THE FUTURE OF EUROPEAN CAR PARKS

OCCUPANCY RATE DEVELOPMENTS IN THE PERIOD 2015-2025

Informing future managerial decision making in order to create competitive advantage and support profitability by studying occupancy rates of European car parks.
Informing future managerial decision making in order to create competitive advantage and support profitability by studying occupancy rates of European car parks.
Contents of presentation

1 | Research overview
2 | Methodology
3 | Theoretical framework
4 | Results
5 | Conclusion
6 | Discussion
   | Q&A
1 | RESEARCH OVERVIEW

Introduction
Problem statement
Aim
Research Questions
Research overview

Introduction

Research programme
- Real Estate Management: *Successful Corporate Real Estate (CRE) strategies to support profitability and competitive advantage*

Graduation company
- Bouwfonds Investment Management
- Rabo Vastgoedgroep
- Institutional investor
- 41 car parks (€700 million)

*Cashflow in car park investments*
Research overview

Trigger and motivation

- Last study by Van der Voordt & Van Wegen (1993)

- “30% of public space is assigned to parking.”
  (Respondent 5, 2015)

- “Parking is the first acquaintance and final reminder of an experience.”
  (Respondent 7, 2015)
1. Research overview

Problem statement

Recent history: occupancy rate decline
Forecast: ?

Operator cannot pay its rent anymore from direct parking revenue (possible exception for revenue based contracts)
Research overview

Aim

Aim of graduation company
- Operators business model
- Investments future proof?

Aim of study
- Influential factors on occupancy rates
- Widely supported vision on future

Gap in literature
- No studies on occupancy rates for commercial car parks
1. Research overview

Research Questions

Which factors will influence European car park occupancy rates in the period 2015-2025?

1. What factors influence European car park occupancy rates?
   - General focus

2. How have those factors develop in European car parks till 2015?
3. How have European car park occupancy rates been developing till 2015?
   - Current & recent developments

4. How will those factors develop in the period 2015-2025?
   - Future developments
5. How will those factors influence occupancy rates of European car parks in the period 2015-2025?
2 | METHODOLOGY
Scope
2 Methodology

Concept

Problem Statement

Research questions

Theoretical background

Research methods

Data analysis
  *Regression modelling*

Results

Conclusion

Results

Expert interviews
  *Q-methodology*

Conclusion
2 Methodology

Scope

- Parking: Est. 440,000,000
  - Public (regulated): Est. 34,000,000
  - Private (unregulated): Est. 1,000,000
  - Unpaid: Est. 1,000,000
- Off-street: Est. 22,000,000
- On-street: Est. 12,000,000
  - Permit parking
  - Visitor parking
- Car parks: Est. 20,000,000
- Airports: Est. 1,000,000
- Car parks / P&R: Est. 1,000,000
- Inner-city multiple anchors
- CBDs
- Hospitals
2 | Methodology

Scope

Sample size of study

<table>
<thead>
<tr>
<th></th>
<th>Off-street parking places</th>
<th>Sample size</th>
<th>Sample size %</th>
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<tbody>
<tr>
<td>European Union</td>
<td>20,000</td>
<td>28</td>
<td>0.14%</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>200</td>
<td>12</td>
<td>6.00%</td>
</tr>
</tbody>
</table>
3 | THEORETICAL FRAMEWORK

The context of parking
4 | Theoretical framework

The context of parking

Influential factors on car parks according to literature

- Car parks, technology & operators
- Urban Planning & Regulation
- Tariffs & Willingness to Pay
- Mobility
- Retail, leisure and office locations
- Socioeconomic factors
Theoretical framework
The context of parking

Tariffs & Willingness to Pay
- Automated payment methods
- Dynamic and flexible parking tariffs
- Payments per minute
- Level of safety in car parks
- Visual attractiveness of car parks
- Paid parking at hospitals
4 | RESULTS
Data analysis
Interviews
First hour parking tariffs The Netherlands

