Measuring Effectiveness of Kaizen Events within the Wood Products Industry

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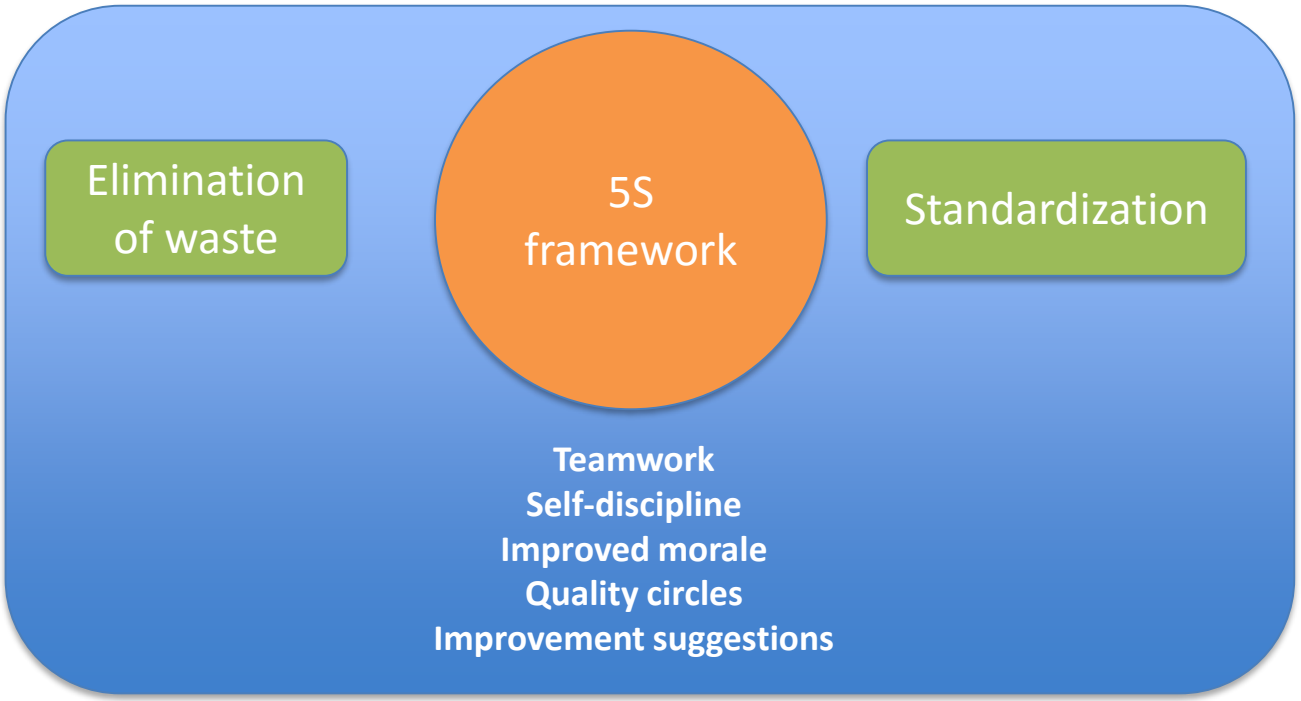
Background

- Key features of Kaizen



Background

- Drivers of Kaizen
  - Teamwork and functional teams
  - Quality planning and control
  - Employee awareness and training
  - Productivity improvement

Kaizen Event in Dominican Republic (2015)

