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Life Cycle of Dwellings; a Conceptual Model based on Dutch Practice

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Abstract

What is the average lifespan of dwellings?
Many professionals answer this question with presumptions of the pre-calculated write off time in the rental sector (50 years). The true answer should be though, that we do not know it: the average age of the actual housing stock - at least in most 'old' EU countries - being too young for useful longitudinal ex post analyses. Looking at the actual rate of new construction of approximately 1% pro annum the average needed lifespan of the existing dwelling stock should be at least 1 century. Looking at the actual replacement rate of less than 0,25% pro annum the average needed lifespan of the existing Dutch dwelling stock should be at least 4 centuries! Recent research shows that, from a sustainable viewpoint, life cycle extension of existing dwellings is a better choice than replacement by new construction (de Jonge, 2005; Klunder, 2005). However, when we look at recent schemes proposed by Dutch housing associations we can see a sharp increase in numbers of less than 50 years old dwellings to be demolished. What is happening and how can we assess this increase.

Unlike the life span of human beings, the life span of dwellings can technically be endless; prolongation is subject to decisions of the owner. The knowledge about this decision process and the underlying considerations is meagre (p.m.). Following our previous research (Van der Flier en Thomsen, 2004; Thomsen, 2005), our paper gives an overview of contemporary knowledge about the life cycle of dwellings and a conceptual framework to analyse the decision process about (the prolongation of) the life span of dwellings. We will use this scheme to assess the schemes proposed by Dutch housing associations and end with some questions for further research.

1. Introduction

What determines the life cycle of dwellings?
Recent research shows that, from a sustainable viewpoint, life cycle extension of existing dwellings is (often) a better choice than replacement by new construction. (De Jonge 2005), (Klunder 2005) and a recent OECD whitepaper emphasizes the need for Sustainable Use of the Building Stock (SUBS) in which life cycle extension is a key issue (Awano 2006). However, current praxis is still quite contrary and the awareness of SUBS is still a far cry[1]. Though the volume of demolition in the EU is very limited and rather stable in past time, the available statistics show considerable differences between the states and an overall rising tendency. Compared to other surrounding European countries the Netherlands show a disproportional and increasing demolition rate, predominantly due to destruction of social rented dwellings. A recent enquiry by the authors of demolition and demolition plans by housing associations revealed not only the volume of demolition in the past 10 years but also a sharp increase in numbers of planned demolition in the next years, mainly of early postwar apartments (Thomsen and Andeweg-van Battum 2004). What is happening and how can we assess this increase?
In our recent survey we questioned housing associations about their demolition plans and motives. We distinguished motives related to building quality (technical /physical, functional and urbanistic), market performance, economic motives and other reasons. We concluded that above all building quality and - in the more recent stock - demand-supply ratio were leading motives; but further inquiring and checking of the answers with referring data on the respondent's websites made us suspect that other reasons and secret agendas - like disposal of unwanted tenants and redevelopment of attractive locations - also played a decisive role. One of our findings was also that housing associations can be divided in obvious *'demolishers'* and *'non-demolishers'*: the first group will, in similar cases and under similar circumstances, demolish where the latter definitely does not. Our research showed that the motives of the decision makers were only partly related to dwelling and housing characteristics. Tenancy is a decisive factor and corporate image, management style and managers' ambitions play a significant role.
Regarding the importance of life cycle extension as stated above, we should thus achieve better knowledge of the decision making process of landlords, real estate managers and property owners.
Following our previous research, we tried to further examine the demolition process of dwellings and the underlying decisive motives, particularly of Dutch housing associations. We collected existing quantitative and qualitative data about demolition in the Netherlands and surrounding countries and analyzed possible relations with a range of relevant variables like tenure, quality and age, market position and owners characteristics like the volume of new construction and other stock management activities. Based on our findings and relevant literature we tried to distillated a conceptual framework for the analysis of the demolition decision process. And last but not least we tried to answer the question: what is happening? Is there something like a pulling down culture among social landlords?
Our paper gives an overview of our findings, preliminary results and conclusions.

2. The Life Cycle of Buildings; Models and Definitions

As the word *life cycle* indicates, it is common praxis to compare the lifespan of long lasting goods like buildings with the life span of living beings. In the same way building pathology studies the causes of decay and collapse of buildings and building components.
But unlike the limited and insecure life span of living beings, buildings are man made, man maintained and man demolished. The life span of buildings is not limited by physical condition but can in

[1] A quick scan of the book of abstracts of the IAHS 2004 Congress on "Sustainability of the Housing Projects" in Trento, Italy, showed that a vast majority of the papers presented on this sustainability focused conference were focused on new construction and less than 25% in some way on the existing stock. Other conferences, specialized workshops etcetera in the same field show a similar bias.

principle be endlessly prolonged, as long as it keeps being useful. A study of the life cycle of buildings, and more specifically dwellings, should as such not only be directed at the physical but also at the functional and (micro)economical performance as underlying factors in the decision making process about continued use, transformation or destruction.

