University of South-Eastern Norway

Evaluation of Lean Business Process Improvement Methodology

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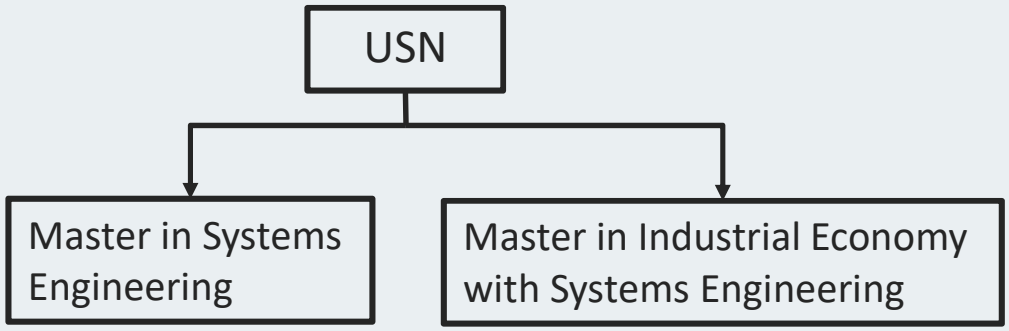
Introduction

- University of South-Eastern Norway (USN) offers Master Programs in Systems Engineering



- Master thesis project with 30 ECTS at the end of the study
  - Students have to show they can apply the theory in practice

The paper is based on Niclas Måren's Master Thesis in 2019

Contents

- Case Company Introduction
- Background for the Research
- Business Process Improvement Introduction
- BPI at Case Company
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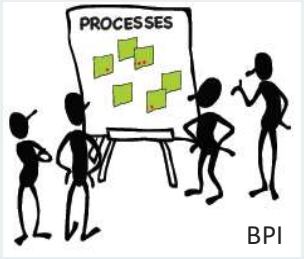
Case Company

GKN Aerospace, Kongsberg, Norway

- Manufacturer of jet engine components for the military and civilian market, with more than 40 years of experience.
- 500 employees
- The product portfolio consists of rotary and static components.

Background for the Research

Production excellence



Business excellence

GKN AEROSPACE

VOLVO AERO

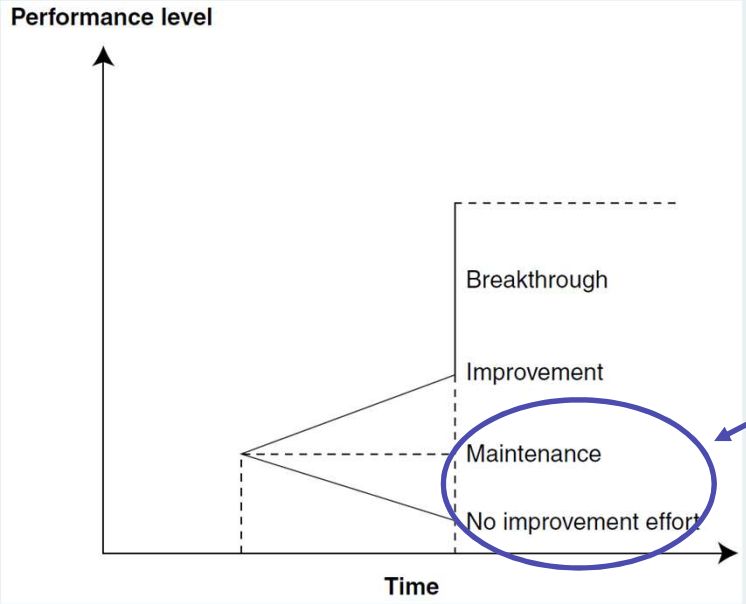
2012 — 2012/2013 — 2016-19

"70% of all waste are in non shop floor areas"

"Process 'Issues' – Total up to 80% of Lead time!"