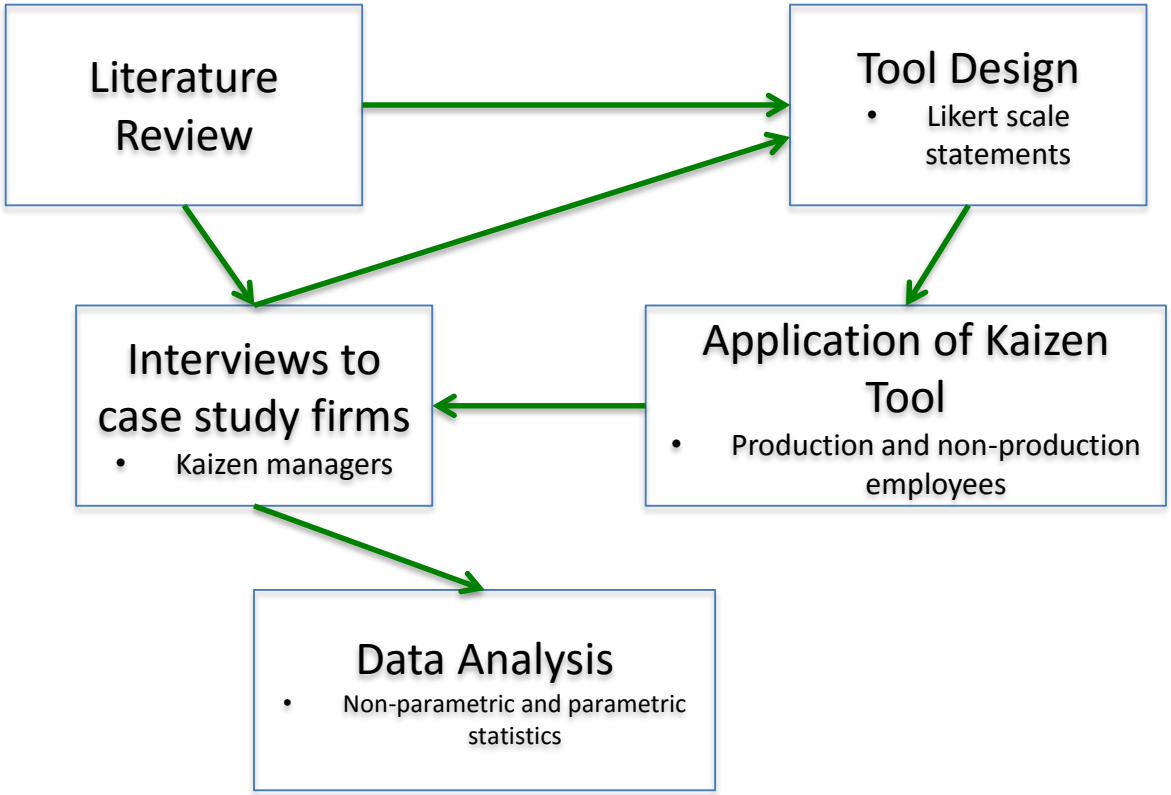
Problem Statement

- Competiveness: Imported products, waste reduction, high fuel costs, lack of innovation, environmental issues, raw material costs
- Kaizen sustainability issues:
  - Barriers to Kaizen and Continuous Improvement (CI)
  - Motivators for Kaizen events and CI
  - Effectiveness of Kaizen events
  - Drivers of Kaizen events

Goal and objectives

- **Goal**: to develop a tool to measure the effectiveness of Kaizen events
- **Objectives**:
  1. Identify motivators and barriers impacting Kaizen events
  2. Develop a tool to measure the effectiveness of Kaizen events
  3. Apply the tool to case study companies in the wood products secondary sector
     - **H_1:** *Perception on motivators and barriers to Kaizen are the same for production and non-production employees*
     - **H_2:** *The perceptions of production versus non-production staff are the same regarding Kaizen effectiveness.*
     - **H_3**: *Effectiveness of Kaizen =b_0+ b_1(Teamwork) + b_2(Employee awareness and training)+ b_3(Productivity improvement)+ b_4(Quality planning and control) + Error*

Methodology



Results: Case study companies

- Demographics

	Company A	Company B
Number of employees	Approximately 200	Approximately 150
Employees surveyed	Both production and management staff	Management staff only
Products produced	Kitchen cabinetry	Standard dimension lumber, manufactured pallets, and countertops
Types of continuous improvement	Just-in-time Kaizen Lean thinking Six Sigma 5S	Kaizen Lean thinking 5S
Specific practices used	Cross-functional teams; employee training, awareness, and recognition; and value stream mapping	Cross functional teams (using supervisors only), employee recognitions, Go/no go checklists