2.1. Life cycle models and approaches

Following a range of scholars, the life cycle of buildings can be described as a cyclic revolving process of building initiative, design, construction, utilization and redevelopment or destruction / recycling (Lönberg-Holm and Larson 1953); (De Jonge 2006); (Straub 2001). Other scholars describe the decay of buildings as a linear life span development. Vroman describes the decay process of dwellings as the gradual loss in time of the original (physical) performance capacity: the theoretical amalgam of the technical and functional qualities of the building. Frictions occur where the performance capacity sinks below the for the users acceptable level (Vroman 1982). Interventions to prevent frictions and thus extend the lifetime can be either addition of performance by i.e. short term technical maintenance or longer term renovation or change of users/ target group.
In the same way Miles et.al. express the performance of buildings. Unlike Vroman they measure the (economic) performance by the income appreciation in dollars. As the balance sheets of Dutch housing associations are at present formally assessed using the income appreciation of their stock, this variable will be an important input for further analyses.

2.2. Definitions and distinctions

Demolition (of dwellings) can be defined as the physical destruction of the construction. Demolition can also be defined as intervention to terminate the lifespan of dwellings. There are also interventions meant to maintain the lifespan: maintenance, or to extend the life span of dwellings: renovation or updating. In this context the OECD uses the concept of service life, which refers to the period between the production and initial use of dwellings on the one hand, and the loss of their basic performance, as well as their abandonment on the other hand. However, the concept of service life is somewhat ambiguous because it is not easy to establish when a dwelling has lost its basic performance. Dwellings have a variety of functions; they can be left vacant for some time without being demolished; a great number of dwellings are demolished even though they are still usable in the technical sense (Kohler and Hassler 2002). For this reason the OECD differentiates between the physical service life, the period between construction and demolition, and the real service life, the period a dwelling actually meets demand (Awano 2006). We will use this distinction in our analyses.

Following Vroman, Miles and Awano we make a distinction between *object* related motives, as the motives for demolition will depend on:

- the *physical* quality of dwellings; dwellings can be demolished because the ‘physical service life’ has come to an end, either caused by the *technical quality*: the structural parts of dwellings are deteriorated and no longer keep their basic physical performances, or the *functional quality*: the structure is no longer useable due to insufficient functional performance;
- the *economic* quality of dwellings; dwellings can be demolished because the effective demand for the dwellings has decreased and the dwellings can no longer produce a positive cash flow; the ‘real service life’ has come to an end.

Following our previous research we make a distinction between *actor* and *policy* related motives, as the motives for demolition will also vary depending on:

- the *tenure*; motives of home owners can be different from motives of landlords and real estate managers because they have different primary objectives concerning their property: home owners want to live in their dwellings; landlords and real estate managers want to earn money with their dwellings;

- the *asset management*; the involvement of landlords and real estate managers in asset management - including interventions like selling of dwellings and building of new construction - can influence decisions to demolish.

In a scheme (Figure 1:):

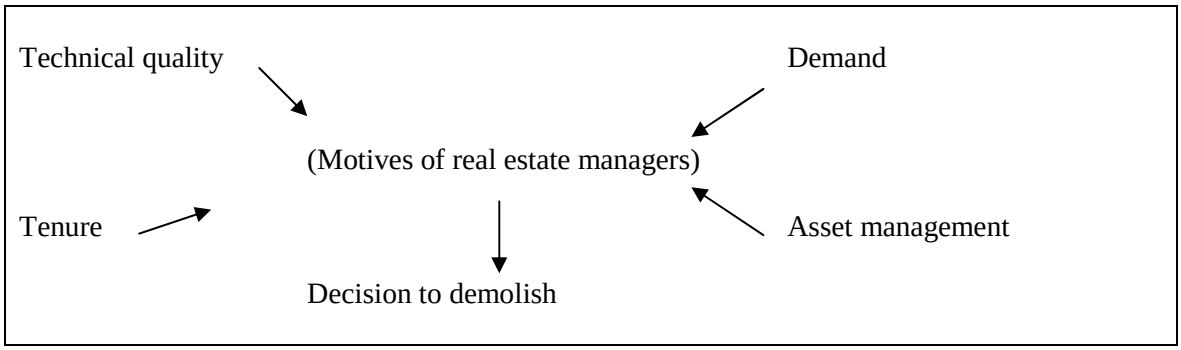

Figure 1: Demolition motives, conceptual scheme

Though this scheme contains the components we consider essential for the decision-making, their relations is also of considerable importance. Combining the components in a matrix results in a framework consisting of (Figure 2):

- *Market performance*:

Physical quality, demand and tenure together are essential aspects of the market performance of a dwelling, which real estate managers usually consider the most important variable for their asset management decisions. But as market performance is an amalgam of many different aspects it is difficult to measure and reliable data are hard to find. For this reason physical quality, demand and tenure are more practicable variables.

- *Policy*:

It is furthermore important to distinguish market performance from housing stock related policies, of which asset management is the most relevant variable for our purpose.

- *Preconditions*:

As the span of control is finally limited by preconditions we include them in the conceptual framework.

- *Manipulability:*

A further distinction lies in the manipulability. As the decision to demolish will also depend on the question whether the issues lie within the span of control of the decision making landlords and real estate managers, we distinguish:

- *endogenous* aspects; internal factors within the managerial reach of the decision maker;
- *exogenous aspects;* external factors outside the control of the decision maker, making the decisions dependent of other - in particular governmental – parties.