Business Process Improvement

A business process is a collection of activities that takes one or more kinds of input and create and output that is of value to the customer. (Hammer&Champy, 1993)



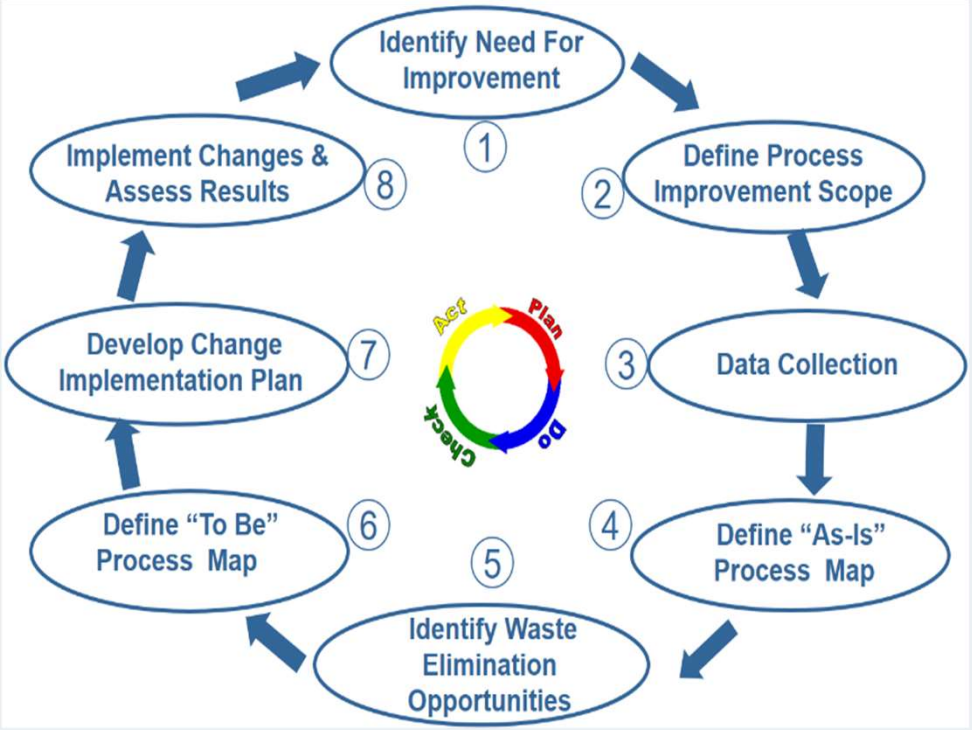
[Ref. Andersen, 2007]

Possible reasons for low improvement efforts

- Lack of improvement culture
- Lack of resources
- Lack of leadership
- Lack of knowledge or methodology

→ Employees adopt workarounds

BPI Methodology at Case Company

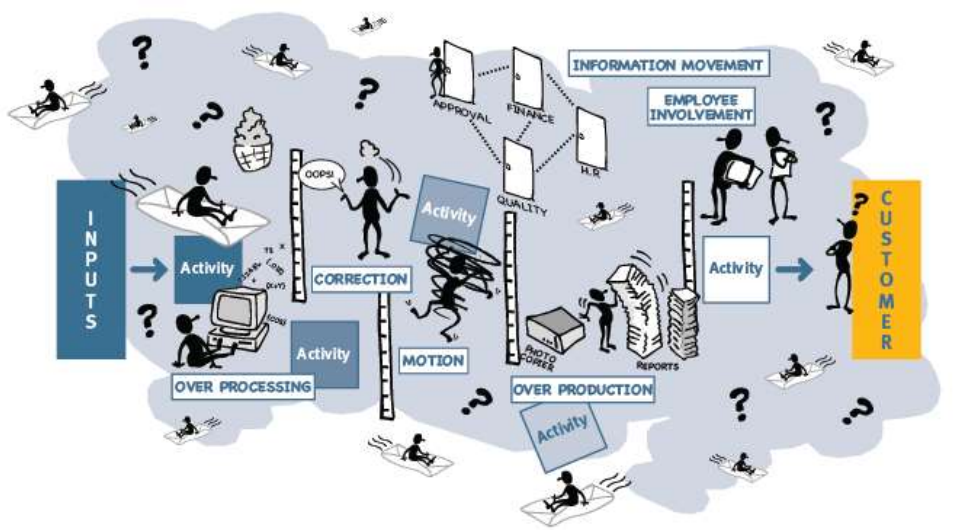


GKN used the PDCA cycle as a basis and applied several pre-existing tools to create a structured approach to improve business processes and identify waste.