<table>
<thead>
<tr>
<th>Year</th>
<th>Off-street tariff</th>
<th>On-street tariff</th>
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<tbody>
<tr>
<td>2005</td>
<td>€1.60</td>
<td>€1.60</td>
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<tr>
<td>2006</td>
<td>€1.80</td>
<td>€1.80</td>
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<tr>
<td>2007</td>
<td>€2.00</td>
<td>€2.00</td>
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<tr>
<td>2008</td>
<td>€2.20</td>
<td>€2.20</td>
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<tr>
<td>2009</td>
<td>€2.40</td>
<td>€2.40</td>
</tr>
<tr>
<td>2010</td>
<td>€2.60</td>
<td>€2.60</td>
</tr>
<tr>
<td>2011</td>
<td>€2.80</td>
<td>€2.80</td>
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<tr>
<td>2012</td>
<td>€3.00</td>
<td>€3.00</td>
</tr>
<tr>
<td>2013</td>
<td>€3.20</td>
<td>€3.20</td>
</tr>
<tr>
<td>2014</td>
<td>€3.40</td>
<td>€3.40</td>
</tr>
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</table>
**Results**

Data analysis

Recent developments

![Graph showing recent developments with lines for Tariff, Turnover, and Occ. Rate from 2011 to 2018F.](graph.png)
4 | Results

Data analysis

Retail

![Graph of Occupancy rate CP10, overview per week](image)

Seven day non-stop occupancy rate analysis: period 01-09-2015 till 08-09-2015

- Occupancy rates
Results

Data analysis
Results

Data analysis

Hospital
Results

Data analysis

CBD

Occupancy rate CP1, overview per week
Seven day non-stop occupancy rate analysis: period 01-09-2015 till 08-09-2015

Occupancy rates
Results

Data analysis

---

**Occupancy rates**

- **CBD**
- **Retail**
- **Hospital**

**Occupancy rate overview per week**

Seven day non-stop occupancy rate analysis: period 01.09.2015 til 08.09.2015

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**Research overview**

**Methodology**

**Theoretical framework**

**Results**

**Conclusion**

**Discussion**
Results

Data analysis: performance indicators

- Turnover per parking spot
- Sold parking hours per spot
Results

Data analysis

- Raw file
  - Variables 69

- After missing value check
  - Variables 62

- After multicollinearity check
  - Variables 40

- After factor analysis
  - Variables 40 or Factors 6

Dataset
- n=41, variables 40 or factors 6

Raw file
- Cases (car parks)
  - n=41
Results

Data analysis

Interesting results

Highest number of payment methods in The Netherlands
- Most advanced parking market

Rent, Market Value & Turnover
- Shows valuation techniques based on turnover and rent

Tariffs
- All the same for one area: no price competition
Results

Data analysis

Regression model predicting turnover

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Variable</th>
<th>Level of influence on turnover</th>
</tr>
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<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>Constant</td>
<td>-</td>
</tr>
<tr>
<td>Locational</td>
<td>Number of competitors within 10 minutes walking</td>
<td>NN_10MIN</td>
<td>-232</td>
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<tr>
<td>Locational</td>
<td>Opening days of main anchor or car park in days</td>
<td>OPEN_DAY</td>
<td>-367</td>
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<tr>
<td>Building</td>
<td>Total parking capacity</td>
<td>CAPACITY</td>
<td>476</td>
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<td>Managerial</td>
<td>Commercial or public operator</td>
<td>COM_OP</td>
<td>-281</td>
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<tr>
<td>Managerial</td>
<td>Number of available types of subscriptions</td>
<td>NO_SUB</td>
<td>280</td>
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<tr>
<td>Financial</td>
<td>First hour tariff in Euro’s</td>
<td>1H_TARIFF</td>
<td>386</td>
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\[ n=41, R=0.802, R^2=0.643, Adjusted R^2=0.580, F=10.224, df=34, p=0.000, S.E.E. 1.128.582, Estimation error= 68.1\% \]
Results