	Endogenous (internal factors)	**Exogenous** (external factors)
Market	Market performance - present quality	Market demand - wanted quality
	- technical / physical quality - functional quality - (micro-)economical quality	
	- potential interventions - tenure	- alternative supply - wanted tenure
Policy	Intended supply - portfolio policy - alternative strategies	Required supply - local housing policy - resident opinions
Preconditions	Corporate objectives Business plan - budget sheet - solvability	Government policy Legislation - (building) regulations - urban / regional plans

Figure 2: Conceptual framework

2.3. Expectations

The conceptual framework enables us to formulate expectations on the relations between quality, demand, tenure and approach on asset management on the one hand, and the relative number of demolished dwellings on the other hand. Using the proposed entrees we will investigate the next expectations:

- *Physical quality*: as the building year highly correlates with the technical and functional quality, we expect that the relative number of dwellings demolished is related to the age of dwellings; the older dwellings are the larger is the chance of demolition. Table 1 shows the building period of the Dutch housing stock. The reasoning behind the expectation is that older dwellings, built before World War II and in the early post-war period, are overrepresented in the group of substandard dwellings as Table 2 shows.

Table 1: The Dutch Housing Stock; tenure according to building period (%)

Tenure Building period	Total	Home owners	Social rental	Private rental
Pre-war	22.8	25.2	11.8	45.5
1946-1970	30.2	23.7	42.0	22.9
1971-1990	35.4	36.3	37.0	26.3
After 1990	11.6	14.8	9.2	5.3
Total	100.0	100.0	100.0	100.0

Source: MVROM 2003a

Table 2: The Dutch Housing Stock; tenure, dwelling type and quality in percentage of dwellings in modest, poor and very poor condition according to building period (%)

Building period	Home owners		Social rental		Private rental	
	Single family	Multi-family	Single family	Multi-family	Single family	Multi-family
Pre-war	12.8	9.7	5.3	5.9	27.6	21.5
1946-1970	4.1	4.1	3.4	1.3	8.2	4.4
1971-1990	0.6		0.5	0.1	2.8	0.4
After 1990						

Source: MVROM 2003a

Table 3: Housing shortage as percentage of the housing stock in Dutch provinces in 2002 and 2005

Province \ Year	Shortage as % of housing stock in 2002	Shortage as % of housing stock in 2005
Groningen	1.7	2.3
Friesland	1.4	1.0
Drenthe	1.7	0.3
Overijssel	2.2	2.1
Flevoland	2.5	3.7
Gelderland	3.1	2.8
Utrecht	3.6	4.0
Noord-Holland	2.8	2.9
Zuid-Holland	2.7	2.9
Zeeland	2.0	0.6
Noord-Brabant	2.5	2.8
Limburg	1.2	1.0
NETHERLANDS	2.5	2.5

Source: VROM 2003b (WBO 2002) and VROM 2005a (PRIMOS 2005)

- *Demand*; we expect that the relative number of dwellings demolished in areas with a loose housing market is higher than the number in areas with a tight market. Table 3 gives a global impression of the shortages in the twelve Dutch provinces. It shows that the shortages are relatively large in the provinces that constitute the Randstad (N-Holland, Z-Holland and Utrecht) and the surrounding provinces (Flevoland, Gelderland and N-Brabant). The reasoning behind the expectation is that landlords and real estate managers will try to prevent or reduce vacancy by demolition of (substandard or least desired) parts of the supply.

- *Tenure*; we expect that the relative number of dwellings demolished by housing associations is below the number demolished by other owners. The reasoning behind this expectation is that the social rented housing stock is relatively young; 12 % of the social rented stock has been built before World War II against 46 % of the private rental stock and 23% of the stock of home owners (Table 1). Moreover the percentage of social rented stock with a modest, poor or very poor condition is relatively low (Table 2).

- *Asset management approach* of the housing association; we expect that housing associations, which are demolishing a high percentage of their stock, the 'demolishers', will also show relatively high percentages in sale of dwellings and in new construction. The reasoning behind this expectation is that demolition is an instrument in strategic housing management / asset management next to other instruments like sale of dwellings and new construction (Van Den

Broeke 1998); (Gruis and Nieboer 2004). Housing associations who are actively managing their stock will probably use various types of interventions next to each other.

3. Demolition of dwellings, figures and volumes

In this section we will present the data on demolition in the same order as the expectations. As data source we have used available public statistics on housing; we have not collected data ourselves. We will start with an overall picture of demolition in the housing stock.

3.1. Housing stock and demolition

As we stated before, the Netherlands show a disproportional and increasing demolition rate. Fig. X shows the Dutch demolition rate compared to neighboring EU countries. As showed below the social rented sector is responsible for the majority of the demolitions.

