Adaptive reuse in Dutch care accommodation

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Abstract

Purpose – Identifying opportunities for adaptive reuse in a changing (increasing market driven) context for Dutch care accommodation.

Design/methodology/approach – Combination of two student thesis, both based on case study and decision model development.

Findings – Due to new courses in the Dutch care industry functions of care accommodation are shifting, which could result in additional vacancy, unless the buildings are adaptable for the new situation. It is expected that new programs will be defined for the new care accommodations. However, one of the first lessons of transformation is to seek functions close to the original. With focus on adaptive reuse the problematic accommodations can be dedicated to closely related functions. The decision should be supported by a LCC-based comparative assessment.

Research limitations/implications – Limited to Dutch context, but recognisable international trends

Practical implications (optional) –

Social implications (optional) – Without focus on adaptive reuse the adjustments in care, in itself directed to economizing, could fail due to missed opportunities.

Originality/value – Known approaches (value evaluation, LCC-analysis) in a redefined context due to changing market, adding new material to the knowledge base.

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Keywords: Adaptive reuse; Care accommodation, LCC

Introduction

The policy to deal with the demand for care accommodation is at least somewhat indecisive. At one hand there is an increase in need due to growing share of elderly people. As anywhere age is a burden. At the other hand, for cost control, structured informal care is advocated in order to reduce the use of formal care facilities. This paper elaborates amongst others on two master research projects: the first based on the increased need, investigating the (financial) feasibility and possibilities of transformation of office buildings to residential care facilities(Mooij, 2013), and the second on the

possibilities of adaptive reuse of formal care facilities (van Dam, 2013). Both moves can be observed at the same time, and lead to additional vacancy instead of contributing to reducing the problem.

Vacancy

The vacancy in the office market in the Netherlands is well documented (Remøy, 2010; van der Voordt, Geraedts, Remøy, & Oudijk, 2007; Wilkinson, Remøy, & Langston, 2014). Many initiatives are taken to reduce the problem but the current vacancy is still around 15%. If the hidden vacancy is included, revealing the depth of the problem, the number is even 19 to 24% (Lokhorst, Remøy, & Koppels, 2013). Although the Dutch building industry seems to have passed the most severe period, the hidden vacancy, caused by users of buildings still renting above their desired capacity, will gear down the recovery of the office market. Along with the sustainable arguments, adaptive reuse remains in the coming period an essential measurement to reduce the mismatch.

Design challenge?

A combined study of the Dutch Architect Association (BNA) and Delft (Remøy & Van der Voordt, 2011) showed that with the effort of architects a relative fast research on esthetical, functional, technical, juridical and financial perspective is possible. The results on 11 investigated buildings are promising; in most cases is transformation of offices into care facilities, based upon existing programs is achievable. Within this study existing criteria checklists for adaptive research are refined for this specific field. This check covers veto and gradual criteria on market, location and building - a no go (veto) if there is no demand, or if the location does not provide minimal conditions or gradual condition if solutions can be provided in a certain range.

Figure 1 An example of one of the cases of, Middellandstraat, Rotterdam, feasibility study by MAS Architectuur and OIII architecten (Remøy & Van der Voordt, 2011)

Changing context

All European countries are confronted with increasing cost for care, the downside of increasing health and age, and looking for ways to keep such cost in control (see Figure 1). The Dutch approach is in finding approaches in which events, like an operation or a stay in a hospital or care centre, are broken down in all cost elements. Hereafter the budgets for institutions are determined by the market shares. This is opposite of the previous approach in which national budgets where divided over these institutions, after which these institutions can offer the care to the clients. This previous approach created supply-driven care market, where the current approach aims at a demand-oriented market.

