IS PHYSICAL ADAPTABILITY EFFICACIOUS?

A research to reveal the office users' preferences for adaptable office space

CONTENT

• Research outline
• Theoretical framework
• Methodology
• Results
• Conclusion and reflection
• Questions?

RESEARCH OUTLINE

PROBLEM
**Problem**

**Structural vacancy** is an increasing threat to the functioning of the Dutch office market.

### Motivation

Structural vacancy
Old architecture building
- 700 students in 1970 (Ideoma, 2008)
- 3,064 students in 2009 (GemeenteDelft, 2009)

Maximising investor’s yield

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**Objective**

The aim of this research is to reveal the office users’ preferences for adaptable office space.

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**Hypotheses**

Adaptability → Market potency → Vacancy → Investor’s yield
### Hypotheses

(Office building's) Adaptability contributes to the (long term) market potential of a building. Therefore, (over the long term) a higher level of adaptability decreases the risk of structural vacancy.

### Research Question

1. How can the performance of an office building be measured?
2. Which building and location characteristics influence the performance of an office building?
3. To what extent do the identified adaptability indicators have influence on the risk of structural vacancy?
4. How important is the adaptability of an office building for modelling the causes of structural vacancy?
5. How could a real estate investor use the knowledge gathered from this research in their decision-making process of acquiring new office buildings?

### Focus and Product

**Focus**
- Dutch real estate investing market
- Office market
- Study area: Amsterdam

**Final product**
- An advice to an investor of how they should use physical adaptability in their decision-making process regarding acquisition of office buildings.

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### Theoretical Framework
Office Building Performance Indicators

Performance indicators
- Direct – return on investment
- Indirect – occupation level

Types of vacancy

Adaptability

‘the capacity of a building to accommodate effectively the evolving demands of its users and environment, thus maximising value through life’ (Schmidt III et al., 2010)

- the capacity to change
- the ability for the building to remain fit for purpose
- the value of a building
- time
  - speed of change
  - through life changes.

Partitionable

The possibility to easily compartmentalize a building (a partitionable structure) for various independent users or occupiers increase its adaptability.

The partitionability level of an office building defined by:
- Smallest independent unit;
- Number of independent units;
- Largest independent unit.
A flexible office building is a space which is able to change within the existing main structure. This can be achieved when the floor plan can have different space planning options.

**Flexible Office Plans**

- **Cellular Office Plan**
- **Open Office Plan**

**Measuring Flexibility**

- **Flexibility Score**
  \[-TF = EC \times EO\]

- **Cellular Efficiency Ratio**
  \[-EC = \frac{R}{LU}\]
**MEASURING FLEXIBILITY**

Flexibility score

- \( TF = EC \times EO \)

Cellular efficiency ratio

- \( EC = \frac{R}{LU} \)

Open efficiency ratio

- \( EO = \frac{Area}{LU} \)

**METHODOLOGY**

- Sample data
  - Database: 322 observations
  - Database: 322 observations
  - Adaptable indication

Research outline, Theoretical framework, Methodology, Results, Conclusion and reflection
**PROCEDURE**

**Model building strategy**

- **Research outline**
- **Theoretical framework**
- **Methodology**
- **Results**
- **Conclusion and reflection**

**LOGISTIC REGRESSION VARIABLE**

**Dependent variable**
- Structural vacancy (0 = less than 30% structural vacancy)

**Independent variable**
- Location variable
- Accessibility
- Facilities in the nearby surrounding
- Status area (houses and employment)
- Building variable
  - Interior quality (size floor and building, space ratio entrance etc.)
  - Exterior quality (building height, type and quality facade)
  - Parking quality (parking type and ratio)
  - Asking rent
  - Adaptability indicators (partitionability, flexibility)

**RESULTS**

To determine whether the regression model is stable across the sample, the statistic 'Adjusted Residual' is used. This value indicates the loss of predictive power. The cut-off point is the value smaller than -2.58 and 2.58 (95% of the z score in a normally distributed sample).

