FROM DATA TO VALUE
IN REAL-ESTATE INVESTMENT MANAGEMENT

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OVERVIEW

1- INTRODUCTION
   - RESEARCH PROBLEM
   - HYPOTHESIS
   - RESEARCH OUTCOME
   - RESEARCH QUESTIONS

2 - THEORETICAL FRAMEWORK

3 - RESEARCH METHODOLOGY

4 - RESULTS & DISCUSSION
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Real estate investment (Dutch Office market):

- ‘Real estate is the largest asset class in the world’
  Arthur Segel - Harvard business school Professor

- Real estate represents about one-half of the world’s economic wealth, and forms big part of shaping the economy
1- INTRODUCTION - RESEARCH PROBLEM:

REAL ESTATE VS CONTEXT

complex

Imperfect

Lack of information
untransparent

REAL ESTATE IS TRADITIONAL MARKET!
1 - INTRODUCTION - RESEARCH PROBLEM:

"From a general real estate point of view, I think it should be but for the company it is a bit risky, who is going to invest in it and who is going to benefit from it? I am with transparent, but the way is a bit tricky."

Martijn Martijn (W.M.) de Jager - CBRE

"Yes, I am fine with that. But I think what you now see that it takes a lot of time and resources."

Raphael Rietema - CBRE

"I am with it. I think eventually it will be better for the real estate market in the Netherlands, because it will enhance trust between parties, liquidity which is a good thing. On the other hand, our competition will become much harder.

Fabian Marchand - Carin Real estate

"I think it is important, yes,... I don't know why shouldn't you?... I think your starting point should be transparency."

Agnes Wittink - RVGB

"I think it is better for the market if it is,... but you know it is not my goal to make the market more transparent, but it is a side effect of what I am doing."

Christiaan Swen - Versgoeddata

PROONENTS

"In the last crisis, banks had huge losses because they didn't have enough information, investors are making a lot of money because they know something that we don't know, and the data needs to get transparent."

Martijn Witvoet - ABN AMRO bank

"Yes, I do. I would like to see that everything that I do manually now is available on data base that contains all the transactions and required information."

Sjors van Iersel - Spring real estate

"for Geophy, we are working towards transparency, we think that it will change the dynamics of the market which will open opportunities."

Brittany Burns - Geophy

"It is also good for the office market to make the data available."

Anna Mira Brethouwer - Geophy

"We are really in favour of more transparency, because we think smart cities are much better than smart buildings and if you want to create smart cities you have to share data. So that is something that we see for the future, on the other hand, we have privacy issues, so we cannot share certain data, we simple are not allowed to share certain data." 

Jeroen Jansen - Bouwinvest

"No, this market is totally different than a typical governmental public market. Because we also have our advantage because we know certain information that other parties do not know,........... but at the end I am with transparency as it has more advantages than disadvantages."

Ivar Hillerstorm - Spring real estate

OPPONENTS

"No, because then the fun is gone, then the interesting side of investing and trying to get your hands on a deal is gone, it becomes purely emotionless, then the whole idea of doing deals and the whole risk and return is gone, so I don't believe in it."

Maurits van Schilie - PNB Paribas real estate

"No, I don't agree. Then you lose a lot of opportunities. If you are better than average. And that is why the good side of the market will not cooperate with that."

Sebastiaan van Nimwegen - CBRE

"It shouldn't be the transparent. The only difficulty is that if all people have the same information and if everyone is using big data, then the real estate will be like buying a share on the stock market due to the public available information."

Martijn van den Eijnden - Carin Real estate
1- INTRODUCTION

DATA IS THE BASIS FOR INFORMATION

‘You can have data without information, but you cannot have information without data’
Daniel Keys Moran (NT, 2015).
**HYPOTHESIS:**

‘Big data and smart tools enhance the investment decision making process of office property for institutional real estate investors by reaching more accurate and informed decisions based on data and reliable analysis’

**RESEARCH OUTCOME:**

The expected final product of this research is a developed integrated decision making model and flow chart that involves big data methods and techniques for making more informed real estate investment decisions ‘Dutch office market’.
- **RESEARCH QUESTIONS:**

**Main question:**

- How to make use of big data for achieving more informed real estate investment decisions?

