be acquired.

3. Instruments to determine and measure types of obsolescence

In the previous paper we concluded that the conceptual model was rather crude and had to be operationalized. According to our definition, obsolescence is the process of declining performance. Performance is defined as the extent to which buildings meet requirements. To operationalize the model it will thus be necessary to make an inventory of requirements and of instruments to assess to which extent buildings meet these requirements. Decline will eventually emerge as a result of shortcomings regarding the requirements. The shortcomings can be absolute, measureable and testable regarding minimal required standards, i.e. loss of strength. Or they can be relative, by comparison with other similar objects and/or options and as such affected by time and fashion, i.e. loss of market position. In practice, physical requirements will generally be absolute and measurable, where behavioural requirements will generally be relative. Decline will usually have a cause. Requirements can in some instances also be defined as absence of potential causes i.e. harmful conditions.

To complete the inventory there are at least two options. The first one is to start with an inventory of all relevant aspects related to the four quadrants of the model, detail and operationalize them and collect data about them. The second way is to start with the available instruments used to assemble data about the performance of buildings and neighbourhoods and see if they are suitable as indications for the various types of obsolescence and easily accessible. For pragmatic reasons - time and capacity - we decided for the second option. We made an inventory of existing instruments that are used in the Netherlands to investigate building and dwelling performance. Some of the instruments are comparable with instruments used in other countries but we did not investigate this topic. A summary of the inventory is given below.

3.1. Physical building obsolescence - A

We define physical building obsolescence as absolute or relative decline of performance of building elements emerging from physical shortcomings.

Physical building obsolescence is generally caused by two main factors: ageing and initial quality. Ageing can be caused by i.e. climate, wear, fatigue emerges as decay that should be repaired in time. Insufficient initial quality can be caused by i.e. poor design, materials, construction, increases ageing, as does insufficient maintenance and management.

Buildings must satisfy building codes set by national and/or local authorities, like the Dutch national Building Decree. Conformity with these codes is thus an obvious requirement. Methods and instruments to assess physical building performance, as used by real estate appraisers, insurance experts and so on, are most often directed to shortcomings in that respect.

Most of the methods used to describe and measure the technical performance of buildings are focusing on defects. They do not regard obsolescence as a continuously process of declining performance. They detect defects, elements of buildings that do not meet requirements to a certain level, most often related to building codes. The Dutch standard NEN 2767 (Condition measurement (Condiimetring, NEN, 2011) is the most elaborated one. The method starts with an assessment by an inspector of the seriousness, the magnitude and the intensity of a defect in a part of a building. The three assessments are combined in a score from 1 (very good; new construction) to 6 (very bad, replacement necessary). The score can be used as an operationalization of physical building obsolescence. The method is widely used, anchored in a formal standard and there is a lot of experience with it. A practical disadvantage is that the assessment has to be conducted by a certified inspector and that the required recent data are not always available, especially in the owner occupied sector. A serious restraint is that the instrument is focusing on the technical quality and the lower limits of this quality as set in the Dutch Building
Decree. The functional quality and energy efficiency are largely disregarded. The Dutch technical agreement (draft-standard) NTA 8060 technical assessment of dwellings has a wider scope, is more dedicated to dwellings and includes the Dutch EPBD assessment (see below), but is still in development (NEN 2011a).

To incorporate the functional quality, figures from the Dutch Housing Valuation System (Woningwaarderingssstelsel - WWS, Ministerie BZK, 2013a) can be used. As part of the Dutch rent control system the WWS-score is simple and widely available. A restraint is that the system is limited to rent controlled dwellings (approx. 85% of the rental stock, 35% of the total stock) and functional quality is only a part of the score. A more elaborated and general applicable system is the Dwell Quality Indicator (WoonKwaliteitWijzer - WKW, VACpunt Wonen, 2012).

The assessment of energy efficiency will obviously be covered by the Dutch EPBD based energy efficiency label system.

3.2. Physical location obsolescence - B

We define physical building obsolescence as absolute or relative decline of performance of location/elements emerging from environmental shortcomings.

Physical location obsolescence is generally caused by two main factors: environmental impact and governmental interventions. Environmental impact can be nuisance and dangers like i.e. contamination, noise, nuisance, lack of sunlight and vulnerability to exogenous threats like earth quakes, flooding etc. Governmental interventions can be alteration of spatial plans i.e. nearby new construction (shopping malls, industry, roads) and/or new regulations i.e. increasing requirements, restriction of use, parking or traffic.

