



# Lean and accounting systems

## Preventing accounting systems from crushing lean

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Jan Emblemståg, PhD  
SVP / Yard Director STX OSV Søviknes

## Overview

- Background
- How managerial cost accounting inhibits lean implementation
- Activity-Based Costing (ABC) versus traditional costing approach
- ABC and lean
- So what?
- Possible solutions



# Background

- STX OSV is implementing lean planning and other lean initiatives
- We see that the cost accounting system prevents economic sound judgments
- Expressions found in the literature concerning traditional costing systems include;
  1. Number one enemy of production (Goldratt)
  2. Undermining production (Kaplan)
  3. Systematically distorting product costs (Cooper and Kaplan)
- Unfortunately, this is correct!
- What can we do?
  1. Ignore the problem – will inhibit further lean initiatives
  2. Adjust the costing system – will take time and effort, but worth the while; but how?

# How managerial cost accounting inhibits lean implementation

- Illustrative case is next
- Shows the systematic “wrong-costing” of traditional costing approaches;
  - Overhead costs are assigned like butter on bread
  - Overhead costs are assigned using volume as allocation mechanism, but overhead costs are related to complexity which in turn is related to transactions, see next slide
- The context here is product costing, but similar problems arise in general
- Since costing systems “rule the world”, lean initiatives and costing systems always clash – it is just a matter of time...
- Who should yield?

# Types of complexity

<p><b>Volume complexity</b></p>	<p><b>Size complexity</b></p>	<p><b>Product design complexity</b></p>	<p><b>Distribution complexity</b></p>
<p>Number of units Machine hours Direct labor hours Direct materials</p>	<p>Area Number of employees Amount of equipment</p>	<p>Number of parts numbers Number of material structure levels Number of engineering change orders Number of 'special' parts</p>	<p>Number of customers Number of outlets National standards Number of manual customer orders Number of customer 'e-orders' Number of internal orders</p>
<p><b>Procurement complexity</b></p>	<p><b>Process complexity</b></p>	<p><b>Product complexity</b></p>	<p><b>Other complexity</b></p>
<p>Number of suppliers Delivery precision National standards Number of procurement orders Number of inspected parts Number of 'A' parts</p>	<p>Outsourcing Change transactions Logistics transactions Quality transactions Balancing transactions Cycle / lead time Process flow Changes of plans</p>	<p>Number of products Number of variants Number of accessories Number of 'bundling' options Number of new products Number of discontinued products</p>	<p>Warehouse levels Internal transportation Information systems Rework Scrap Waste</p>

**Traditional focus area**

## Example

Product	Size	Volume	Costs related to direct inputs		
			Material costs [\$]	Direct labor hours	Machine hours
P1	Small	10 ( Low )	60	5	5
P2	Small	100 ( High )	600	50	50
P3	Large	10 ( Low )	180	15	15
P4	Large	100 ( High )	1800	150	150
Amounts consumed			2640	220	220
Overhead [\$]			264	2200	3300
Aggregated overhead [\$]			--	--	5764

This example is from  
 “ABC: A Need, not an  
 Option”, by Robin Cooper,  
 in Accountancy, issue  
 September 1990, pp. 86-88.