Research Scope
Business Process Innovation

Evaluate the GKN BPI methodology

- RQ1: Successfulness of the method
- RQ2: Stakeholders' satisfaction
- RQ3: Identification of Waste
- RQ4: BPI Cost
- RQ5: Success factors and pitfalls



Research Approach

Research approach

- Review of old BPI attempts
- Ongoing BPIs
  - Facilitator of one BPI
  - Passive participant in one BPI to observe
  - Data collection from a third BPI that was executed at the same time as this research
- Structured interviews of BPI stakeholders

Research Method

- **RQ1: Successfulness of the method:** Measured and estimated improvement in process efficiency KPIs (Lead time and workload for process execution)
- **RQ2: Stakeholders' satisfaction:** *Quantitative data* gathered using the Likert scale to calculate NPS score.
- **RQ3 Wastes identified:** *Quantitative data g*athered from BPI documentation or facilitator
- **RQ4 BPI Cost:** Calculated BPI cost based on data gathered from BPI documentation or facilitator.
- **RQ5 Success factors and pitfalls:** *Qualitative data* gathered through open questions in structured interviews of BPI stakeholders

Research Approach

Case Study

- **Improvement project in production**
- The researcher has been the PM of this project
- Goal: Reduce manual labor in deburring
- Required: Test many tools in a short period
- Resistance: Administrative processes become bottlenecks in procuring and registration of new tools
- Enabler: Initiate BPIs to improve process efficiency

Identified BPIs

- 4 ongoing. Only step 8 is remaining
- 4 completed.
- 2 ongoing, but with little/no progress
- At least one has been abandoned

BPI (Registration of new tools)

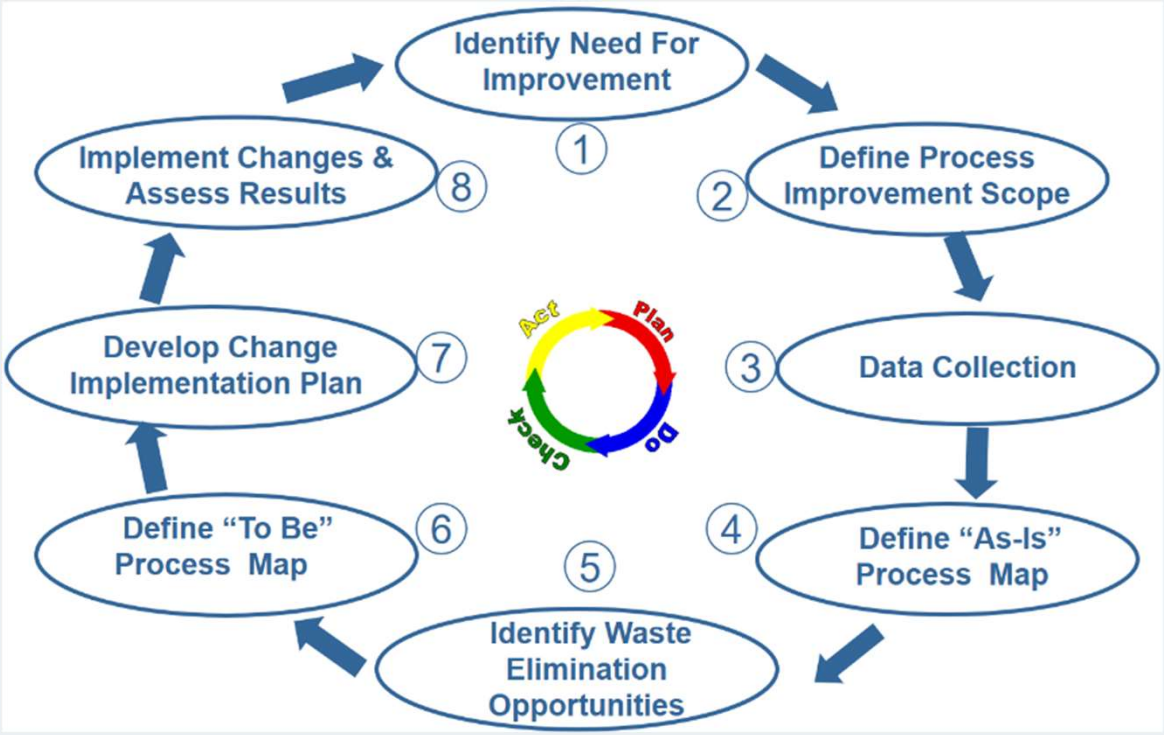
- The researcher has been the facilitator
- BPI goal: Remove manual documents and reduce the workload and lead time of the process execution.