Results: Interviews with Companies

	Company A	Company B
Strategic planning	• Management uses Value Stream Mapping to plan the next 6-12 months • Includes Kaizen events in the planning • Repeats the process continuously	• Each day supervisors on Kaizen teams meet to discuss progress, problems, and solutions • Sometimes this includes production employees with special expertise
Main focus of company's implementation of Kaizen	Establishing and sustaining a strategic vision of Kaizen and continuous improvement	Creating a safety-oriented workplace culture and making safe products for customers
Largest motivators for implementing Kaizen	Desire to standardize work processes	Desire to improve safety, lower costs, and better manage inventory
Kaizen events and cross-functional teams	• Kaizen events occur once a week • Kaizen events use "action plans" that outline the goals , steps, and responsibilities for each team member • Cross-functional teams include production employees	• Kaizen events occur each month • Cross-functional teams only include supervisors due to the language barrier between management and many production level employees

Results: tool design for measuring Kaizen´s Effectiveness

- Section A: Demographic questions:
  - Position, time in company, awareness of type of CI initiative
- Section B: Likert statements to measure perception on
  - knowledge Kaizen use, effectiveness, motivators and barriers
- Section C: Likert statements to measure perception on Kaizen's drivers:
  - Employee awareness and training, Teamwork, Quality planning and control, Productivity Improvement
- Section D: Closed questions on
  - frequency of Kaizen events, participation in Kaizen events, communication of kaizen events

Results: tool design for measuring Kaizen´s Effectiveness

- Example of Likert statements to measure perception of Kaizen's Motivators

Motivators of Kaizen Activities					
1	2	3	4	5	N/A
Strongly disagree	Disagree	Undecided	Agree	Strongly Agree	Not applicable
Customer feedback influenced our company's decision to implement Kaizen methods				1 2 3 4 5	N/A
Cost efficiencies influenced our company's decision to implement Kaizen methods				1 2 3 4 5	N/A
Improved quality outcomes influenced our company's decision to implement Kaizen methods				1 2 3 4 5	N/A
Sales growth influenced our company's decision to implement Kaizen methods				1 2 3 4 5	N/A
Lead time reduction influenced our company's decision to implement Kaizen methods				1 2 3 4 5	N/A
Inventory reduction influenced our company's decision to implement Kaizen methods				1 2 3 4 5	N/A
Leadership from within the company influenced our company's decision to implement Kaizen methods				1 2 3 4 5	N/A
Attending a training session or trade conference our company's decision to implement Kaizen methods				1 2 3 4 5	N/A
Knowledge of another company's use of Kaizen activities influence our company's decision to implement Kaizen methods				1 2 3 4 5	N/A

Results: Application of tool

- Received a total of 23 responses
  - 16 (8%) from Company A and 7 (4.6%) from Company B
  - 13 production and 10 non-production respondents
  - Sample size might be to small to draw conclusions on each case

Employee Type	Company A	Company B	Total	Percentage of Total
Production	7	6	13	56.5%
Non-Production	9	1	10	43.5
Total	16	7	23	100.0%

Results: Application of tool

- **H_1:** *Perception on motivators and barriers to Kaizen are the same for production and non-production employees.*

Motivators of Kaizen	Chi-square	P-value
Customer feedback influenced our company's decision to implement Kaizen methods	1.67	0.64
Cost efficiencies influenced our company's decision to implement Kaizen methods	3.73	0.44
Improved quality outcomes influenced our company's decision to implement Kaizen methods	1.59	0.45
Sales growth influenced our company's decision to implement Kaizen methods	2.27	0.52
Lead time reduction influenced our company's decision to implement Kaizen methods	1.66	0.65
Inventory reduction influenced our company's decision to implement Kaizen methods	6.51	0.16
Leadership from within the company influenced our company's decision to implement Kaizen methods	1.36	0.51
Attending a training session or trade conference influenced our company's decision to implement Kaizen methods	2.33	0.80
Knowledge of another company's use of Kaizen activities influence our company's decision to implement Kaizen methods	4.80	0.31

