ANALYSIS OF VISUAL MANAGEMENT PRACTICES FOR CONSTRUCTION SAFETY

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Outline

- Visual Management in Lean Construction
- Visual Tools
- Visual Orders
- Methodology
- Case Studies: Construction Sites
- Results and Discussion
- Conclusion
What is Visual Management

- Visual Management is a set of techniques for creating a place embracing visual communication and control throughout the environment. (Grief, 1991).
Visual Management in Lean Construction

• VM in construction is adopting different visual tools and orders in construction buildings to enhance safety and reduce wastes.
Visual Tools According to Galsworth (Galsworth 1997)

- Visual Indicators
- Visual Signals
- Visual Controls
- Visual Guarantees
Visual Indicators

- They are used to pass crucial information from management operational level intending to affect human’s behaviour.
Visual Signals

- They are used to provoke a response to the eyesight tending to grab attention for some essential points.
Visual Controls

- They are used to show deviations and enforce full human control by limiting the response to specific height, size, colour, width, length, quantity and volume.
Visual Guarantees

- They are used to ensure that everything’s done in the right way enabling only the correct outcome.

- They are known as mistake proof or Pokayoke striving to eliminate human errors.
Visual Orders

5S + ?
5S

SORT
SET IN ORDER
SHINE
STANDARDIZE
SUSTAIN

STEPS FOR SUCCESS

(Hafey, 2010)
6th S: Safety

Safety is eliminating all hazards and verifying that suitable control measures are in place (Sukdeo 2007).
Purpose Of The Study

The study highlights the importance of VM in the workplace for construction crews and the public as well as its relation to safety.

It presents an investigation on the significance of implementing VM in construction projects in Lebanon and how it enhances safety.
Methodology

Case studies’ analysis of 12 building construction sites in Lebanon that differ by type and total built area.

- Visiting different projects
- Meeting multi-disciplinary engineers and project managers
- Interviewing 31 of them
- Filling the surveys which include questions answered by the interviewed parties using 5 point Likert scale to grade the statements and one open-ended question
- Analyzing survey results including the mean and standard deviation of all responses to get detailed information about safety management in Lebanon.
## Case Studies: Construction Sites

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Type</th>
<th>Total Area (m²)</th>
<th>Extent of VM Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Residential</td>
<td>2940</td>
<td>No usage</td>
</tr>
<tr>
<td>B</td>
<td>Residential</td>
<td>4500</td>
<td>Slight usage</td>
</tr>
<tr>
<td>C</td>
<td>Commercial</td>
<td>22400</td>
<td>Slight usage</td>
</tr>
<tr>
<td>D</td>
<td>Residential</td>
<td>3750</td>
<td>No usage</td>
</tr>
<tr>
<td>E</td>
<td>Residential</td>
<td>3900</td>
<td>Slight usage</td>
</tr>
<tr>
<td>F</td>
<td>Commercial</td>
<td>7000</td>
<td>No usage</td>
</tr>
<tr>
<td>G</td>
<td>Residential</td>
<td>1350</td>
<td>No usage</td>
</tr>
<tr>
<td>H</td>
<td>Residential</td>
<td>1820</td>
<td>No usage</td>
</tr>
<tr>
<td>I</td>
<td>Residential</td>
<td>2040</td>
<td>No usage</td>
</tr>
<tr>
<td>J</td>
<td>Residential</td>
<td>2760</td>
<td>No usage</td>
</tr>
<tr>
<td>K</td>
<td>Commercial</td>
<td>15000</td>
<td>Slight usage</td>
</tr>
<tr>
<td>L</td>
<td>Residential</td>
<td>2880</td>
<td>No usage</td>
</tr>
</tbody>
</table>

Table 1: Construction Sites’ Case Studies
# Results

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean $\bar{x}$</th>
<th>Standard Deviation $\sigma$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  The construction site is kept clean</td>
<td>3.92</td>
<td>1.44</td>
</tr>
<tr>
<td>2  Every material/tool in its place</td>
<td>3.17</td>
<td>1.27</td>
</tr>
<tr>
<td>3  Safety nets are available</td>
<td>3.50</td>
<td>1.81</td>
</tr>
<tr>
<td>4  PPE are clearly displayed</td>
<td>2.1</td>
<td>1.44</td>
</tr>
<tr>
<td>5  Workers wear hard hats</td>
<td>2.00</td>
<td>1.81</td>
</tr>
<tr>
<td>6  Workers wear hard and closed shoes</td>
<td>2.33</td>
<td>1.67</td>
</tr>
<tr>
<td>7  Workers often face accidents on site</td>
<td>4.17</td>
<td>1.11</td>
</tr>
<tr>
<td>8  First aid tools location is known &amp; accessible</td>
<td>2.83</td>
<td>1.34</td>
</tr>
<tr>
<td>9  Slab openings and shafts are marked &amp; closed</td>
<td>4.50</td>
<td>0.90</td>
</tr>
<tr>
<td>10 All exits are clearly marked</td>
<td>2.75</td>
<td>1.29</td>
</tr>
<tr>
<td>11 All walkways are unobstructed</td>
<td>3.50</td>
<td>1.57</td>
</tr>
<tr>
<td>12 Emergency evacuation indicators are available</td>
<td>2.00</td>
<td>1.28</td>
</tr>
<tr>
<td>13 Disposal procedures are visually displayed</td>
<td>2.50</td>
<td>1.00</td>
</tr>
<tr>
<td>14 Visual tools are used to make waste apparent</td>
<td>2.42</td>
<td>1.00</td>
</tr>
<tr>
<td>15 Caution signs to indicate newly casted areas</td>
<td>1.75</td>
<td>1.14</td>
</tr>
<tr>
<td>16 Safety mistakes are regularly reflected</td>
<td>3.25</td>
<td>1.22</td>
</tr>
<tr>
<td>17 Meetings held to increase safety awareness</td>
<td>1.67</td>
<td>1.07</td>
</tr>
<tr>
<td>18 Major barriers of VM implementation</td>
<td>Open-Ended</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Conducted Surveys related to Construction Sites
Discussion Of Results

Chaotic /Unclean Sites
Discussion Of Results

Chaotic /Unclean Sites

CONGESTION!!!
Discussion Of Results

Slips, Trips & Falls
Discussion Of Results

Nail Wounds
Discussion Of Results

Clean Sites
Discussion Of Results

First Aid on Site
Discussion Of Results

Visual Indicators
Discussion Of Results

PPE
Discussion Of Results

Safety Nets
Barriers Of VM On Construction Sites

1- Inertia/Resistance to Change
Barriers Of VM On Construction Sites

2- Overconfidence
Barriers Of VM On Construction Sites

3- Cost
Barriers Of VM On Construction Sites

4- Time
Barriers Of VM On Construction Sites

5- No Government Regulations
6- Culture
Conclusion

Results of the studied cases show that VM needs further improvement in Lebanon and highlight the importance of implementing VM to reduce accidents.

As a recommendation,

❖ Visuals should be utilized everywhere to direct actions and enhance.
❖ Engineers and contractors should dedicate enough time and spend more money on training workers to efficiently use VM tools and reduce accidents.
❖ A lean culture should be cultivated to enhance utilization of VM.
❖ Further research is recommended to determine strategies for implementing VM in construction sites so that invested efforts will pay off in more effective results.
Thanks For Your Attention!