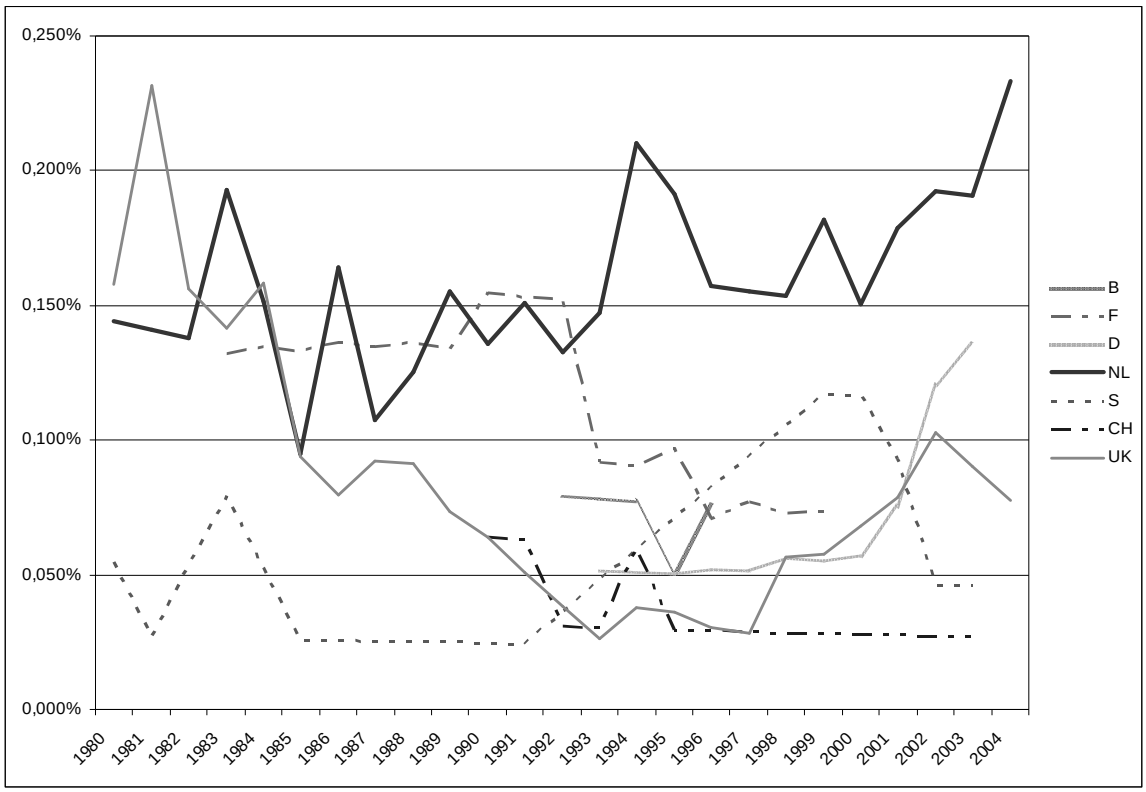

Figure 3: Demolition rate NL compared to neighboring countries

Table 4 gives the total decrease of the Dutch housing stock because of withdrawals and the parts of this decrease that take place in the rental stock and in the owner occupied stock. The last two columns give the numbers and percentages of dwellings that have been destructed. Decrease includes withdrawals due to merging of small apartments, change of function and destruction. Destruction includes demolition and a very small number of calamities like fire damage.

Table 4: Housing stock decrease: total decrease, by tenure and by destruction (demolition and calamity)

(1) Year	(2) Housing stock (x 1000)	(3) Decrease Total	(4) Decrease as % of housing stock: (3):(2)x 100	(5) Decrease rental dwellings	(6) Decrease owner occupied	(7) Decrease by destruction (demolition, pulling down, fire)	(8) Destruction as % of housing stock: (7):(2)x 100
1992	5.969	11.659	0.20	Not av.	Not av.	8.006	0.13
1993	6.043	12.984	0.21	Not av.	Not av.	9.474	0.16
1994	6.116	15.561	0.25	Not av.	Not av.	12.607	0.21
1995	6.192	13.691	0.22	9.605	4.083	10.382	0.17
1996	6.276	11.513	0.18	7.542	3.971	8.220	0.13
1997	6.358	12.527	0.20	8.998	3.529	10.338	0.16
1998	6.441	13.098	0.20	8.520	4.578	9.904	0.15
1999	6.522	14.354	0.22	10.390	3.964	11.811	0.18
2000	6.590	13.529	0.21	9.759	3.769	10.258	0.16
2001	6.651	15.555	0.23	11.096	4.459	11.959	0.18
2002	6.710	16.410	0.25	11.952	4.458	12.738	0.19
2003	6.764	17.763	0.26	12.706	5.057	12.633	0.19
2004	6.810	19.313	0.28	14.201	5.112	15.910	0.23
2005	6.859	19.057	0.28	14.712	4.345	13.907	0.20

Source: CBS Statline (2006a), (2006b)

The table shows that the numbers of withdrawals are stable until 2000: 0.20% in 1992 and 0.21% in 2000. After this year the numbers are increasing slowly up to 0.28% in 2005. However, in this pace the average life span of dwellings will be over 350 years!
Rental dwellings are overrepresented in the withdrawals; the percentage increases from 65 % in the beginning of the nineties up to 77% in 2005. In the same period the rental stock decreases from 55% of the total stock in 1990 to 45% in 2005. As the volume of commercial rented stock is very limited - less than one fifth of the rented stock – and commercial landlords do not demolish at all, the demolition of rented stock is fully due to
Withdrawals because of destruction, mainly demolition, show the same pictures as withdrawals in general: a small and stable percentage until 2000 and a slow increase after this year.

3.2. Building year and demolition

Table 5 displays the building period of the withdrawals. Unfortunately in 2001 the periods have been changed in the statistics so there are no complete time series of data.
Despite the break in the periodization, the general picture is clear. Until 2000 the pre-war part of the housing stock - 23% of the total stock - is overrepresented; over 50% of the withdrawals are dwellings built before or just after World War II. The percentage of withdrawals built in the early post war period, 1945/50 - 1970/75, is increasing up to 45% in 2002. Approximately 30% of the building stock has been built in this period. The number of withdrawals built after 1975 is small but accelerates after 2000.