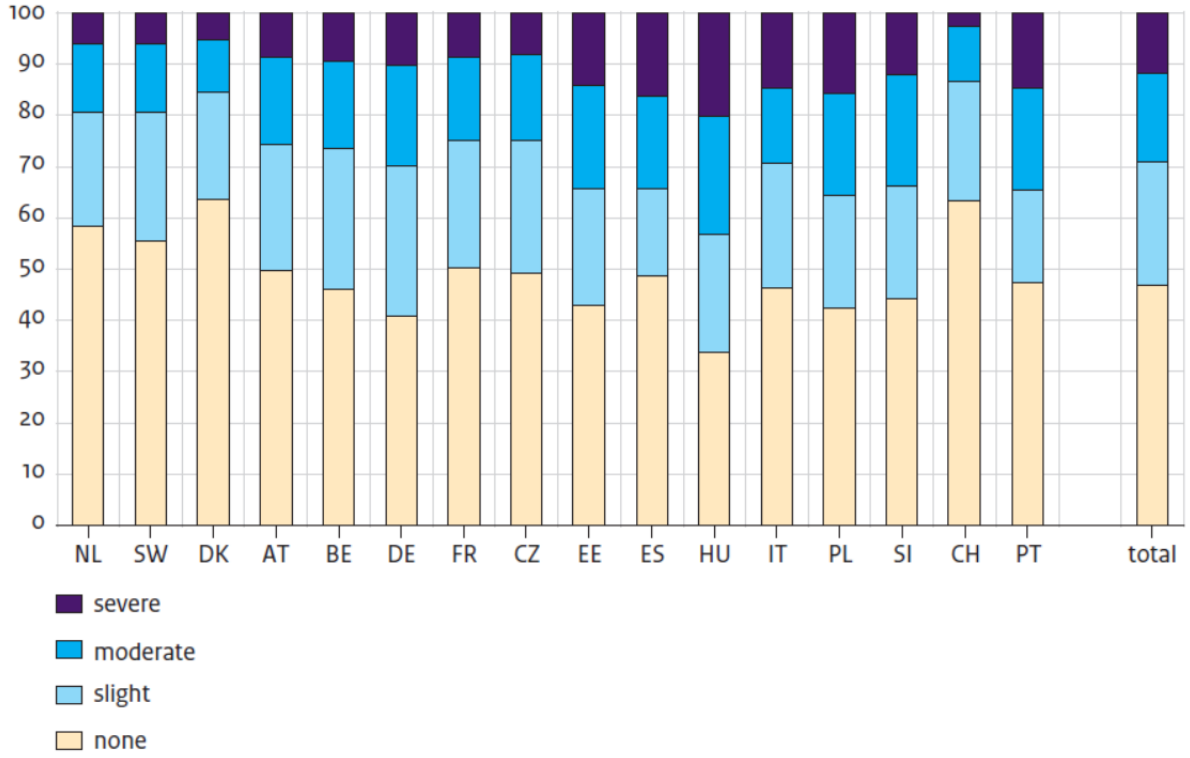

Figure 2 Percentage of over-50s with physical impairments in different countries in Europe, based on SHARE (2011), as cited by SCP (Verbeek-Oudijk, Woittiez, Eggink, & Putman, 2014)

For the care real estate this is seized in the Normative Housing Component (NHC), a product related normative imbursement for renovation and new development and maintenance of that real estate. This payment is a indexed yearly sum covering, related to the life cycle of and given standard investment for the care facility, interest, depreciation and maintenance cost, based on an occupancy rate of 97%. This NHC is strictly real estate related. For investments in medical and other equipment alternative sources should be tapped.

Actually both approaches as described above are in operation in a period of transition. This period ends in 2018 when the system should be completely based on the NHC.

Care accommodation are facilitating long term events as mentioned before. The clients are classified based upon their potential claim for care (ZZP) related to the complaints or syndrome of the group. The ZZP sets the amount of money to be declared at the national health office. The effects this system is aiming for is reduction of empty beds, cost effectiveness and concentration of clients in homogeneous groups in accommodations.

Long term classification requires a comprehensive application supported by medical statements. Examples of such a ZZP in the section of Nursing & Care are:

- ZZP 4 VV Sheltered accommodation for intensive treatment and extensive care
- ZZP 5 VV Protected accommodation for intensive dementia care

Less severe categories are rescinded. These clients should stay at home with informal (domiciliary) care.

Within this field of a shifting policy the cost of care accommodation is an important issue, a lot of money is involved. However this is overshadowed by actual discussions on free choice of medical specialists and attempts to add financial drivers to informal care of relatives. Nevertheless the combination of 2 studies: a qualitative model for identifying possibilities for adaptive reuse in health care accommodations (van Dam, 2013), and a quantitative LCC-model to illustrate the financial implications of these transformations (Mooij, 2013) could play a role in the care discussion, and contribute to the reduction of vacancy .

Research methods

Core element of the research of Van Dam (2013) is the definition of a theoretical model of relevant parameters of adaptive reuse in health care, based upon literature and interviews. In a series of steps, like refining the model based on ex post case studies (5) of reused health care accommodations and testing the model ex ante in a practical situation, the overview (see table 3) for opportunities and obstacles for the redevelopment of care accommodations was established. The first model was based on literature, the second version refined with the cases and the final version after the test.

