Improving Production Efficiency to Increase the Capacity and Profitability of a Swedish Wooden Single-Family House Producer

Tobias Schauerte, Victor Svensson, Simon Allhorn
Market for wooden houses in Sweden

- Housing shortage requires 40 000 – 60 000 new units per year.
- 20 000 – 25 000 units p.a. have been finalized the past years.
- Market share for wooden single-family houses ≈ 90 %
- Market share for wooden multi-family houses ≈ 10 %
Industry for wooden single-family houses in Sweden

- Industry structure is characterized by a high degree of perfect competition.

- Industrialized building = offsite prefab production of elements, volumes and modules that are assembled onsite.

- Offsite production is being applied for wooden single-family houses for a long time, but many firms drag behind in production development and Lean-thinking.
Industry for wooden single-family houses in Sweden

- LEAN production offers a number of tools that could help to e.g.:
  • improve the production flow by reducing lead-times,
  • downsizing stocks,
  • reducing waste,
  • ...

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Industry for wooden single-family houses in Sweden

- That would lead to e.g.:
  - a decrease in capital tie-up,
  - an improvement in the rate of turnover and production efficiency
  - and consequently an increase in profitability.
Case firm

- Prefabricates semi-finished modules for wooden single-family houses, row houses and multi-family houses up to 4 floors.
- Production capacity equaling ca 40 single-family houses per year.
- Steadily increasing demand, yet, no possibility to expand.
Aim

How can production efficiency be improved to free production capacity for a firm producing wooden single-family houses?
Value stream mapping

Original facility layout

existing layout
free space: 50 %
storage space: 27 %
value adding space: 23 %
Value stream mapping

Original value stream efficiency

\[ VSE = \frac{value \ adding \ time}{lead \ time} \]

Value adding time: from 3.15 to 10.65 hours
Lead time: from 108.15 to 521.65 hours

\[ \rightarrow VSE = \text{ranging between } 0.029 (= 2.9 \%) \text{ and } 0.02 (= 2 \%) \]
Value stream mapping

DuPont analysis original state: ROA: 2.51%

- Net sales 30 844 000 sek
- Costs of products sold 30 668 000 sek
- Financial revenues 0 sek
- Current assets 6 002 000 sek
- Fixed assets 1 006 000 sek

+ Net profit 176 000 sek
+ Net sales 30 844 000 sek

/ Net profit margin 0.57%
/ Asset turnover 4.4 times

Return on assets 2.51%
Value stream mapping

Top 3 problems in the original production

• Stock areas compete with production areas.  
  
  Suggestion: adjust purchase strategies (JIT) and behavior.

• Operators cut material for too many walls at a time to avoid set-ups.  
  
  Suggestion: new saw and implementation of Kanban.

• Resource intensive painting station.  
  
  Suggestion: outsourcing.
Value stream mapping

Suggested facility layout

new layout
increased capacity: +50 %
free space: 57 % (+14 %)
storage space: 17 % (-37 %)
value adding space: 26 % (+13%)
Value stream mapping

Value stream efficiency according to suggestions

Value adding time: from 3.15 to 10.65 hours
Lead time: from ca 100 to 162 hours

→ VSE = ranging between 0.032 (=3.2 %) and 0.066 (=6.6 %), before it was between 2.9 % and 2 %.

→ Improvement between 10.3 % and 230 %.
Value stream mapping

DuPont analysis after suggestions: ROA : 37.8 %
Concluding remarks.

Questions?
Thank you for listening!

Tobias.Schauerte@lnu.se