Data analysis

Regression model predicting *occupancy rates*

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Variable</th>
<th>Level of influence on turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Locational</td>
<td>Relative region area size within country</td>
<td>Area NUTS3/NAT*100</td>
<td>1,415</td>
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<tr>
<td>Locational</td>
<td>Distance to nearest highway in meters</td>
<td>D_HIGHWAY</td>
<td>1,337</td>
</tr>
<tr>
<td>Financial</td>
<td>On-street first hour tariff in Euro’s</td>
<td>STR_TARIFF</td>
<td>1,541</td>
</tr>
<tr>
<td>Socioeconomic</td>
<td>Regional passenger cars per 1,000 inhabitants (NUTS2)</td>
<td>PASS_CARS_NUTS2/1000_POP</td>
<td>1,742</td>
</tr>
</tbody>
</table>

*n=40, R=0,631, R²=0,398, Adjusted R²=0,329, F=5,782 df=35, p=0,001, S.E.E. 0,1687, Estimation error= 6,0%*
Results

Interviews

Method
- Structured using Q-Methodology
- Ranking of 42 influential factors
- Argumentation

Eight experts, different roles
- Investor
- Operator
- Consultant
- Researcher
- Consumer association
4 Results

Interviews

- Local policies and regulation (e.g. congestion zones, paid parking zones)
- Total parking capacity (ratio on-street and off-street)
- Connected cars (informative systems with parking info provided by parking brokers)
- Population size
- Car ownership
- Number of households
- Shopping experience
- Online shopping
“Historically, parking has been a product that sold itself, nowadays, one should more steer upon groups of users, occupancy rates and tariffs.”

“No real differences in tariffs exist within close proximity.”

“The biggest competitors of parties involved in parking cannot be found in the parking market itself but are the internet retailers such as Alibaba, Amazon or Bol.com.”

“The parking broker in the form of a Booking.com will radically change the parking market.”

“The number one reason to park is found in the distance to the final destination.”

“New car parks should be developed with alternative uses in mind, such as storage rooms or even electric power plants.”
5 | CONCLUSION

Main findings
Strategy implications
Conclusion

Main findings

Which factors will influence European car park occupancy rates in the period 2015-2025?

Differences per country, city, object
- Local policies
- Socioeconomic factors

General conclusions
- Most constant occupancy rate: realized through multiple anchors
- Municipal policy tendency: parking taken from on-street to off-street locations
- Online shopping: winning and losing cities
5 | Conclusion

Strategy implications

General implications
• Closely monitor mobility developments – e.g. connected cars, autonomous vehicles, car sharing
• Study development of operators’ business model
• Study possibilities to include operations and real estate
• Data sharing - collaboration with consultancy firms or research institutes

Acquisition phase
• Already consider alternative future uses for car parks during acquisition phase
• Study long term regional trends and developments (centrality index)
• Benchmark car parks with portfolio
• Only buy car parks with multiple anchors or long term committed single use (airport, hospital)
6 | DISCUSSION

Results
Restrictions and limitations
Recommendations for further research
Results

- Interesting for practice

Methodology

- Interesting: Combination of current state & future developments (interviews & data analysis)

Limitations of research

- Only 41 car parks
- Difficult to determine differences per country
- Occupancy rates not available

Recommendations for future research

- Perform data analysis at operator (larger sample)
- Long run study, multiple years
QUESTIONS
Theoretical


Bibliography


Dolfsma, A. (2002). Parkeren; meer dan de auto wegzetten. (parkeren als marketinginstrument)


Freese, C., & Schönberg, A. T. (2014). Shared mobility; how new businesses are rewriting the rules of the private transportation game. Retrieved from Munich:


Bibliography

Vanhoutte, P., (2014). De invloed van verkeersveiligheid op eventuele regulering van parkeercentrales. Retrieved from De Lijn:
Appendices – Conceptual model

PROBLEM STATEMENT & RESEARCH QUESTIONS

Which factors will influence European car park occupancy rates in the period 2015-2025?
1. What factors influence European car park occupancy rates?
2. How have those factors developed for European car parks till 2015?
3. How have European car park occupancy rates been developing till 2015?
4. How will the determining factors develop in the period 2015-2025?
5. How will those factors influence occupancy rates of European car parks in the period 2015-2025?