Table 5: Housing stock, decrease total and decrease by building period

(1) Year	(2) Housing stock (x 1000)	(3) Decrease Total	(4) Decrease built before 1950	(5) Decrease built between 1950 and 1975	(6) Decrease built after 1975
1992	5.969	11.659	8.856	2.651	152
1993	6.043	12.984	9.805	151	32
1994	6.116	15.561	10.651	4.667	243
1995	6.192	13.691	8.880	4.491	320
1996	6.276	11.513	7.830	3.336	347
1997	6.358	12.527	7.921	4.182	424
1998	6.441	13.098	8.807	4.073	218
1999	6.522	14.354	7.313	6.571	290
2000	6.590	13.529	7.020	6.035	451
2001	6.651	15.555	7.378	6.671	1.508
2002	6.710	16.410	7.419	7.693	1.296
2003	6.764	17.763			
2004	6.810	19.313			
2005	6.859	19.057			

Source: CBS Statline (2006a), (2006b)

3.3. Demand and demolition

Table 6 shows the percentages of withdrawals because of destruction in the twelve provinces and in the 4 larger cities. On these lower levels of aggregation the percentages show more variation by area and by year than the percentages for the whole stock. Except for this variation we can see relatively high percentages in the provinces of Groningen and Zuid Holland and in the cities of Rotterdam and ‘s-Gravenhage. Low percentages occur in Gelderland, Utrecht, Noord Brabant and Limburg.

Table 6: Decrease by destruction in % of the housing stock by area: provinces, 4 largest cities and NL

Area / Year	Gr	Fr	Dr	Ov	Fl	Gel	Utr	NH	ZH	Ze	NB	Li	A’dam	R’dam	The H.	Utrecht (city)	NL
2000	0.32	0.12	0.20	0.17	0.02	0.10	0.06	0.14	0.25	0.44	0.09	0.04	0.13	0.41	0.43	0.10	0.16
2001	0.68	0.18	0.38	0.20	0.30	0.11	0.15	0.14	0.20	0.13	0.10	0.13	0.11	0.17	0.66	0.42	0.18
2002	0.40	0.18	0.24	0.26	0.34	0.12	0.12	0.11	0.26	0.26	0.16	0.13	0.12	0.53	0.53	0.29	0.19
2003	0.37	0.25	0.16	0.22	0.04	0.17	0.06	0.16	0.28	0.12	0.13	0.13	0.23	0.67	0.28	0.06	0.19
2004	0.44	0.26	0.22	0.23	0.07	0.16	0.24	0.09	0.41	0.12	0.19	0.20	0.07	0.86	0.44	0.49	0.23
2005	0.62	0.21	0.12	0.10	0.05	0.11	0.07	0.32	0.26	0.09	0.17	0.11	0.44	0.36	0.59	0.12	0.20

Source: CBS Statline (2006a

3.4. Tenure and demolition; the social rented sector

Table 7 shows the demolition figures of the social rented stock.

The social rented stock reaches its peak in 1999: almost 2.5 million dwellings. After this year the stock is decreasing because of the sale of dwellings to tenants, a low level of new construction and rising demolition. Table 6 shows the same tendencies about demolition as table 4 (the total stock). However, the increase of the numbers and percentages is starting earlier and goes faster in the social rented stock compared with the total stock.

Table 7: Social rented stock and demolition

(1) Year	(2) Housing stock (x 1000)	(3) Demolition (*)	(4) Demolition as % of stock (3):(2) x 100
1992	2.237	4.500	0.20
1993			
1994	2.289	5.200	0.23
1995			
1996	2.365	6.100	0.26
1997	2.372	5.200	0.22
1998	2.374	7.401	0.31
1999	2.475	8.937	0.36
2000	2.438	7.537	0.31
2001	2.441	8.214	0.34
2002	2.436	9.681	0.40
2003	2.420	14.163	0.59
2004	2.412	13.514	0.56

Source: until 1998:MVROM (1998, 2004); after 1998: CFV (2003-2005)
(*) including merging

Table 8: Demolition in the total stock and in the social rented stock compared

(1) Year	(2) Demolition in the total stock as % of the total dwelling stock	(3) Demolition in the social rented stock as % of the total social rented stock
1992	0.13	0.20
1993	0.16	
1994	0.21	0.23
1995	0.17	
1996	0.13	0.26
1997	0.16	0.22
1998	0.15	0.31
1999	0.18	0.36
2000	0.16	0.31
2001	0.18	0.34
2002	0.19	0.40
2003	0.19	0.59
2004	0.23	0.56
2005	0.20	

Source: CBS Statline (2006a), (2006b) recalculated by authors

Table 8 shows that in the first years of the new century the percentages of demolition in the social rented sector are two to three times as high as the percentage in the total housing stock. When we look at the forecasts for the social housing stock this difference will probably increase: table 9. This is in line with our previous findings (Thomsen et.al. 2004) which showed not only the same overall average increase but also strong regional differences, up to an increase with a factor 7 in the Randstad. We also found that the demolition is not evenly spread within the regions: one part of the housing associations is responsible for the majority of thy demolition - the *demolishers*-, whereas the other part – the *non-demolishers* - does hardly take part in any demolition. As we could not find true distinctive differences between the two parts – similar social landlords with a similar stock in the same region and even in the

same city could be demolishers ore non-demolishers – we concluded that the differences had apparently something to do with the management, and most probably with differences in policy and identity. For this reason a further overlook on the asset management approach of housing associations may give us more information about their demolition behavior.