Locations must satisfy spatial and environmental regulations set by national and/or local authorities, like the Dutch national Spatial Planning Act and Environmental management Act. Conformity with these regulations is thus an obvious requirement. Methods and instruments to assess and analyse physical location performance as used by spatial planners and alike are most often directed to shortcomings in that respect.

The inventory did not yield general available and accepted instruments to determine physical location obsolescence. This type is usually assessed in urbanistic project analyses using building-, planning- and zoning-codes and/or standards. In this analyses conflicts are established between the building and environmental regulations on contamination, noise, nuisance, lack of sunlight etc. and vulnerability to exogenous threats like earth quakes, flooding etc. Also the presence and quality of services (shops, schools etc.) can be established in this analysis. The disadvantage of this approach is that a general comprehensive instrument is not available and assessment has to be conducted on a range of aspects for each individual project.

3.3. Behavioural building obsolescence - C

We define behavioural building obsolescence as absolute or relative decline of performance of building/elements emerging from behaviour of owners and residents.

Behavioural building obsolescence is generally caused by two main factors: maltreatment and change of management. Maltreatment can be i.e. misbehaviour, neglect, overcrowding or lack of control. Change of management can occur due to i.e. change of residents or owners or circumstance, resulting in change of objectives and management policy.

Extensive data about changing behaviour (stated and revealed) concerning dwellings are available from the 5-annual Dutch Housing Survey (Woningonderzoek Nederland - WoON. Ministerie BZK, 2013b). A disadvantage is that these data cannot be used on the low scale-level of neighbourhoods and estates. The WoON survey offers the option for local authorities for specific and/or detailed oversampling, but this is not comprehensively applied. On the level of rental estates the most appropriate indications can be extracted from allocation and migration data of the municipality and housing management data about allocation, and letting and characteristics of residents moving in and out of the dwellings, the degree of acceptance by new residents of vacant dwellings and the time it takes to sell a dwelling. Special attention should be paid to the behaviour of the owner to prevent imminent obsolescence. Instruments to assess this aspect are not generally available. Possible sources are reports from the municipal building authorities and/or interviews.
3.4. Behavioural location obsolescence - D

We define behavioural location obsolescence as absolute or relative decline of performance of location/elements emerging from behaviour of the environment. Behavioural location obsolescence is generally caused by two main factors: the housing market and the social environment. Housing market dynamics can result in a declining market position by i.e. loss of attractiveness and/or more attractive alternative supply. The social environment can be problematic due to i.e. insecurity, criminality, trouble, litter, ugliness etc. The liveability monitor (in Dutch: Efefbarometer) is an instrument that biannually yields public accessible data (www.leefbarometer.nl) on the low scale level of neighbourhoods and postal code areas for the whole Netherlands. The Efefbarometer includes data about the assessment by residents of the housing stock, the population, the social cohesion and the safety. It also includes data about the presence of services. The instrument does not include data about the market value. The Dutch Property Tax Value (WOZ-waarde Ministerie Van Financien, 1994) is an annual standard valuation of each single residential and non-residential property, based on realised market value. Also the quarterly Housing Market Statistics (CBS, 2013) and the quarterly transaction price survey of the Dutch association of real-estate agents NVM, published for different dwelling types on the scale of housing market regions, give insight in general changes of market positions. The latter offers the most up-to-date data.

4. Conclusions and discussion: an adapted model

4.1. Questions and results

In this paper a second test is conducted of the conceptual model developed in a previous paper. The test was guided by two research questions:

1. What types of obsolescence can be found in cases from the owner occupied sector and the private rented sector; what types are most important and what are the relations between the types?
2. What instruments are available to establish and measure types of obsolescence?

The answer to the first research question is resumed in table 2. The general conclusion can be that the problems found can be classified by means of the model. The types found vary with the tenure. In other words: the assessment of obsolescence is related with the perspective of the owner involved: private or semi-public owner or owner occupier. The case studies show a reasonable relation between aspects in the 4 quadrants and the perceptions and policies of the proprietors. Though it is too early to draw conclusions about the practical usability of the model, the model seems to have explanatory potency; predictive potency cannot be foreclosed on forehand, but is still too early for any expectations.