Table 1 Cases opportunities and obstacles

Care facility	Institute	Type	Location	
Johannes de Deo	Tulip Inn West	Tourist hotel	Amsterdam	Ex post
Lichtkring	Swinhove Groep	Communal living	Zwijndrecht	Ex post
Lindonk	Swinhove Groep	Communal living	Zwijndrecht	Ex post
Roggeveenhuis	Woongoed	Self-reliant living	Middelburg	Ex post
Vier Ambachten	Careyn	Care hotel	Spijkenisse	Ex post
Wittebrug	Pieter van Foreest.	Nursing home	Poeldijk	Ex ante

The research of Mooij (2013) also started with a literature study on the market, theory on life cycle cost, the health care policy. This was followed by the analysis of 9 cases: residential care facilities. This analysis was focussed on the relations between operational costs and the building characteristics of these facilities. Ideally the cases would have been care facilities with a previous function as an office, but such examples does not exist in that numbers.

Table 2 Cases LCC

Care facility	Institute	Type	Location
Arcadia	Laurens	Nursing home	Rotterdam
Borgsate	Laurens	Nursing home	Rotterdam
Foreschate	Topaz	Nursing home	Voorschoten
Haagwijk	Topaz	Nursing home	Leiden
Liduina	Laurens	Nursing home	Rotterdam
Overrhyn	Topaz	Convalescent home	Leiden
Stadzicht	Laurens	Convalescent home	Rotterdam
Vlietwijk	Topaz	Convalescent home	Voorschoten
Wilgenborgh	Laurens	Nursing home	Rotterdam

Cases

Roggeveenhuis

One of the cases for the assessment of opportunities and obstacles is the Jacob Roggeveenhuis. The adaptive reuse of a nursing home into an apartment block for students. The 7 floors building was established in 1972 and transformed in 2011.

Figure 3 Jacob Roggeveenhuis before (left) and after the transformation (right)

Original the nursing home provided 174 units, of 20 m^2 for 1 person and 40 m^2 for 2 persons. As a student home exactly the same units are available. The original function is replaced by apartments for elderly at different locations in the region. Due to the establishment of a new high school in Middelburg there was a new need for student housing.

Due to this new demand the market conditions were good. There are sufficient facilities in the neighbourhood and public transport is available at a distance of 1.7 km.

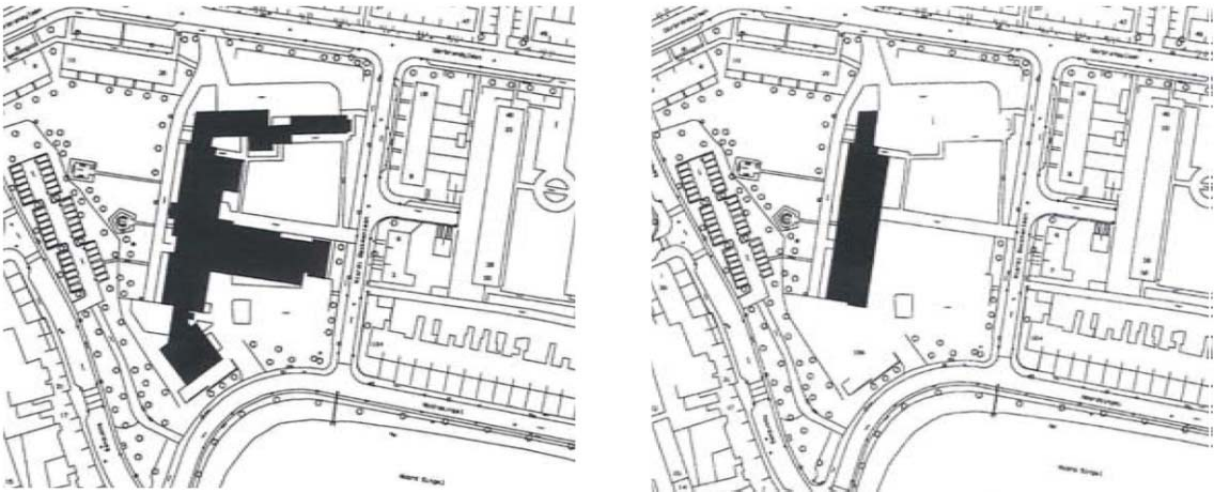

Figure 4 Jacob Roggeveenhuis before (left) and after the transformation (right)

In this transformation only the high rise is kept as student flat. The low rise with specific care functions is demolished. Windows and frames are renewed and every unit has its own sanitary unit. On every floor a communal room and a washing room is added. Furthermore there is at ground level a new bicycle storage (students) and an appealing entrance.