**Sub-Questions:**

- Which acquisition criteria are affecting the real estate investment decisions for institutional investors?; and what type of data is required and available?
- How could big data tackle the current problems in the real estate industry?
- What are the main challenges for applying big data to the real estate industry?
- What are the opportunities of using big data and predictive analytics in real-estate investment decisions?
### 2- THEORETICAL FRAMEWORK (REAL ESTATE INVESTMENT)

#### ACQUISITION CRITERIA (OFFICE SPACE):

<table>
<thead>
<tr>
<th>ECONOMIC FEATURES</th>
<th>LOCATION FEATURES</th>
<th>BUILDING FEATURES</th>
<th>CONTRACT FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Vacancy Rate.</td>
<td>1- Distance to CBD and important places.</td>
<td>1- The building size.</td>
<td>1- Contract period (years).</td>
</tr>
<tr>
<td>2- Gross Domestic Product (GDP).</td>
<td>2- Distance to public transportation and railways.</td>
<td>2- Building materials and its quality.</td>
<td>2- Duration of rent free.</td>
</tr>
<tr>
<td>3- Absorption Rate.</td>
<td>3- Distance to Highways (Road infrastructure).</td>
<td>3- Building design.</td>
<td></td>
</tr>
<tr>
<td>4- Office stock &amp; supply.</td>
<td>4- Parking.</td>
<td>4- Building Condition: age and structure</td>
<td></td>
</tr>
<tr>
<td>5- Office Employment Rate.</td>
<td>5- Charisma of surroundings &amp; Environmental amenities</td>
<td>5- Building compatibility and formity with its surroundings.</td>
<td></td>
</tr>
</tbody>
</table>

‘GDP is the market value of goods and services produced within a selected geographic area (usually a country) in a selected interval in time (often a year)’ (Leamer, 2010).
DECISION MAKING MODELS (EXAMPLES):

1. Definition phase (objectives/.constraints)
2. Planning phase (implementation/envirnoment)
3. Dealing phase (search, analysis, evaluation)
4. Executing phase (final decision/deal closing)
5. Watching phase (measurement)
6. Optimising phase (disposal, revaluation)

Sources: Parker (2010)

Step 1 – Identification of objectives and constraints of the investor
- Wealth
- Preferences regarding risk and return

Step 2 – Analysis of market conditions and context
- Market analysis
- Legal environment
- Socio-political analysis

Step 3 – Development of the financial analysis
- Operational decisions
- Financial decisions
- Decisions to change
- Taxation of income
- Tax Planning
- Taxation of wealth

Step 4 – Application of decision criteria
- Rules of thumb
- Discount Cash Flow
- Traditional methods

Step 5 – Investment decision

Fig. 3. Mapping the Real Estate Portfolio Management Process (Parker, 2010).
Fig. 4. A model of decision-making process relating to the generic investment (Manganelli, 2015).
2- THEORETICAL FRAMEWORK (BIG DATA & SMART TOOLS)

BENEFITS OF BIG DATA IN REAL ESTATE:

"Nobody really wants big data, ... what they really want is big impact and big results"

1- Property management:
Monitoring the building performance: air pressure, internal environment, etc.

2- Portfolio management:
Holistic overview for faster actions (proactive management)

3- Smart marketing:
Google-like searches connecting potential buyers to products around the world (E-commerce)

4- Risk management:
Calculating and determining different kind of risks based on data.

5- Preventing money laundering:
Suspicious Activity Reports (SAR) are always needed. Defining all involved stakeholders in high transactions.

6- Future smart cities:
a city that provides mobility, green technology, personalized medicine, safe services, clean water, traffic management, etc,
- generates massive amount of daily data.

BIG DATA BENEFITS IN REAL ESTATE
2- THEORETICAL FRAMEWORK (BIG DATA & SMART TOOLS)

BENEFITS OF BIG DATA IN REAL ESTATE INVESTMENT MANAGEMENT:

Identifying the financial burden of a potential investment based on modelling property appreciation, maintenance costs, capital outlay, potential tenants, demographical prime growth areas and marketing expenses,
2- THEORETICAL FRAMEWORK (BIG DATA & SMART TOOLS)

CHALLENGES OF ADAPTING BIG DATA

COMPLEXITY

Data is complex and unstructured.