Table 9: Social rented dwellings; stock and demolition: realized and forecasted

(1) Year	(2) Housing stock (x 1000)	(3) Demolition	(4) Demolition as % of housing stock (3):(2) x 100
2004 (realized)	2.412	13.514	0.56
2005 (forecast)	2.410	15.996	0.66
2006 (forecast)	2.420	26.048	1.08
2007 (forecast)	2.433	22.525	0.93

Source: CFV (2005)

3.5. Asset management approach of housing association and demolition

Recently the Department of VROM has published a performance indicator for housing associations (VROM 2005; 2006). In an effort to boost urban restructuring the indicator is meant to stimulate housing associations to perform better in the field of urban restructuring. The indicator has been composed of three items: the performance of housing associations in new construction, the performance in the sale of dwellings to residents and the performance in demolition. For each of these items a ranking has been made and the three rankings have been combined into one ranking showing the most active association in urban restructuring. Unfortunately there are only figures on the performance of housing associations in 2003 and 2004 and there is a lot of variation between the rankings in both years. So we have to be careful using these figures.

Given this warning we will use the figures of 2003 and 2004 to see if the housing associations with the highest percentages of demolition are also very active in the other fields of asset management ranked in the index: sale of dwellings and new construction. We will compare the performance of the 20 housing associations with the highest percentage of demolition: the ‘demolishers’, with the average performance of the housing associations in the selected areas. We will also compare the performance of the ‘demolishers’ with the performance of the 20 most active - highest ranking - associations with no demolition: the ‘active non-demolishers’. As most demolition takes place in the larger urban areas we only looked at the figures of the associations in the larger communities, the so-called G30 (in 2003) and G31 (in 2004).

Table 10: The 'demolishers'; the 20 housing associations with the highest percentage of demolition in the G30 and their performances in sale and new construction in 2003

(1) Housing association	(2) Housing stock 01.01.03	(3) Demolition as % of the stock	(4) Sale as % of the stock	(5) New construction as % of the stock
1.Nieuw Amsterdam*	9.757	11.88	0.09	0.75
2.ZVH Zaandam	5.523	6.83	1.01	1.76
3.Woonpl. Enschede	4.617	5.13	3.23	0.02
4.Woonplus Schiedam	14.113	4.62	0.84	0.00
5.Brabant W. Den Bosch	6.202	3.47	0.03	0.00
6.Het Oosten A'dam**	13.005	2.66	2.65	4.19
7.Woonbron R'dam***	26.533	2.65	1.07	0.71
8.Stichting In Groningen	7.895	2.51	0.25	0.61
9.Wooncom Emmen	11.469	2.27	1.65	0.08
10.Wonen Z. Heerlen	2.209	2.26	1.27	0.95
11.Volksbel. Helmond	2.479	2.10	0.00	2.34
12.Hoogkerk Groningen	1.938	2.06	0.67	0.10
13.TIWOS Tilburg	7.893	2.00	0.10	0.00
14.Com Wonen R'dam***	20.503	2.00	0.43	0.31
15.Elan W. Haarlem	5.327	1.82	0.00	0.00
16.Portaal Nijmegen	11.974	1.64	0.79	0.00
17.Woondrecht D'drecht	7.368	1.56	0.92	0.20
18.Vestia Den Haag****	19.663	1.52	0.16	0.70
19.Zomers B. A'dam**	9.427	1.52	0.03	0.52
20.SSWB Den Bosch	5.113	1.49	0.16	0.78
Average 1-20	9.650	3.10	0.77	0.70
Average G30 (n=109)	9.195	0.75	0.63	0.67

Source: MVRO (2005b)

* *Bijlmermeer*

** *Westelijke Tuinsteden*

*** *Hoogvliet*

**** *Den Haag Zuidwest*

When we compare tables 10 and 11 we can see that in 2003:

- 10 of the 20 'demolishers' come from the Randstad, an area with a relatively tight housing market; 4 of the 20 'active non-demolishers' are also from the Randstad;
- the 'demolishers' are slightly larger than the average housing association in the G30 and larger than the 'active non-demolishers', but regarding the wide spread the differences are not significant;
- the performances of the 'demolishers' in sale of dwellings and new construction are comparable with the average of the housing associations in the G30; the performances of the 'active non-demolishers' in sale of dwellings and new construction are far above average as could be expected from their high ranking on the index.

Table 11: The 'active non-demolishers'; the 20 most active (=highest ranking) housing associations with no demolition in the G30 and their performances in sale and new construction in 2003

(1) Housing association	(2) Housing stock 01.01.03	(3) Demolition as % of the stock	(4) Sale as % of the stock	(5) New construction as % of the stock
1. Portaal Amersfoort	5.544	0.00	1.01	1.88
2. Hanzewonen Deventer	2.920	0.00	0.86	2.50
3. PWS Rotterdam	16.127	0.00	1.17	1.43
4. Rentré Deventer	4.356	0.00	1.01	1.56
5. SVH Arnhem	14.005	0.00	1.64	0.82
6. Haag Wonen De Haag	23.591	0.00	0.71	1.48
7. SVA Alkmaar	2.652	0.00	1.58	0.53
8. Ons Huis Enschede	4.210	0.00	0.50	1.64
9. Compaen Helmond	2.035	0.00	0.34	6.78
10.Woonwaard Alkmaar	8.792	0.00	1.62	0.31
11.Openb.Belang Zwolle	2.056	0.00	0.29	3.40
12.Standvast Nijmegen	4.407	0.00	0.34	1.95
13.CHF Leeuwarden	8.186	0.00	2.71	0.00
14.Ymere Amsterdam	37.475	0.00	0.36	0.80
15.Bej.huisv. Eindhoven	795	0.00	1.13	0.00
16.Progrez Dordrecht	6.897	0.00	1.03	0.00
17.Volion Enschede	7.003	0.00	0.49	0.46
18.Friesland Leeuwarden	8.179	0.00	0.37	0.66
19.Portaal Arnhem	5.568	0.00	0.88	0.00
20.Huismeest.Groningen	7.661	0.00	0.59	0.17
Average 1-20	8.523	0.00	0.93	1.32
Average G30 (n=109)	9.195	0.75	0.63	0.67

Source: MVRO (2005b)

The data are somewhat colored by the fact that among the 'big' demolishers are 6 large housing associations with stock in the 4 largest demolition areas in the G4. And as stated above the data should be handled with care.