The original nursery home is sold by Woonzorg (care institute) to the municipality for € 1.6 million and after changing the zoning plan sold to Woongoed (housing association) for € 3.5 million. They invested € 3.0 million including taxes (building cost € 3300 per m2 GFA price level 2011).

In terms of opportunities and obstacles:
+ due to the high school and its students a clear demand,
+ good location with sufficient facilities,
+ by creating accommodation for self-reliant living a rent rebate is possible,
+ relatively simple renovation in which units are adjusted 1-to-1, basically interior improvement,
+ renovation could be done in phases, due to partial vacancy,
- need for adjustment of zoning plan,
- demolition of low rise.

The overall focus of the redevelopment in these 5 cases is strongly at care, and especially intensive care. But the feasibility of the redevelopment can be improved by also checking the other redevelopment functions, by analysing the parameters market, location, building and financial aspects. These cases resulted in a refined model, to be tested and validated in an ex ante case.

Wittebrug

Figure 5 Nursing home Wittebrug Poeldijk

This object is currently vacant because it is outdated for the original function and a new nursing home is already established. It is built in 1970 and renovated in 2003 for the last time. The 3-floor building has 4240 m^2 GFA for 12 units of 64 m^2. The function according to the zoning plan is social.

The zoning plan is adjustable according to the municipality. Units could be combined for housing purpose. There is no hospital in the area and no demand for student housing. The need for care facilities is researched, showing an overall stable situation with a national trend for an increasing demand of small scale self-reliant living for mentally disabled elderly. Also an increase in senior apartments can be foreseen. Lacking hospitals there is no need for a care hotel. An increase in tourist is expected, and given the nature of the area (industrial greenhouse) foreign labour facilities are needed.

The building is in the heart of the village centre, with all essential facilities, good parking possibilities and in general a safe environment.

The units of the building are semi self-reliant with communal space for activities. Interior is dark, installations obsolete and narrow corridors.

Figure 6 From left to right: recreation area, corridor, living room, sanitary unit.

For the ex-ante test financial are mapped; a risk and result assessment in which advisors are consulted for the applicable parameters. Based on the model the most promising functions are self-reliant living and (migrant) hostel. After consultation of the stakeholders the migrant hostel appeared to be the most feasible reuse.

Stadzicht

One of the cases for the assessment of operational costs is Stadzicht. This nursing home is built in 1976. This 7 floor building has a GFA of 15295 m^2 with 4193 m^2 (0.27) for the units, 1949 m^2 (0.13) for care facilities. The building efficiency is 0.48. The GFA per patient is 64 m^2.

Figure 7 Nursing home Stadzicht Rotterdam (www.laurens.nl)

The cost for taxes are € 2.14, for maintenance for the building € 15.42, for installations € 9.41, terrain € 1.55, all per m^2 per year. Costs for gas € 9.58, water € 1.11 and electricity € 7.64 and cost for cleaning € 15.03 per m^2 per year. The overall operational cost are € 61.89 per m^2 per year, housing 240 patients for intensive treatment and extensive care.

Table 3 opportunities and obstacles for the redevelopment of care accommodations, from left/green opportunities to right/red obstacles.

market		
demand driven	●●●●●●●●●●	supply driven
focus on DESTEP	●●●●●●●●●●	focus on politics
presence enthusiastic investor	●●○○○○○○○○	
presence university or college	●●○○○○○○○○	
presence hospital	●●○○○○○○○○	
location		
centrally located in multifunctional areas	●●○○○○○○○○	
a lot of facilities	●●○○○○○○○○	
located near green	●●○○○○○○○○	
easily accessible	●●○○○○○○○○	
	○○○○○○○○●●	change of the zoning plan
building		
technical lifespan	●●●●●●●●●●	functional lifespan
simple interventions	●●●●●●●●●●	technically complex interventions
already has a residential function	●●●●●●●●●●	specific care design
simple intervention: interior up-to-date	●●●●●●●●●●	moderate and dark interior
simple intervention: entree up-to-date	●●●●●●●●●●	sober small entrance / entrance area
suitable for co-operative living and small units	●●●●●●●●●●	small units with small sanitary
meets high fire safety requirements	●●○○○○○○○○	
building construction flexible	●●○○○○○○○○	
faster than new build	●●○○○○○○○○	
more sustainable than new build	●●○○○○○○○○	
redevelopment in phases	●●○○○○○○○○	
	○○○○○○○○●●	hard to divestment / adjust
	○○○○○○○○●●	large amount of shared space
	○○○○○○○○●●	little design differentiation
	○○○○○○○○●●	bearing walls (not flexible)
	○○○○○○○○●●	placing extra installations is difficult
	○○○○○○○○●●	units will lost by merging
financial		
object is cheap to acquire	●●●●●●●●●●	book value presses on acquisition costs
attract equity (investor)	●●●●●●●●●●	financing debt
seek a solution together with corporation	●●●●●●●●●●	long-term leases corporations
redevelopment is cheaper	●●○○○○○○○○	
ground level spaces rented to other parties	●●○○○○○○○○	
rental subsidy for independent units	●●○○○○○○○○	
	○○○○○○○○●●	book value too high
	○○○○○○○○●●	financial and economic obstacles
	○○○○○○○○●●	focus on health care finance
	○○○○○○○○●●	business turnover depending on number of units
	○○○○○○○○●●	replace installations more expensive than new

