Institute of Facility Management
Workplace Research & Management

EFFECTIVE WORKPLACES - A MULTI-LEVEL STUDY

ERES 24th Annual Conference
June 28 - July 1, 2017, Delft, The Netherlands
Research gap

Current studies on the effects of work environments on employees
(1) are often based on single buildings or organisations and therefore not generalizable
(2) do not separate the influences of work design (and the social environment) from the influences of the work environment
(3) focus either on physical or perceived parameters – the two perspectives are usually not put into relation with each other
Research goals

- To analyse the relationship between objective parameters of office design and office users’ experience.
- To model effects of job design and design of physical office environment on users’ experience and to analyse relative effects of the two classes of influences.
Action-regulation theory

Work task → Goal setting → planning → (observable) action → feedback → Work task

Outcomes
Action-regulation theory

Environment

Work task

Goal setting

feedback

(observable) action

planning

Outcomes
Action regulation problems in office work
(based on Frese & Zapf, 1994; Greiner & Leitner, 1989; Leitner, 1999)
Effective workplaces: spatial environments and job design

Office environment

Spatial organisation of offices
- Layout
- Spatial Density
- Workspace quality
- Work and storage spaces
- Workplace appropriateness

Indoor environmental conditions
- Office noise
- Indoor climate
- Lighting
- Control over environment

Socio-spatial environment
- Social density
- Privacy
- Crowding
- Distractions

Employee-level outcomes
- Satisfaction
- Health
- Work performance

Job design

Scope of action
decision possibilities with regard to procedures, equipment, time frame, and sequence of actions

Variety
degree to which skills and abilities can be applied for dealing with work tasks, deciding, and learning new things on the job

Overload
- Quantitative overload (time pressure, high workload)
- Qualitative overload (overtaxing information processing)
Method

Cross-sectional field study, Switzerland

24 organisations
(technology, IT, telecom, public administration, financial services, higher education, construction, pharmaceutical industry, consulting, professional association)

39 buildings
- Cell office (1-2 employees): 11
- Small group office (3-15 employees): 11
- Large group office (16-501 employees): 14
- Open space (> 50 employees): 2
- Combi office: 1

1373 employees completed survey (average 35 per building)
Multi-level Analysis
Multi-level Analysis

Employee-level variables
- **Spatial organisation of offices**: workplace appropriateness, work and storage space, and workspace quality
- **Ambient environment**: office noise, lighting, indoor climate, and control over the office environment
- **Socio-spatial environment**: privacy, distractions, and social density
- **Job characteristics**
- **Outcomes**: work area satisfaction, job satisfaction, health, job performance, work engagement

Building-level variables
- Office type (layout)
- Spatial density (physical density, i.e. floor area measures)
- Ventilation type (natural, mechanical)
- Building age
- Time since last indoor refurbishment
- Windows (openable or not)
- Building size (number of workspaces)
Intraclass correlations and variance components

Intraclass correlations describe the degree to which individuals share common experiences due to closeness in space (and time)

<table>
<thead>
<tr>
<th>Intraclass correlation</th>
<th>Work area satisfaction</th>
<th>Job satisfaction</th>
<th>Health</th>
<th>Self-assessed performance</th>
<th>Self-assessed performance based on feedbacks</th>
<th>Situational performance</th>
<th>Vigour</th>
<th>Dedication</th>
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</thead>
<tbody>
<tr>
<td>.160</td>
<td>.062</td>
<td>.024</td>
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<td>.026</td>
<td>.045</td>
<td>.014</td>
<td>.052</td>
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</tbody>
</table>

Variance Components

| Between buildings     | 15.95%                 | 6.19%            | 2.41%  | 6.13%                     | 2.59%                                      | 4.47%                  | 1.42%  | 5.22%      |
| Within buildings      | 84.05%                 | 93.81%           | 97.59% | 93.87%                    | 97.41%                                     | 95.53%                 | 98.58% | 94.78%     |
Floor space per workplace per building

→ Amount of floor space is not statistically related to employee-level outcomes (satisfaction, health, work performance)
Floor space ratios per workplace per building

> Ratios of floor space / office type are not statistically related to employee-level outcomes (satisfaction, health, work performance)
Office quality lies in the eyes of the beholder

Satisfaction, health, and work performance cannot be explained by spatial building parameters but depend on users' perceptions
Explained variance: relative effects of office environment and job characteristics

→ Substantial effects of office design variables on all outcome dimension
# Ranking of job characteristics and office design effects on employee-level outcomes

<table>
<thead>
<tr>
<th></th>
<th>Work area satisfaction</th>
<th>Job satisfaction</th>
<th>Health</th>
<th>Self-assessed job performance</th>
<th>Self-assessed job performance based on feedback</th>
<th>Situational work performance</th>
<th>Dedication</th>
<th>Vigour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Workspace quality</td>
<td>Variety</td>
<td>Gender</td>
<td>Variety</td>
<td>Variety</td>
<td>Variety</td>
<td>Overload</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Work and storage spaces</td>
<td>Workspace quality</td>
<td>Overload</td>
<td>Workspace quality</td>
<td>Scope of action</td>
<td>Privacy</td>
<td>Office noise</td>
<td>Variety</td>
</tr>
<tr>
<td>3</td>
<td>Distractions</td>
<td>Overload</td>
<td>Social density</td>
<td>Gender</td>
<td>Overload</td>
<td>Scope of action</td>
<td>Workplace appropriateness</td>
<td>Variety</td>
</tr>
<tr>
<td>4</td>
<td>Privacy</td>
<td>Distractions</td>
<td>Scope of action</td>
<td>Distractions</td>
<td>Gender</td>
<td>Workplace appropriateness</td>
<td>Workplace appropriateness</td>
<td>Social density</td>
</tr>
<tr>
<td>5</td>
<td>Control</td>
<td>Control</td>
<td>Distractions</td>
<td>Age</td>
<td>Gender</td>
<td>Scope of action</td>
<td>Distractions</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Indoor climate</td>
<td>Indoor climate</td>
<td>Workplace appropriateness</td>
<td>Overload</td>
<td>Overload</td>
<td>Scope of action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Gender</td>
<td></td>
<td>Workplace quality</td>
<td>Workplace quality</td>
<td>Lighting</td>
<td>Workplace appropriateness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Variety</td>
<td></td>
<td>Office noise</td>
<td>Distractions</td>
<td>Age</td>
<td>Privacy</td>
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<tr>
<td>9</td>
<td></td>
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<td>Age</td>
<td></td>
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</tbody>
</table>

Note: Ranking is based on significant γ-values in Multilevel Analysis; coefficients for factors printed in bold are >.10
Conclusions

• Substantial effects of office design
  These effects are independent from job design effects
• Office types do not explain variance in outcomes
  Office types are less important than some of the perceivable consequences such as distractions or privacy office types implicate
• (Analysed) building characteristics are not significant predictors for individual level outcomes
  Multi-level Modelling takes the (in)consistency of the relationship between building characteristics and outcomes across different contexts into account
• Consider demands and resources in the office environment
• User-centred approaches to office and workplace design
  Analysing stakeholder and user needs as well as continuous evaluation and improvement of existing work settings.
Limitations

- Voluntarily participating organisations
- Interaction of users and their environment: Occupants control their comfort in the workplace
- MLM serve for prediction and explanation of associations but do not prove causality
- Focus on individual level outcomes
- Employee mobility not controlled
Thank you.

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