Factors categorized by:
- Car parks, technology and operators
- Retail, leisure & office locations
- Tariffs and willingness to pay
- Urban planning & regulation
- Socioeconomic factors
- Mobility

METHODOLOGY

1. Theoretical framework
   Subquestion 1: Factors influencing car park occupancy rates

2. Regression modelling
   Subquestions 2 & 3: Determine the current state

3. Expert interviews
   Subquestions 4 & 5: Determining future developments

RESULTS

A three step approach towards conclusions

CONCLUSION & RECOMMENDATIONS

Formulate an answer to the research questions and thereby inform future managerial decision making.
<table>
<thead>
<tr>
<th>Variable name</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 CP</td>
<td>Car park number (string variable)</td>
</tr>
<tr>
<td>1 NAT</td>
<td>Nation</td>
</tr>
<tr>
<td>2 NL</td>
<td>Located in The Netherlands or other country</td>
</tr>
<tr>
<td>3 N3_AREA</td>
<td>CBD, Inner city or Hospital location</td>
</tr>
<tr>
<td>4 CLASS</td>
<td>Centrality index, defined as retail turnover/retail spending*100%.</td>
</tr>
<tr>
<td>5 CENTRAL</td>
<td>Distance to nearest competitor in meters.</td>
</tr>
<tr>
<td>6 D_NEAREST_COMP</td>
<td>Distance to nearest highway in meters.</td>
</tr>
<tr>
<td>7 D_HIGHWAY</td>
<td>Distance to nearest railway station in meters.</td>
</tr>
<tr>
<td>8 D_TRAIN</td>
<td>Distance to main anchor of car park in meters.</td>
</tr>
<tr>
<td>9 D_RING</td>
<td>Distance to parking ring in meters.</td>
</tr>
<tr>
<td>10 D_ANCHOR</td>
<td>Indicator for mixed use, defined by walkscore.com</td>
</tr>
<tr>
<td>11 OPEN_DAY</td>
<td>Number of competitors within a 10 minute walk.</td>
</tr>
<tr>
<td>12 ANCHOR_MIX</td>
<td>Opening days of main anchor of car park in days.</td>
</tr>
<tr>
<td>13 NN_10MIN</td>
<td>Total parking capacity</td>
</tr>
<tr>
<td>14 CAPACITY</td>
<td>Underground or aboveground</td>
</tr>
<tr>
<td>15 UNDERGROUND</td>
<td>Number of lifts.</td>
</tr>
<tr>
<td>16 NO_LIFT</td>
<td>Number of floors.</td>
</tr>
<tr>
<td>17 NO_FLOOR</td>
<td>Main type of material: steel or concrete</td>
</tr>
<tr>
<td>18 MATERIAL</td>
<td>Entrance level for cars.</td>
</tr>
<tr>
<td>19 ENTRANCE_LEVEL</td>
<td>Underground or above ground entrance for cars.</td>
</tr>
<tr>
<td>20 UNDERGROUND_ENTRANCE</td>
<td>Number of pedestrian access points.</td>
</tr>
<tr>
<td>21 NO_PDEST</td>
<td>Number of entry and exit ramps for cars.</td>
</tr>
<tr>
<td>22 NO_RAMP</td>
<td>Construction year.</td>
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<tr>
<td>23 YEAR</td>
<td>Free height in meters.</td>
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<td>24 HEIGHT</td>
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### Variables