Possibilities

Using veto criteria (acceptable yes or no) and gradual criteria (the level of viability) for the assessment of the probable adjustability (Geraedts & van der Voordt, 2007) first the market is analysed. Basically if there is no demand there is no option. As in the case Wittebrug the optional functions are scrutinised. A DESTEP analysis, a survey on demographic, economic, social, technical,

environmental and political aspects, is applied. There are several conditional relations for veto criteria on the location, such as an educational institute located in the neighbourhood as a condition for student housing or a hospital for a care hotel. In the Netherlands it is generally an impracticable if a zoning plan does not allow the optional function.

Only if the veto criteria are passed, it becomes profitable to go on with the detailed level of gradual critera.

Figure 8 Gradual criteria on building level

E.g. the existence of thresholds is a problem for a care facility but can be adjusted. However if the number of adjustments is getting too high, it can become infeasible.

Finally the model assists with the establishment of a first estimate of building cost and a discounted cash flow, linking to the LCC-study.

LCC-scheme

For the definition of the LCC-scheme the European standard (NEN-ISO, 2008) is used, with all its imperfections related to the application of externalities and environment cost (de Jong & Arkensteijn, 2014).

One of the essential problems is in providing the case specific cost for operation and maintenance (de Jong & Arkensteijn, 2014; Hughes, Ancell, Gruneberg, & Hirst, 2004; Ive, 2007). As discussed before the results of this study are based on 9 cases. However, these cases are not transformed buildings but care facilities built as such. The transformation of an office into a care facilities may result in a performance up to standard, but analysis of buildings with a second function show deficiencies in general. It is always difficult to reach the same efficiency in an old building as in a new

designed building. The lesser efficiency will result in more floor space in relation to the necessary functional space, by which e.g. cleaning cost will take a higher share.

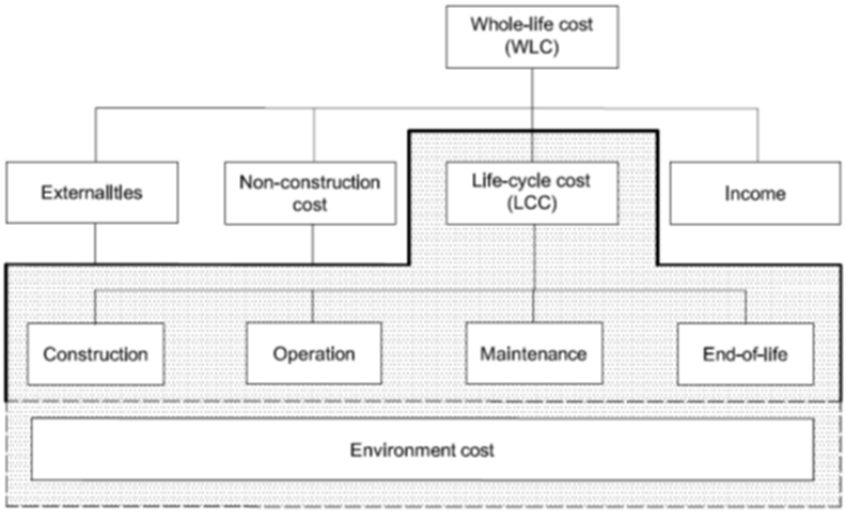

Figure 9 Definition of life cycle cost (NEN-ISO, 2008)

In the end the LCC-approach is an standard discounted cash flow:

$NPV = (CF_1/(1+R)^1) + (CF_2/(1+R)^2) + ... + (CF_n/(1+R)^n)$

Also in this study the application of the cost of demolition of other definition of End-of-life is not rewarded, as in most LCC-schemes. It is assumed there is no end value after a period of 30 years.