Table 12: The 'demolishers'; the 20 housing associations with the highest percentage of demolition in the G31 and their performances in sale and new construction in 2004

(1) Housing association	(2) Housing stock 01.01.04	(3) Demolition as % of the stock	(4) Sale as % of the stock	(5) New construction as % of the stock
1.Nieuw Amsterdam*	8.662	9.34	0.15	1.56
2.ZVH Zaandam	5.633	3.87	0.28	3.37
3.Vestia Den Haag****	19.546	3.55	0.09	2.19
4.Woonbron R'dam***	25.673	3.53	0.93	0.28
5.Volksbelang Helmond	2.485	3.30	0.00	0.00
6.Vestia R'dam***	27.212	2.32	0.17	1.50
7.Woonplus Schiedam	13.341	2.24	0.63	0.87
8.Trudo Eindhoven	8.116	2.19	2.37	0.67
9.Rentré Deventer	4.145	1.76	1.01	4.22
10.Laurentius Breda	6.633	1.64	0.77	3.80
11.ZO Wonen Sittard	10.329	1.64	0.79	0.47
12.SWZ Zwolle	7.356	1.63	0.50	1.81
13.Com Wonen R'dam***	19.467	1.60	0.45	0.12
14.Servatius Maastricht	10.539	1.58	0.56	0.55
15.Nw Wonen L'warden	8.174	1.52	0.72	0.02
16.Voorzorg Heerlen	2.644	1.51	0.30	0.34
17.Woonpartn. Helmond	7.638	1.51	0.22	0.25
18.Ons Huis Enschede	4.248	1.48	0.80	1.46
19.Volkshuisv. Arnhem	13.902	1.43	1.40	1.24

20.Wocom Helmond	1.964	1.43	0.10	0.00
Average 1-20	10.385	1.52	0.61	1.24
Average G31 (n=106)	9.439	0.66	0.71	1.09

Source: MVRO (2006)

* *Bijlmermeer*

** *Westelijke Tuinsteden*

*** *Hoogvliet*

**** *Den Haag Zuidwest*

Table 13: The'active non-demolishers'; the 20 most active (=highest ranking) housing associations with no demolition in the G31 and their performances in sale and new construction in 2004

(1) Housing association	(2) Housing stock 01.01.04	(3) Demolition as % of the stock	(4) Sale as % of the stock	(5) New construction as % of the stock
1.Delta Wonen Zwolle	7.196	0.00	3.34	3.52
2.De Key Amsterdam	21.697	0.02	2.09	2.44
3.GroenrandW. Utrecht	1.522	0.00	0.72	8.34
4.Woonwaard Alkmaar	8.648	0.00	1.55	2.09
5.Hanzewonen Deventer	2.917	0.00	1.44	2.23
6.TBV Wonen Tilburg	5.905	0.00	0.78	2.74
7.Wooninvest Den Haag	1.793	0.00	0.00	10.15
8.Woonplaats Enschede	11.211	0.00	1.01	1.96
9.Standvast Nijmegen	4.426	0.00	0.43	3.00
10.Ons Belang Hengelo	6.304	0.00	0.82	1.60
11.Interstede Dordrecht	2.627	0.00	0.04	3.50
12.Portaal Amersfoort	5.352	0.00	1.05	1.05
13.Wonen Zuid Heerlen	2.131	0.00	2.91	0.00
14.Portaal Arnhem	5.519	0.00	0.22	2.07
15.Portaal Utrecht	11.501	0.00	0.41	1.66
16.Ymere Amsterdam	37.268	0.00	0.76	1.04
17.Domein Eindhoven	4.160	0.00	0.19	2.02
18.St.In Groningen	7.707	0.00	0.56	1.36
19.Friesland Leeuwarden	8.064	0.00	1.12	0.42
20.Woonunie Deventer	6.010	0.00	0.72	0.88
Average of housing associations 1-20	8.097	0.00	1.01	2.60
Average of all housing associations in G31 (n=106)	9.439	0.66	0.71	1.09

Bron: MVROM, 2006, Prestatie-index corporaties 2004

When we compare tables 12 and 13 we can see that in 2004:

- 7 of the 20 'demolishers' come from the Randstad, an area with a relatively tight housing market; 4 of the 20 'active non-demolishers' are from the Randstad;
- the 'demolishers' are larger than the average housing association in the G31 and larger than the 'active non-demolishers', but regarding the wide spread the differences are not significant;
- the performances of the 'demolishers' in sale of dwellings and new construction are comparable with the average of the housing associations in the G31; the performances of the 'active non-demolishers' in sale of dwellings and new construction are in line with 2003 far above average.

Again the data are somewhat colored by the fact that among the 'big' demolishers are 5 large housing associations with stock in 3 of the 4 largest demolition areas in the G4. And as stated once again the data should be handled with care.