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Results: Application of tool

- **H_1:** *Perception on motivators and barriers to Kaizen are the same for production and non-production employees.*

Barriers to Kaizen	Chi-square	P-value
There is little interest in changing or adopting Kaizen activities	9.19	0.10
There is not enough expertise on how to implement Kaizen activities	6.11	0.19
There is resistance to generating new measurements of improvement for Kaizen activities	8.36	0.08*
Middle management resists implementing Kaizen activities	3.67	0.45
Employee staff resist implementing Kaizen activities	3.20	0.53
Implementing Kaizen would pose a challenge to our workplace culture	6.99	0.14
There is not enough time for the company to currently implement Kaizen activities	4.40	0.36
There were poor experiences with past Kaizen projects	9.84	0.08*
There is a lack of technological capability to implement Kaizen activities effectively	2.56	0.63
Financial resources that are dedicated for Kaizen projects are limited	4.35	0.36

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Results: Application of tool

- **H_2**: *The perceptions of production versus non-production staff are the same regarding Kaizen effectiveness.*

Effectiveness of Kaizen	Chi-square	P-value
Since we introduced Kaizen we have increased our competitiveness	2.38	0.67
After we implemented Kaizen activities we have increased profits	2.79	0.59
Since we applied Kaizen activities we have decreased costs	1.71	0.79
Application of Kaizen helped us improve lead time	4.35	0.23
Since we introduced Kaizen we have increased productivity	2.07	0.72
Adopting Kaizen activities enabled us to improve product quality	6.34	0.18
Since we introduced Kaizen we have improved employee motivation	1.86	0.60
After we started practicing Kaizen we have improved customer satisfaction	0.20	0.98
Since we introduced Kaizen we have improved the time it takes to cut the dimensions of a product (cut time)	3.22	0.52

* $p \leq 0.1$, ** $p \leq 0.05$, *** $p \leq 0.01$

Results: Application of tool

- **H_3:** *Teamwork, Employee awareness and training, productivity improvement, and quality planning and control have a positive contribution to Kaizen`s effectiveness.*

Likert scale construct	Average inter-item covariance	Number of Likert items in the scale	Cronbach's alpha reliability coefficient
Effectiveness of Kaizen	0.91	9	0.98
Quality planning and assurance	0.76	10	0.91
Teamwork	0.10	5	0.67
Employee awareness and training	0.27	9	0.88
Productivity	0.34	4	0.82

Results: Application of tool

- *Effectiveness of Kaizen = **b_0**(constant term) + **b_1**(Quality planning and control) + **b_2**(Teamwork) + **b_3**(Employee awareness and training) + b4(Productivity improvement) + **Error***

Likert scale construct	Coefficients	T-test statistic	P-value
Productivity improvement	1.52	2.39	0.04**
Teamwork	1.10	1.60	0.14
Employee awareness and training	0.13	0.96	0.36
Quality planning and control	0.11	0.44	0.67
Constant term	(19.77)	(1.28)	0.23
R-squared: 0.71 F-ratio: 6. 61 Prob(F): <0.01			

Conclusions

- Sustainability of Kaizen events are affected by
  - Motivators, barriers, and drivers to Kaizen
- Drivers to Kaizen are:
  - Employee awareness and training, Teamwork, Quality planning and control, Productivity Improvement
- A tool to measure the effectiveness of Kaizen events was created and applied to two secondary wood products companies

Conclusions

- Nonparametric and parametric statistics were used to measure the effectiveness of Kaizen events. Main results indicate that:
  - Sample size is too small
  - Barriers (production vs non-production workers):
    - No interesting in changing or adopting Kaizen events
    - Resistance to generate new measurements for Kaizen events
    - Poor experiences with previous Kaizen events
  - Perceptions of productivity improvement were positively and significantly related to perceptions of the effectiveness of Kaizen

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Thanks for your time

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