<table>
<thead>
<tr>
<th>Structural vacancy</th>
<th>Count</th>
<th>Adjusted Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>45</td>
<td>-1.0</td>
</tr>
<tr>
<td>&gt;30</td>
<td>20</td>
<td>1.0</td>
</tr>
</tbody>
</table>

| Total Count | 65    | 75    | 35    | 20    | 120   | 315  |

**PRE-SELECTION**

The cut-off point is the value smaller than -2.58 and 2.58 (95% of the z score in a normally distributed sample).
### Regression Analysis – Flexibility

<table>
<thead>
<tr>
<th>Logistic regression flexibility score</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig</th>
<th>Exp(B)</th>
<th>95% C.I. for EXP(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility score</td>
<td>-52</td>
<td>24</td>
<td>4.64</td>
<td>1.00</td>
<td>.049</td>
<td>.59</td>
<td>(.59 - .99)</td>
</tr>
<tr>
<td>Constant</td>
<td>-22</td>
<td>0.78</td>
<td>0.01</td>
<td>1</td>
<td>.77</td>
<td>.80</td>
<td>(.59 - .99)</td>
</tr>
</tbody>
</table>

Note: Log likelihood = -150.14, # of obs = 315, # per groups = 63.

- Significance < 0.1
- Odds ratio < 1

### Regression Analysis – Partitionability

<table>
<thead>
<tr>
<th>Logistic regression Partitionability indicators</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig</th>
<th>Exp(B)</th>
<th>95% C.I. for EXP(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Largest unit</td>
<td>0.51</td>
<td>0.31</td>
<td>1.00</td>
<td>1</td>
<td>.09</td>
<td>1.66</td>
<td>(.59 - 4.04)</td>
</tr>
<tr>
<td>Maximal independent units</td>
<td>-0.53</td>
<td>0.81</td>
<td>1.01</td>
<td>1</td>
<td>.69</td>
<td>.59</td>
<td>(.23 - 1.12)</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.30</td>
<td>1.14</td>
<td>1.02</td>
<td>1</td>
<td>.36</td>
<td>.12</td>
<td>(.06 - 2.42)</td>
</tr>
</tbody>
</table>

Note: Wald chi = 3.37 (P=.185), Log likelihood = -150.99, Number of observations = 315, Number of groups = 63

- Largest unit
  - Significance < 0.1
  - Odds ratio > 1

- Maximal number of independent units
  - Significance > 0.1
**CONCLUSION – ANSWERING SUB QUESTION**

1) How is the performance of an office building measured?
- Direct – return on investment
- Indirect – occupation level

"if there is no potential user who is willing to pay the rent, the property will remain vacant"

(Remoy, 2010)

**CONCLUSION – ANSWERING SUB QUESTION**

2) Which building and location characteristics influence the performance of an office building?
- Building size (CAT)
- Parking Type
- Distance NS station
- Distance Highway
- Flexibility score

**CONCLUSION – ANSWERING SUB QUESTION**

3) To what extent does the qualified adaptability of an office building contribute to the vacancy level of an office building?

Flexibility score
- Significance < 0.1
- Odds ratio < 1

Partitionability indicators
- Significance > 0.1

**CONCLUSION – ANSWERING SUB QUESTION**

4) How important is the adaptability of an office building for modelling the causes of structural vacancy?

*Best model includes the flexibility score, therefore, the flexibility score should be used in model to predict structural vacancy*
CONCLUSION – ANSWERING SUB QUESTION

5) How could a real estate investor use the knowledge gathered from the previous questions in their decision-making process concerning acquisition of new office buildings.

The flexibility score should be used in as an decision-making criteria of an investor since it improves the model to predict structural vacancy.

REFLECTION

Relative small data set
Criteria which are not taken into account
- Investor’s preferences (benefits of a single tenant building)
- Negotiation conditions
  • Incentives
  • Length of lease contract
Partitionability
- Smallest Unit: Subjective measurement
- Max. Units: Low diversity in data
- Largest Unit: preference for single / multi tenant

ACADEMIC CONTRIBUTION

This thesis contributed to the existing literature on the body of knowledge of:
- Flexibility
- Adaptability
- Office vacancy
- Office user’s preference.

Limitations and further research
- Vacancy level is only studied at one point in the life cycle
- The costs for obtaining adaptability are not taken into account.

LITERATURE