**Data complexity:**
Unstructured format and different type

**Computational complexity:**
new computing approaches are needed.

**System complexity:**
Big data requires very complex computing algorithms. (system architecture)

PRIVACY & SECURITY

Critical ethical and moral debate.
Personal information.

Fig.6. Default visibility settings in social media over time (Acquisti et al., 2015).

- Individuals should control their actions on the internet.
- Privacy policy are required.

CULTURE & MINDSET

Changing the way people think about data and their culture.

Fig.7. BI vs Analytical services (Schalekamp, 2017).

People should believe in data and its value to the organization.
2- THEORETICAL FRAMEWORK (BIG DATA & SMART TOOLS)

HOW TO ADAPT BIG DATA STRATEGY?

- **Strategy**
- **People**
- **Process**
- **Data**
- **Technology**
3- RESEARCH METHODOLOGY

- RESEARCH SCHEME:

Empirical research
(Qualitative research)

- Data Analysis techniques:
  - Thematic analysis
  - Narrative analysis

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3- RESEARCH METHODOLOGY

**Thematic analysis scheme**

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**Theme 1**
(Decision making process)

**Keywords:**
1. Process in practice
2. Excluded/added steps to theory.
3. Average investment time horizon
4. Traditional ways
5. Innovative methods

**Tools:**
- Interviews
- Score-cards
- Reports

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**Theme 2**
(Acquisition criteria)

**Keywords:**
1. Current criteria (KPI’s)
2. Added criteria in 10 years
3. Excluded criteria in 10 years
4. Data Availability
5. Gut feelings & emotions

**Tools:**
- Interviews
- Score-cards
- Reports

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**Theme 3**
(Big data & smart tools)

**Keywords:**
1. Benefits to real estate investment
2. Main challenges
3. Data ‘accurate, up to date’
4. Data accuracy assurance.
5. Mindset Acceptance
6. Social media
7. Techniques for collecting and processing data
8. Techniques for visualizing
9. 100% Automation (Agree/disagree)
10. The new role of appraisals

**Tools:**
- Data companies, tools, and reports
- Interviews
- Score-cards

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**Theme 4**
(Future trends & analysis)

**Keywords:**
1. Most likely future trends
2. The office space in 10 years

**Tools:**
- Interviews
- Reports
3- RESEARCH METHODOLOGY

- RESEARCH SAMPLE:

DEMAND SIDE

- End users.

SUPPLY SIDE

- Construction companies.
- Development companies.
- Real estate owners.

REAL ESTATE INVESTORS

- Direct.
- Asset mang. Plan
- Renovation
3- RESEARCH METHODOLOGY

- RESEARCH SAMPLE:

INVESTORS & ADVISORS (SUPPLY SIDE)

ABN-AMRO
CBRE
Bouwinvest
BNP Paribas Real Estate
CAIRN Real Estate
Spring Real Estate
Reborn

BIG DATA & REAL ESTATE (INNOVATION SIDE)

Geophy
Lone Rooftop

Vastgoeddata
Cleverstone

END-USERS (DEMAND SIDE)

Leesman
Royal Haskoning DHV
Ministerie van Binnenlandse Zaken en Koninkrijksrelaties
PHASE ONE
DECISION MAKING PROCESS:

Excluded steps
Additional steps
Valuation models
4- RESULTS & DISCUSSION (Theme 2)

ACQUISITION INDICATORS AND THEIR AVAILABILITY:

Building features

- Heating, cooling, ventilation
- Waste production
- Water usage
- Energy usage
- Sustainability label and certificates
- Communication technology
- Building amenities and services
- Lighting
- Flexibility
- Charisma of the entrance
- Privacy
- Architectural quality
- Availability of external view
- Ceiling height
- Number of elevators
- The percentage of unused space
- The percentage of common space
- LFA/GFA ratio
- Number of floors
- Total floor area
- Building compatibility with the surroundings
- Building condition (Structure)
- Building Age
- Building Design
- Building materials and its Quality
- The building size (Total area)

Economic features

- Annual depreciation rate of the building
- Annual interest rate
- Office employment rate
- Office supply
- Office stock
- Absorption rate
- Gross Domestic Product (GDP)
- Vacancy rate

Location features

- Number of parking places
- Parking fees
- Charisma of surroundings...
- Distance from airports
- Distance to highways (Road)
- Distance to public transportation
- Distance to the Randstad area
- Distance to CBD