Table 4 Energy cost per m^2 GFA

Care facility	Gas	Water	Electricity	City heating	Total
Foreschate	25.50	2.77	14.60		42.86
Haagwijk	19.90	2.59	9.45		31.94
Overrhyn		0.74	8.21	9.50	18.45
Vlietwijk	16.45	1.68	7.10		25.24
Arcadia	8.70	1.01	6.94		16.64
Borgsate	9.12	1.06	7.27		17.45
Liduina	9.87	1.15	7.87		18.88
Stadzicht	9.58	1.11	7.64		18.34
Wilgenborgh	8.95	1.04	7.14		17.13
Average	13.51	1.46	8.47	9.50	22.99
Percentage	59%	6%	37%	41%	100%

The most illustrating results of this study are the tables for energy cost and maintenance cost for the different cases. Table 4 shows the energy cost with an average of € 23,- per m^2 GFA. The heating component (gas or city heating) and electricity are the most contributing components. Remarkable is the range between 16.64 and 42.86. Both Foreschate and Haagwijk do have sheltered accommodation (small self-reliant units) next to the main complex. These units are managed by other stakeholders, different from the main facility. Although both complexes are also badly isolated, contributing to this high energy cost, the organisational arrangement have been leading to questions as well.

Table 5 Maintenance cost per m^2 GFA

Care facility	Building	Installations	Terrain	Total
Foreschate	5.33	6.65	3.81	15.78
Haagwijk	8.80	8.58	3.11	20.49
Overrhyn	4.96	4.18	1.62	10.75
Vlietwijk	2.21	8.94	1.50	12.65
Arcadia	4.98	3.46	0.57	9.01
Borgsate	4.75	3.30	0.54	8.59
Liduina	7.54	5.24	0.86	13.64
Stadzicht	15.42	9.41	1.55	26.38
Wilgenborgh	6.27	4.35	0.71	11.33
Average	6.70	6.01	1.58	14.29
Percentage	47%	42%	11%	100%

Table 5 shows the maintenance cost with an average of € 14,30 per m^2 GFA. Again the range is impressive, considering one facility is paying three times as much as the one with the lowest maintenance cost.

All different costs are in a cross case analysis evaluated. For such a study 9 cases is very limiting on the conclusions, especially since depending of the aspect 1-3 cases had to be allocated as outlier. However, just like with building costs, larger volumes, more compact and newer buildings perform better.

Using these data on energy and maintenance and the possible range a validation case is executed in which the building costs has been estimated. For different scenario's (range maintenance cost, range energy cost, expected energy price development, cost of additional measurements for better performance and different options for end values), using the LCC-scheme and the discounted cash flow, the choices for design and adjustments can be argued.

Conclusions

The cost of accommodation is of relative importance. Taking care of your mother by giving them shelter in your own house seems beneficial for society, but if your household is punished by a reduction her state pension is seen as unfair. These issues are the actual headlines. Freedom of choice of medical specialists is another subject keeping everybody busy. The time a nurse can spend at the bed of a patient is measured per minute. But even so, if one care facility is able to reduce the yearly costs of the accommodation with 50% of another facility, there is much to gain, which can be spend on staff or medical treatment. If the number of new buildings can be reduced by sensitive reuse, there is another huge gain, especially when this adaptive reuse is done properly.

Using the approach as described in the study of Van Dam, using DESTEP and mapping opportunities and obstacles in this cluttered field of demand for new types of care facilities and redundancy of other objects is necessary. A complete assessment is time-consuming but the stepwise approach of first using veto criteria, eventually followed by gradual criteria can provide quicker answers.

Energy is discussed in an economic sense, but in the end it is about the use of resources. The need of implementing the desired measurements is obvious. Reduction of energy cost requires additional initial investments which can be balanced by LCC approach. The study of Mooij contributes to insight in data needed for an integral approach, essential for sustainable design.

Literature

Due to the nature of this research, with its focus on the situation of care in the Netherlands, the majority of the literature is based in the Netherlands and written in Dutch. This is of course hampering in a discussion on an European platform. However the university based literature is all retrievable at the repository.tudelft.nl. Providing an extensive English summary is common practice.

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