The second research question is approached in a pragmatic way by an inventory of available instruments that produce accessible indications of the four types of obsolescence. The inventory yielded the next instruments:

A: The condition measurement NEN 2767 is a well-developed and accessible instrument to detect physical building obsolescence. A practical disadvantage is that the assessment has to be conducted by trained inspectors. A serious restraint is that the functional quality and the energy efficiency are largely disregarded. The Technical assessment of dwellings NTA 8060 is a more appropriate instrument but is still in development. For energy efficiency the Dutch EPBD label system is most appropriate. For functional quality the Housing Assessment System (WWS) is a simple and widely available tool, but covers only 35% of the housing stock. A more elaborated and general applicable system is the Dwell Quality Indicator.

B: There are no general available comprehensive methods to assess physical location obsolescence. This type has to be assessed for each project by means of urbanistic project analyses using planning- and environmental codes and/or standards.

C: There are also no general comprehensive methods available to assess behavioural building obsolescence. Assessment can be done by means of housing management data about turnover,
vacancies, moving tenants characteristics and acceptance rates. Special attention should be paid to the behaviour of the owner to prevent imminent obsolescence.

D: To assess behavioural location obsolescence the Liveability monitor is an instrument that yields accessible data about the quality and the popularity of the location. For the market value the property tax value system WOZ is most appropriate. Changes in market position of dwelling types can be collected from housing market statistics.

4.2. Discussion; improvement and elaboration of the model

As explained in section 1 the model is based on two starting points. The first one is that building are both an object with physical characteristics and an object that is situated on a location, in an area or even wider in a certain context. Both the building and the location may change. That also holds for the requirements set for the building and location. When the building or the locations does not meet the requirements (completely) the concepts of building obsolescence and location obsolescence are used. The second starting point is that obsolescence can find expression in physical characteristics of buildings and in behaviour regarding the building. Obsolescence can emerge from defects of buildings or from conflicts with regulations and from changing behaviour of owner and user; physical obsolescence in behavioural obsolescence. Governments, national and municipal, play a special role as public body by setting building and planning standards, requirements and regulations, and by influencing the behaviour of owners and users. Building and planning standards impose minimum requirements on buildings and building components that can reduce the risk but not prevent obsolescence. Changing behaviour of owners and users might be expressed in misuse, in rising mobility, in back repairs or in decreasing popularity and value of the location.

The two starting points lead to two dimensions combined in the model:
- The endogenous - exogenous dimension: the building and its locations
- The physical - behavioural dimension: the physical characteristics of the building and the (changing) behaviour regarding the building. Combined with the answers to the two research questions the model can be further elaborated and refined as shown in figure 2.

Fig. 2. Conceptual model of obsolescence (adapted)

The two starting points lead to two dimensions combined in the model:
- The endogenous - exogenous dimension: the building and its locations
- The physical - behavioural dimension: the physical characteristics of the building and the (changing) behaviour regarding the building. Combined with the answers to the two research questions the model can be further elaborated and refined as shown in figure 2.

1 Governments sometimes also act as an actor, causing obsolescence by i.e. urban plans, the so called planning blight, or simply as owner or otherwise interested party.
The objective of our research project is to contribute to better knowledge of the phenomenon of obsolescence by developing and testing a model that can be used to diagnose obsolescence, and maybe treat and prevent it.

With the results so far, the development phase nears completion and the testing phase is sufficiently successful to be continued. The next step will be to further test the model as a diagnostic tool that can be applied in housing management and pathological analyses (Thomsen, 2012). One of the tasks in that direction will be to further inventory the most critical aspects in the four quadrants and the tools needed to assess and measure these aspects.

A promising application might also be to use the model for typological analyses by combining the scores of the critical aspects in a radar graph like figure 3.

![Fig. 3, Possible radar graphic of building performance](image)

A further step should also be to invite colleagues from the Netherlands and abroad to use the model in their research and establish an international working group for joint research on obsolescence and housing pathology.

References

Gemeente Leidschendam-Voorburg (2010-2012). *Bouw mee aan Voorburg-Noord*


NEN. (2011), NEN 2767 *Condiemietering / Condition Measurement* (ICS 03.080.10; 91.010.30), Delft.

NEN. (2011a), NTA 8060 *Keuring bouwtechnische woningkwaliteit* (ICS 91.040.30; 91.140.40), Delft.


[www.leefbarometer.nl](http://www.leefbarometer.nl) (accessed on 26-11-2012 and 24-02-2013)

[www.vormvastgoed.nl](http://www.vormvastgoed.nl) (accessed on 20-02-2013)