Contract features

- Duration of rent-free period
- Contract Period (Years)
## DATA AVAILABILITY:

<table>
<thead>
<tr>
<th>Available Indicators</th>
<th>Easier to be collected via big data analytics, smart tools or building and combining different data sets</th>
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<tbody>
<tr>
<td><strong>A- Economic Features</strong></td>
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<td>1- Vacancy rate</td>
</tr>
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<td>2- Office employment rate</td>
<td>2- Absorption rate (Net/Gross)</td>
</tr>
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<td>3- Annual interest rate</td>
<td>3- Office stock</td>
</tr>
<tr>
<td>4- Annual depreciation rate of the building</td>
<td>4- Office supply (vacant stock)</td>
</tr>
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<td><strong>B- Location Features</strong></td>
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<td>1- Distance to CBD</td>
<td>1- Charisma of the surroundings &amp; Environmental amenities</td>
</tr>
<tr>
<td>2- Distance to the Randstad area</td>
<td>2- Number of parking spaces</td>
</tr>
<tr>
<td>3- Distance to public transportation</td>
<td></td>
</tr>
<tr>
<td>4- Distance to highways (road infrastructure)</td>
<td></td>
</tr>
<tr>
<td>5- Distance from airports</td>
<td></td>
</tr>
<tr>
<td>6- Parking facilities/fees</td>
<td></td>
</tr>
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<td><strong>C- Building Features</strong></td>
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<td></td>
<td>12- Building amenities and services</td>
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<tr>
<td></td>
<td>13- Communication technology</td>
</tr>
<tr>
<td></td>
<td>14- Energy usage</td>
</tr>
<tr>
<td></td>
<td>15- Water usage</td>
</tr>
<tr>
<td></td>
<td>16- Waste production</td>
</tr>
<tr>
<td></td>
<td>17- Heating, cooling, Ventilation</td>
</tr>
<tr>
<td></td>
<td>18- Building layout (Single/ multi-tenants)</td>
</tr>
<tr>
<td></td>
<td>19- Renovation date</td>
</tr>
<tr>
<td></td>
<td>20- Health</td>
</tr>
<tr>
<td><strong>D- Contract Features</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1- Contract period</td>
</tr>
<tr>
<td></td>
<td>2- incentives</td>
</tr>
</tbody>
</table>
**BENEFITS OF BIG DATA:**

- **More transparency (better data)**
  - ‘It comes more transparent. We are still young and we cannot imagine the time where such things like Google Maps for example were not there,.....’
  - ‘10 years or 15 years ago all these platforms like Geophy or Vastgoeddata didn’t even exist. I cannot imagine doing the same thing 15 years back.’

- **Better, faster, cheaper decisions**
  - ‘Big data can provide information that wouldn’t be rather accessible, there would be better fit between demand and supply. Better information, better knowledge of prices, (more accurate and faster decisions)’
  - ‘I think the obvious reason is that you have better arguments to do or do not invest in a certain property, better argued decisions.’

- **Reducing risks**

- **Adapting faster to user’s preferences**
  - ‘It leads to more accurate decisions in the right moment. Because what we see now that organizations still making decisions based on the wrong assumptions.’
  - ‘You can have more accurate comparable, market insights, how tenant preference will change, (user preferences), then you can adapt to that more quickly.’

- **Better future expectations**
  - ‘It also provides you by enough information which can be shared among people, in order to see possibilities, which are not seen right now (better future expectations).’
  - ‘I would say that the transformation into using predictive analysis and I think that is the most important part.’

- **Approach potential investors**
  - ‘...in terms of big data you are working of large scale, which allows you also to approach now investors that you have never seen before. ......... You can approach him much quicker, because I am not going to read all the newspapers and magazines for all the countries.’

- **better knowledge of prices & the market**
**CHALLENGES OF BIG DATA:**

- **Data accuracy and quality**
  - ‘One of the challenges is the accuracy of data, ...., I believe this is a big challenge to get the data and information correct.’
  - ‘Getting accurate data. That is not publicly available. .......... How you keep the quality of the data?’

- **Knowledge & skills of people**
  - ‘To have the data, ...., Updating the data, and data quality and the knowledge and skills of people working on it, and I think the third part is security or safety of the data in combination with the privacy issues.’