BPI (Procurement of new tools)

- The researcher has been a passive participant
- BPI goal: Reduce the lead time of the project executing, but also reduce the workload

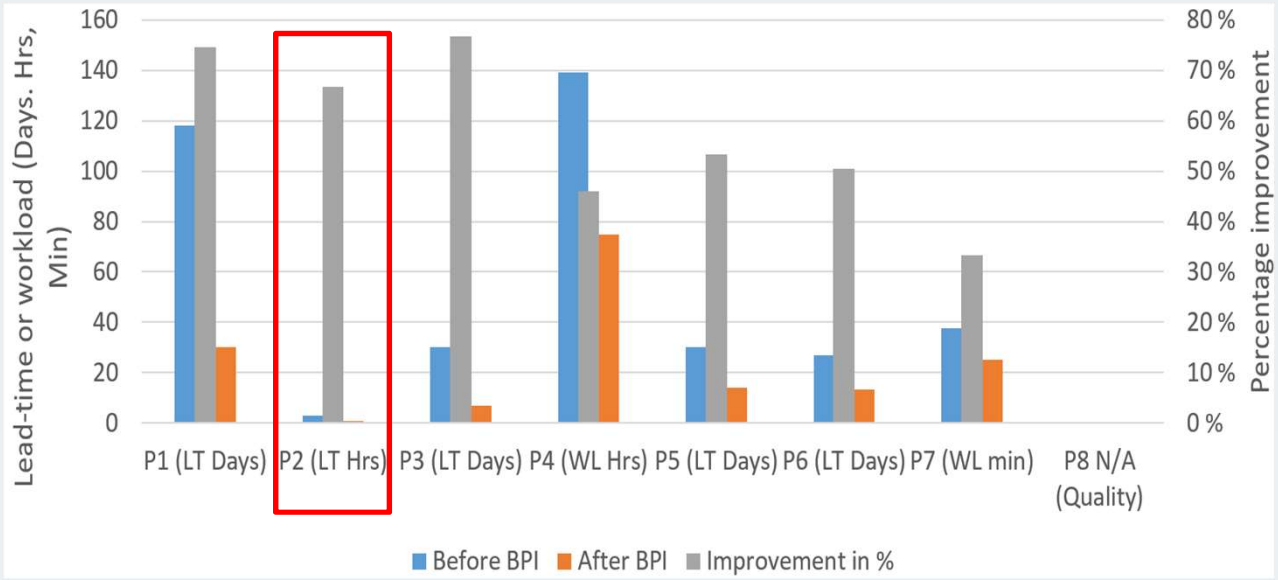
Results

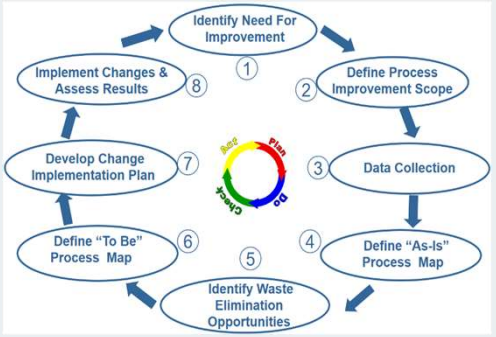
RQ1: Successfulness of the method



Results

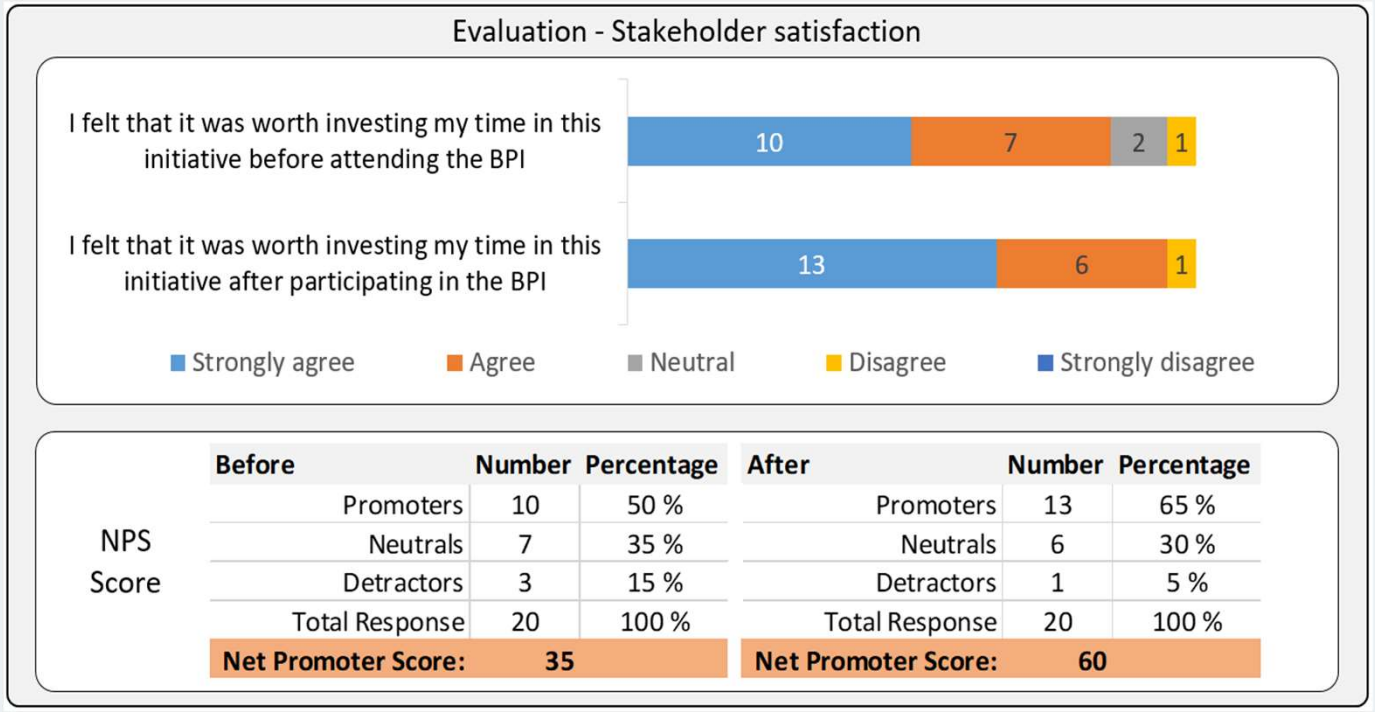
RQ1: Successfulness of the method





Results

RQ2: Stakeholder's Satisfaction



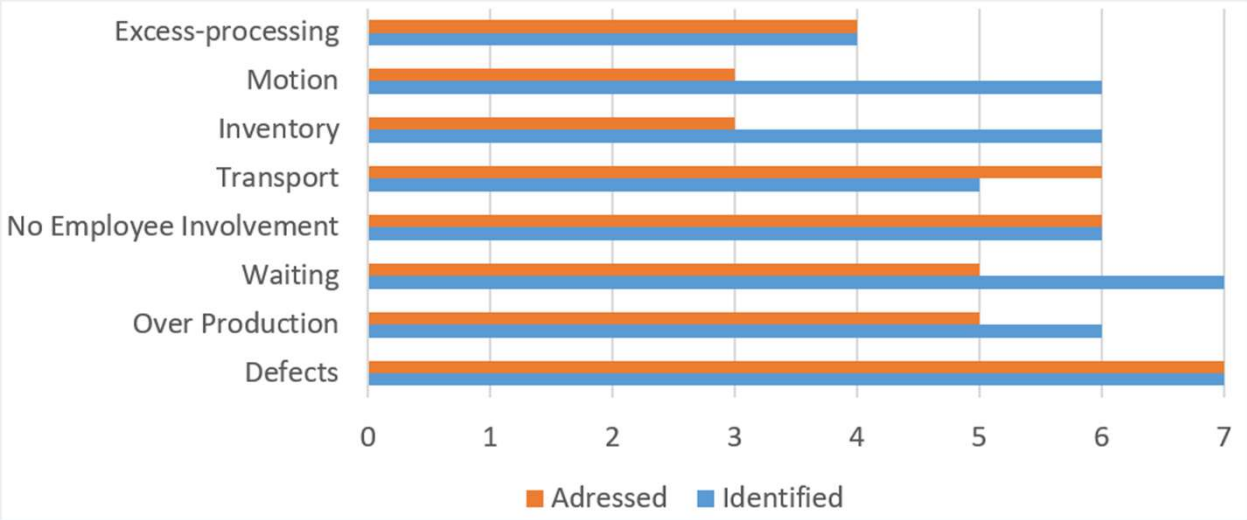
NPS Score

Before	Number	Percentage
Promoters	10	50 %
Neutrals	7	35 %
Detractors	3	15 %
Total Response	20	100 %
Net Promoter Score:	**35**	

After	Number	Percentage
Promoters	13	65 %
Neutrals	6	30 %
Detractors	1	5 %
Total Response	20	100 %
Net Promoter Score:	**60**	

Results

RQ3: Identification of Waste



Results

RQ4: BPI Cost of Method

$$BPI\ Cost = P_a * W_a * W_l * P_{hc}$$

where:

P_a	=	Number of participants
W_a	=	Number of workshops
W_l	=	Length of each workshop (Hours)
P_{hc}	=	Average hourly cost per person per hour

- Cost is driven by larger amounts of workshops and participants.

Highest recorded cost of a BPI

> USD 15 300

Lowest recorded cost of a BPI

> USD 4 590

Average recorded cost of a BPI

> USD 9 903

Results

RQ5: Success Factors and Pitfalls

Success factor	Times reported
A structured and trained facilitator that keeps people focused and keeps discussions on topic	10
That all stakeholders are identified and are present in the workshops where they are needed	10
