APPLYING RESEARCH FINDINGS TO LIGHTING RETROFIT PROJECT

the project process with stakeholders and evaluation

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OUTLINE

1. Project overview
   - Background information: Retrofit site
   - Time line of the project processing

2. Academic point of view
   - Investigation items
   - Applied research findings
   - Survey, evaluation and investigations before and after

3. Project processing with stakeholders
   - Problems and difficulties
   - Positive effects

4. Social influence
1. PROJECT OVERVIEW

BACKGROUND INFORMATION

Before retrofit

- Show room area 227.618 m²
### 1. Project Overview Timeline

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2011</td>
<td>Study group of lighting planning for retail started</td>
</tr>
<tr>
<td></td>
<td>Visited newly built shops</td>
</tr>
<tr>
<td>Aug 2011</td>
<td>Retrofit project arose</td>
</tr>
<tr>
<td>Sept 2011</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; investigation (before renovation)</td>
</tr>
<tr>
<td>Oct 2011</td>
<td>Presentation to the workers (why and how)</td>
</tr>
<tr>
<td>Dec 2011</td>
<td>Final lighting plan set</td>
</tr>
<tr>
<td></td>
<td>1&lt;sup&gt;st&lt;/sup&gt; renovation</td>
</tr>
<tr>
<td>Jan 2012</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; investigation (after renovation)</td>
</tr>
<tr>
<td>May 2012</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; renovation</td>
</tr>
<tr>
<td>June 2012</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt; investigation (after 2&lt;sup&gt;nd&lt;/sup&gt; renovation)</td>
</tr>
<tr>
<td>Sept 2012</td>
<td>Final presentation (accomplishments)</td>
</tr>
</tbody>
</table>
2. ACADEMIC POINT OF VIEW INVESTIGATION ITEMS

Investigations

- Luminance distribution
- Horizontal and vertical illuminance
- Reflectance of furniture and building materials
- Evaluation of the lighting environment (15 items)

Problems

1. Dark
2. Glare
3. Messy
2. ACADEMIC POINT OF VIEW
APPLIED RESEARCH FINDINGS

- Redesign location of space and set a lighting environment for each function
- Effective usage of light by increasing wall reflectance
- Lighten walls considering both horizontal and vertical illuminance
- Consider results of evaluation from both inside and outside the building
- Full usage of highly efficient LED
- Effective usage of daylight
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- Effective usage of day light
## 2. ACADEMIC POINT OF VIEW
### COMPARISON OF BEFORE & AFTER

<table>
<thead>
<tr>
<th>Evaluation from outside the building</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Brightness&quot; inside</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How inside displayed cars appears</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How inside appears</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easiness to enter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The level of surrounding reflections</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whether the shop looks open</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Significance level**
- *, x: 5%
- **, xx: 1%
- ***, xxx: 0.1%

*: Day  
X: Night

**Day time**

**Night time**
2. ACADEMIC POINT OF VIEW COMPARISON OF BEFORE & AFTER

Before  

After

Illuminance distribution at H= 1000mm

- 250lx
- 500lx
- 1000lx
2. ACADEMIC POINT OF VIEW
COMPARISON OF BEFORE & AFTER

Energy Usage Before and After Renovation

<table>
<thead>
<tr>
<th>Energy Usage (W)</th>
<th>Full Usage</th>
<th>Standard Usage</th>
<th>Full Usage</th>
<th>Standard Usage</th>
<th>Standard Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Renovation</td>
<td>6000</td>
<td>5000</td>
<td>36%</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>After Renovation</td>
<td>4000</td>
<td>4000</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
2. ACADEMIC POINT OF VIEW
COMPARISON OF BEFORE & AFTER

Luminance Flux Before and After Renovation

<table>
<thead>
<tr>
<th></th>
<th>Before Renovation</th>
<th>After Renovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Usage</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>Standard Usage</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Full Usage (Daytime)</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Standard Usage (Night time)</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
2. ACADEMIC POINT OF VIEW
SURVEY TO THE WORKERS

- Having problem with VDT work
- Many claims about the darkness during daytime
- ⇔ don’t see the necessity from inside the store

- Clients from nearby dealer come in by mistake
- Little uneasiness caused by color temp difference
Many people involved
- Car dealer owner
- Workers
- Automobile manufacturing company
- Design company
- Lighting design company

Need to share WHY (problem and necessity) and HOW lighting is going to be changed
3. PROJECT PROCESSING WITH STAKEHOLDERS- POSITIVE EFFECTS

- Speeded up the research
- Increased the value of the research:
  + social application
- Other use of simulated results
- Learned how and why lighting is important
4. SOCIAL INFLUENCE

- Social awards
  - Ministry of Environment
  - The Illuminating Engineering Institute of Japan

- Within the company
  - Revising visual identity (VI)
  - Applying it to other stores
4. SOCIAL INFLUENCE

- Energy-efficient lighting design awards 2012
  - Commercial facilities and accommodations
  - Award for excellence
  - Ministry of the Environment

- Tokai branch encouragement prize
  - Tokai branch of The Illuminating Engineering Institute of Japan
THANK YOU FOR LISTENING