- **Privacy and moral issues**
  - ‘... but it means also gathering data from the people who are in the building which is also a privacy issue.’

- **No competition (the market will be the same)**
  - ‘If big data is available so the quality of the data provided by different companies probably will be at the same level.’

- **Current mindset (willingness of people to share & cooperate)**
  - ‘Explaining it, that is the hardest thing because it does seem to be like a black box, but getting investors onboard is actually hard and taking a lot of time.’
  - ‘The willingness of all people collaborating, it is a challenge to get everyone in.’

- **Alot of money, time, resources and technology to invest**
  - ‘I think what you now see ‘it takes a lot of time’, so you need to invest a lot of time and resources to make the information transparent and also that is what we try to do.’
THE PROCESS CANNOT BE FULLY AUTOMATED

‘The stock market in the US is probably the most transparent market in the world – I think and there are still trades over there based on gut feeling. You cannot fully automate it, you can do 90% but the last 10% has to be done by people, in my opinion.’

‘I think that gut feeling is important but we try as researchers to minimize the gut feeling, … but I do think that estimated guess is may be 20% of the decision criteria, because it is always about the part that you cannot answer.’
4- RESULTS & DISCUSSION (Theme 3)

CURRENT DATA FIRMS AND TOOLS:

- DECISION MAKING MODEL FOR REAL ESTATE INVESTMENT (PLATFORM)
- REAL ESTATE DATA PLATFORM
- AUTOMATIC VALUATION
- SMART LOCATION TOOL
- MONITORING OCCUPANCY
  (LESS ENERGY COST, OPERATION COST)
- INTERNAL REAL ESTATE DATA BASE
- EXTERNAL REAL ESTATE DATA BASE
- MONITORING PERFORMANCE
  KNOWLEDGE ABOUT THE END USERS’ PREFERENCES

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4- RESULTS & DISCUSSION (Theme 4)

FUTURE TRENDS AND SCENARIOS:
BUILDING FEATURES (IMPACT ON RENT):

![Bar Charts: Building Features (Currently) and Building Features (in 10 years)]
PHASE TWO

BUILDING AND VALIDATION OF THE REAL ESTATE INVESTMENT DECISION MAKING MODEL
4- RESULTS & DISCUSSION (Phase 2)

REQUIRED DATA: (based on form)
- Quantitative data: transactional data, building data, location, contracts, economic, etc.
- Qualitative data: location data, user preference, user satisfaction, etc.

DATA SOURCES: (based on the collection method)
- Internal data sources:
  * Internal data bases (APIs, automatic, etc.)
  * Sensors and machine generated (real-time data)
  * Manual human data
- External data sources:
  * External data bases by data providers
  * Social media / web.

ANALYSIS TYPE:
- Descriptive & Exploratory
- Estimation
- Prediction

ANALYSIS METHODS:
- Analytics
- Predictive analytics
- Real time analysis
- Location based analysis
- Statistical & mathematical analysis
- Social networks/web analysis
- End-user’s preference and satisfaction surveys
RESULTS & DISCUSSION (Phase 2)

Real estate investment decision Making Process

1. Defining general investment strategy
2. Defining initial goals/investor constraints/risk-return preference
3. Defining related specific business questions/decision making criteria (KPI’s)
4. Macro Analysis: Market analysis, Socio-economic analysis
5. Sourcing products (Available investment opportunities in the market)
6. Meso & Micro analysis: Context analysis, Property research, financial analysis, applying decision criteria, etc.
7. Scenario planning & predictive analytics (Future-proofing)
8. Financial analysis & business plan of different scenarios (sensitivity analysis)
9. Acquisition: Real estate investment opportunity selection/

Sourcing & optimizing Capital Structure (Equity & Debt)
HUMAN RESOURCES

- HUMAN GENIUS & CREATIVITY
- HUMAN GREED
TECHNOLOGY IS MAIN DRIVER OF INCREASING THE ROLE OF HUMAN EXPERTISE AND CREATIVITY

(new ideas, products, services and opportunities)
The required data is not available.

Big data can improve the decision making process.

Data availability and accuracy, and the current mind set are the main challenges.

- Automation and technology are the future so prepare and adapt!
6- REFERENCES


QUESTIONS!