#### Locational

<table>
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<th>Variable Name</th>
<th>Definition</th>
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<tr>
<td>25</td>
<td>RENT</td>
<td>Annual rent in 2014 in Euro's.</td>
</tr>
<tr>
<td>26</td>
<td>VALUE</td>
<td>Market value in 2014 in Euro's.</td>
</tr>
<tr>
<td>27</td>
<td>H_TARIFF</td>
<td>First hour tariff in 2015 in Euro's.</td>
</tr>
<tr>
<td>28</td>
<td>MAX_DTARIF</td>
<td>Maximum day tariff in 2015 in Euro's.</td>
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<td>29</td>
<td>H_TARIFF_COMPET</td>
<td>First hour tariff main competitor in Euro's.</td>
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<tr>
<td>30</td>
<td>MAX_DTARIF_COMPET</td>
<td>Maximum day tariff main competitor in Euro's.</td>
</tr>
<tr>
<td>31</td>
<td>STR_TARIFF</td>
<td>On-street first hour tariff in Euro's.</td>
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<tr>
<td>32</td>
<td>TURNOVER</td>
<td>Total turnover from parking in 2014 in Euro's.</td>
</tr>
<tr>
<td>33</td>
<td>TURNOVER_GROWTH</td>
<td>Turnover growth 2013/2014.</td>
</tr>
<tr>
<td>34</td>
<td>TURNOVER_SPOT</td>
<td>Turnover per spot (turnover/capacity)</td>
</tr>
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</table>

#### Managerial

<table>
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<th>Variable Name</th>
<th>Definition</th>
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<tr>
<td>35</td>
<td>COM_OP</td>
<td>Commercial or public operator.</td>
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<tr>
<td>36</td>
<td>NO_PAY</td>
<td>Number of payment methods</td>
</tr>
<tr>
<td>37</td>
<td>NO_SUB</td>
<td>Number of subscriptions.</td>
</tr>
<tr>
<td>38</td>
<td>OPEN_HOUR_ENT</td>
<td>Car park entrance 24/7 opened or not.</td>
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## Appendices – Variables

<table>
<thead>
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<th>Variable name</th>
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<td>GDP_NAT</td>
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<tr>
<td>43</td>
<td>GDP_NUTS2/GDP_NAT</td>
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<td>GDP_NUTS2_CAP</td>
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<td>PAS_CARS_NUTS2</td>
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<td>DIFF_CARS/1000_INHAB_NAT_NUTS2</td>
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Appendices – Variables

3: Very low influence
1. Car parks, technology and operators
2. Urban planning & regulation
3. Retail, luxury & office locations

3: Low influence
1. Retail, luxury & office locations
2. Socioeconomic factors
3. Urban planning & regulation
4. Tariffs & WTP
5. Mobility
6. Socioeconomic factors
7. Urban planning & regulation
8. Tariffs & WTP
9. Retail, luxury & office locations
10. Urban planning & regulation
11. Tariffs & WTP

3: Low-neutral influence
1. Socioeconomic factors
2. Urban planning & regulation
3. Car parks, technology and operators
4. Retail, luxury & office locations

3: Neutral influence
1. Car parks, technology and operators
2. Socioeconomic factors
3. Mobility
4. Parking sharing (opening of private parking spots)

3: Neutral-high influence
1. Mobility
2. Socioeconomic factors
3. Mobility
4. Retail, luxury & office locations
5. Urban planning & regulation
6. Tariffs & WTP
7. Urban planning & regulation
8. Tariffs & WTP
9. Retail, luxury & office locations
10. Tariffs & WTP

3: High influence
1. Tariffs & WTP
2. Tariffs & WTP
3. Auto parks, technology and operators
4. Mobility

3: Very high influence
1. Tariffs & WTP
2. Urban planning & regulation
3. Mobility
4. Socioeconomic factors
5. Socioeconomic factors
6. Urban planning & regulation
7. Retail, luxury & office locations
8. Socioeconomic factors
9. Retail, luxury & office locations

4: Car parks, technology and operators
5. Urban planning & regulation
6. Tariffs & WTP
7. Retail, luxury & office locations

5: Very high influence
1. Urban planning & regulation
2. Mobility
3. Socioeconomic factors
4. Socioeconomic factors
5. Urban planning & regulation
6. Retail, luxury & office locations
7. Socioeconomic factors
8. Retail, luxury & office locations
## Variables

<table>
<thead>
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<th>Model per category</th>
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<td>TURNOVER</td>
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<td>LOG_SOLD_</td>
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<td>PARKING_HOURS</td>
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### Number of cases

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<th>2b</th>
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<th>4*</th>
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### Independent variables (or factors)

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<th>6: Competition</th>
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### Output

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### Preferred model

- Mixed
- Accessibility
- Competition