A clear agenda with goals for each workshop	5
That the participating stakeholders prioritize the initiative	5
That the stakeholders are positive to change	5
Prepared BPI participants (requires information from the facilitator in good time before the workshop)	5
Continuous evaluation/validation of the solution feasibility	4
Work on the problem often enough (at least one time per week)	3
That a sponsor approves and supports the initiative. (That the BPI participants have a mandate to make changes)	2
That there are not too many people in the workshops	2

Results

RQ5: Success Factors and Pitfalls

Pitfall	Times reported
That stakeholders are not present in workshops/ does not prioritize the initiative	5
That the participants or the facilitator are not prepared for workshops	4
That stakeholders or needs are not identified	4
Jump to a solution before the required time is used to understand the problem.	3
No common agreement. Conflicting opinions	3
That participants does not see the need for change. Lack of improvement culture	2
Unrealistic scope	2
No sponsor	2
Fear of change	2
Poor leadership and weak management engagement	2
That there is no clear agenda for the meetings	2
That there is no visible progress after one or more meetings.	2

Conclusions

- RQ1: Successfulness of the method
  - Seven out of eight BPIs improved the process *efficiency* with 33% to 77%.
  - Only the lead-time was improved more than 50%
  - Improvement in *effectiveness* has been observed. Topic for future research.
- RQ2: Stakeholders' satisfaction
  - General feedback is positive
  - The NPS scores, before (+35) and after (+60) the initiative, are both considered as "great" by the score scale.
- RQ3: Wastes identified
  - Defects and Waiting are the most identified types of waste at GAN. However, the BPIs observed all the other types of waste quite frequently.

RQ4: BPI Cost

> The average cost of conducting a BPI at GAN is $9 903.

> Cost is driven by larger amounts of workshops and participants.

RQ5: Success factors and pitfalls

> + "A structured and trained facilitator who keeps people focused and keeps discussions on topic"

> + "That all stakeholders are identified and are present in the workshops where they are needed."

> - "That stakeholders are not present in workshops/do not prioritize the initiative."

> - Management buy-in prior to project start.

Further Work

- Future research should measure the improvement in process effectiveness. We observed significant improvements. However, the observations were not quantified in our research.
- Implement a BPI roadmap to align the future activities according to the organizational strategy. This will help in making selecting the most relevant and promising processes for improvement initiatives.

Thank you for your attention!

We welcome your questions and comments

Please ask questions using the IS2020 platform,
and the we will respond in writing.