COMBINING TAKT PRODUCTION WITH INDUSTRIALIZED LOGISTICS IN CONSTRUCTION

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Background

External variation

- Unpredictable, irregular factors → Variability in production
  - Problems in material flow
  - Impacts on project performance, quality, cost, duration
Background

Factory Physics

If flow efficiency increased without reducing variation, resource needs to be increased exponentially (Hopp and Spearman 2011) → Difficult in practice

Logistics is a key aspect for takt planning in residential construction (Vatne and Drevland 2016)

Purpose: How takt production benefits from proper logistics solution

Background

**Kitting:** Products or components needed in a specific assembly task are organized, packed and delivered as one package to the assembly location.

Kitting can be combined with just-in-time (JIT) delivery and consolidation centers.

**ALU → Assembly and Logistics Unit**

The solution could be a good fit for **renovation** projects.

Proper logistics management enhances takt production.
Method

How construction industry could obtain more benefits from takt and logistics, based on similar and more mature shipyard industry's practices?

Logistics company working in shipyard industry, extending operations to construction industry

- Interviews with the logistics service company chairman
- Document analysis from the main contractor
Findings

Figure 1. Operations of the logistics provider in the ALU for construction projects
Findings
## Findings

<table>
<thead>
<tr>
<th>Shipyard industry</th>
<th>Construction industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALU is next to production site</td>
<td>ALU is located around 20 km from the production sites</td>
</tr>
<tr>
<td>Takt time is 40 minutes</td>
<td>Takt time is 1 day</td>
</tr>
<tr>
<td>More pre-assembly done in logistics center (20-40%)</td>
<td>Pre-assembly amount is limited</td>
</tr>
<tr>
<td>Shorter material picking and kitting time (3 hours)</td>
<td>Material picking and kitting takes longer (1 day)</td>
</tr>
<tr>
<td>All materials are going through the ALU</td>
<td>Some subcontractors still deliver materials directly to the site</td>
</tr>
</tbody>
</table>

Table 1: Differences between the shipyard and construction industries where takt production is used with logistics solution
Discussion

Logistics solution with takt →
Multiple improvements in projects:

- Improved procurement quality
- Less material waste
- Ability to follow schedule

Why to use the logistics solution with takt?

1. To enforce production sequence by single flow strategy
2. Easy to control the production process
3. Centralized procurement → Material cost savings
4. Shorter lead times due to controlling variation
Conclusion

- Material picking & kitting in logistic center
- Procurement in centralized way
- Delivery is JIT

- Material availability
  - *High quality logistics and procurement management*

Future research
- *Effects of logistics in takt with case studies, focusing on more construction operations*