When we compare tables 10 and 11 (2003) with tables 12 and 13 (2004) we can see that:

- in both years the 'demolishers' are often originating from the Randstad, are slightly larger than the average housing association in the G30/31 and are performing on the average in sale of dwellings and in new construction;
- in both years the 'active non-demolishers' are smaller than the demolishers and smaller than the average housing association. They are often originating from outside the Randstad;
- there is some stability in the rankings over the two years; 7 of the 20 'demolishers' in 2003 also appear in the list of 2004: Nieuw Amsterdam Amsterdam, ZVH Zaandam, Vestia Den Haag, Woonbron Rotterdam, Volksbelang Helmond, Woonplus Schiedam and Com Wonen Rotterdam. 5 of the 20 'active non-demolishers' in 2003 also appear in the list of 2004: Woonwaard Alkmaar, Hanzewonen Deventer, Portaal Arnhem, Ymere Amsterdam and Friesland Leeuwarden. However, two 'demolishers' in 2003 appear in the list of 'active non-demolishers' in 2004: Stichting In Groningen and Wonen Zuid Heerlen. This variation between years underlines the fact that we have to be careful drawing far reaching conclusions from the lists.

4. Demolition; conclusions and discussion

The overall picture of the demolitions in the Dutch housing stock shows that the demolition rate is roughly 0.2 to 0.3% of the housing stock, which is substantially higher and much more increasing than in the surrounding countries.
Whether the Dutch demolition rate is too high or in the other countries too low is a rather academic question as there are no common standards. One approach is the necessity of replacement due to a limited lifetime of dwellings. From this viewpoint it will take over three centuries to replace the total stock with the actual pace of demolition. Regarding the often precalculated economical lifetime of 50 years the actual demolition rate might be considered as far too low. But as stated in the introduction, the life span of buildings is not limited by physical condition but can in principle be endlessly prolonged as long as it keeps being useful. This means that a necessary replacement rate does not exist and that a limited demolition rate simply shows that in practice lifetime extension prevails over replacement.
One other approach is the necessity of life time extension to reduce waste, urban sprawl etcetera. From this viewpoint a low demolition rate is desirable and underlines the conclusion of other research that it is necessary to shift focus from new construction to the various ways to adapt the existing stock to nowadays demand (Carmon and Thomsen 2000; Kohler et.al, 2002; Thomsen and van der Flier, 2002; Awano, 2005).

- *Physical quality*

Concerning the motives of the landlords and real estate managers we have found that there is a relation between building year, related with technical quality of dwellings and the number of dwellings demolished. The chance of dwellings built before or just after the war to be demolished is two times higher than the chance in the total housing stock. The chance of dwellings built in the early post-war period to be demolished is stock is now 50% higher than dwellings in the total housing stock. This is in line with our expectations based on common technical lifecycle theories.

- *Demand*

The relation between demand and demolition is unclear. We expected relatively high numbers of demolition in areas with a loose housing market. The presented figures do not support this expectation; in some areas with a relatively loose market like Groningen we found high percentages of demolition; but in some areas with a tight housing market like the province of Zuid-Holland and the large cities in the Randstad like Amsterdam, Rotterdam and The Hague, we found high levels of demolition. So other variables apparently prevail over the market position, making demand of insecure relevance.

- *Tenure*

There is a strong relation between tenure and demolition; in 2005 77% of the demolition took place in the social rental sector while this sector contains only 34% of the total stock. In contrast to what we expected the demolition rates in the social rented sector are roughly three times as high as in the total stock. The fact that the relation between the building year and quality of the stock and the demolition rate in the social rented stock is weaker than in the rest of the housing stock indicates that other reasons like the asset management approach are prevailing.

- *Asset management*

When we look at the asset management approach of housing associations in 2003 and 2004 in the larger communities (G30/31) we may conclude that there is no relation between demolition as instrument of strategic asset management and other instruments of strategic asset like sale of dwellings and new construction. The limitation of the data to only two time series and the presence of 4 large scale demolition areas in the Randstad do influence the outcomes.
The distinction between 'demolishers' and 'non-demolishers' as we found in our previous survey is clearly visible. Though both groups show some slight differences regarding size, location and active asset management performance, the differences are insufficient distinguishable to draw conclusions about their demolition behavior.

We started this paper with the question why housing associations are demolishing a relatively high percentage of their property and are planning to raise the numbers in the near future. We have looked at potential relevant reasons like technical quality, demand, tenure and asset management approach, but the results are meager; there are no clear relations between most of these variables and the rate of demolition of housing associations. One reason is probably the limited availability and the high level of aggregation of the data, which may hide variations on lower levels. This can be seen in the list of 'demolishers', which is headed in both years by housing association with a large share in large scale demolition areas, like Nieuw Amsterdam (Bijlmermeer) and Woonbron in Rotterdam (Hoogvliet). But on the other hand, other housing associations in the same cities rank high as 'active non demolishers'.
The limited data availability also limited the proofing of our conceptual model.

As the outcomes do not show a clear relation to the analyzed variables, other reasons must be prevailing in the decision making process. This conclusion corresponds with findings of our earlier research (Thomsen et al, 2004). In line with the conceptual framework we suppose that reasons in the endogenous policy quadrant of the model prevail over the performance related quadrant, or - more in concrete – corporate objectives and image and management policies are more decisive than rational asset analyses.
To find out if and to what extent this supposition is true we need to explore the decision process of housing more in detail by means of case studies.

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