## Example (cont.)

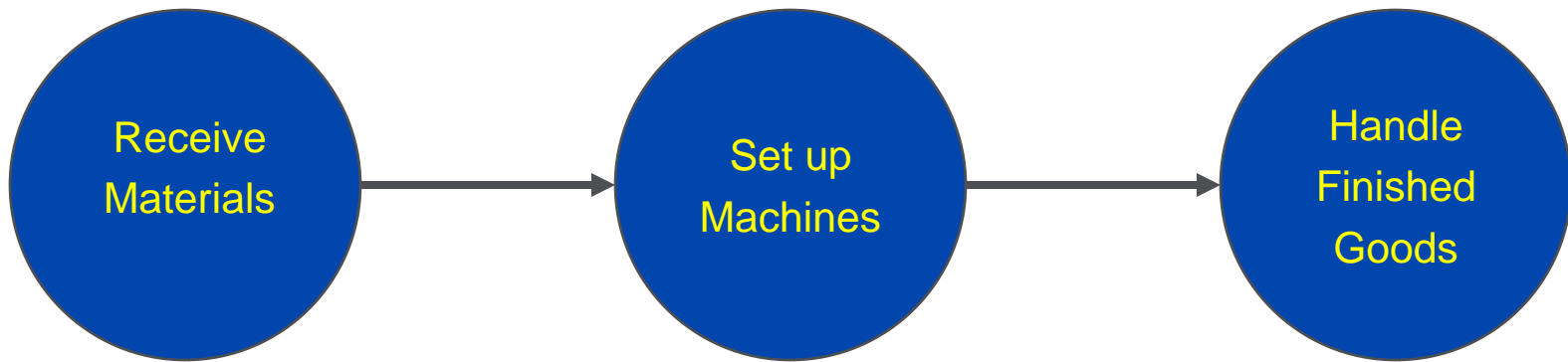
Product	Set - up related costs			Costs related to number of parts [\$]	Total overhead costs [\$]
	Number of set - ups	Number of orders	Times handled		
P1	1	1	1	1	
P2	3	3	3	1	
P3	1	1	1	1	
P4	3	3	3	1	
Amounts consumed	8	8	8	4	
Overhead [\$]	960	1000	200	2000	
Aggregated overhead [\$]	--	--	2160	2000	9924 (5764+4160)

## Traditional approach (Contribution-margin costing)

Product	Direct labor hours consumed	Overhead rates [\$]	Costs allocated	Reported unit cost [\$]
P1	5	45.11	225.55	<b>22.56</b>
P2	50	45.11	2255.50	<b>22.56</b>
P3	15	45.11	676.65	<b>67.67</b>
P4	150	45.11	6766.50	<b>67.67</b>
	-----		-----	
	220		9924.20	

## ABC – starts with a process analysis

### Activities:



### Drivers:

Direct labor hours

Number of set-ups

Number of parts

# ABC

- Split into three activities which has one activity driver each (previous slide)
- Consumption intensities (the unit cost per “activity driver”)

	Activity drivers related to the three activities		
	Direct inputs	Set - ups	Part numbers
Total overhead costs [\$]	5764.00	2160.00	2000.00
Total cost driver units	220.00	8	4
Consumption intensity [\$]	26.20	270.00	500.00

# ABC

- Costs related to the “Direct inputs” activity driver

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Product	Direct labor hours	Consumption intensity [\$/h]	Costs traced [\$]
P1	5	26.20	131.00
P2	50	26.20	1310.00
P3	15	26.20	393.00
P4	150	26.20	3930.00

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# ABC

- Costs related to “Set-ups”

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Product	Set-ups	Consumption intensity [\$/set-up]	Costs traced [\$]
P1	1	270.00	270.00
P2	3	270.00	810.00
P3	1	270.00	270.00
P4	3	270.00	810.00

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# ABC

- Costs related to “Part numbers”

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Product	Part numbers	Consumption intensity [\$/part number]	Costs traced [\$]
P1	1	500.00	500.00
P2	1	500.00	500.00
P3	1	500.00	500.00
P4	1	500.00	500.00

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# ABC

- Reported unit costs (overhead costs only)

Product	Costs related to dir. labor [\$]	Costs related to set-ups [\$]	Costs related to part numbers [\$]	Total costs traced [\$]	Reported unit costs [\$]
P1	131.00	270.00	500.00	901.00	<b>90.10</b>
P2	1310.00	810.00	500.00	2620.00	<b>26.20</b>
P3	393.00	270.00	500.00	1163.00	<b>116.30</b>
P4	3930.00	810.00	500.00	5240.00	<b>52.40</b>

## Comparison

Product	Traditional approach	ABC
P1	22.56	90.10
P2	22.56	26.20
P3	67.67	116.30
P4	67.67	52.40

# ABC versus traditional costing approach – basic principles

## ABC;

- Cost objects consumes activities
- Drivers on several levels
- Process-oriented



## Traditional approach;

- Cost objects consumes resources
- Unit-level allocation bases
- Structure-oriented



# ABC Principles



All resources in the company

Consume



Traced by resource drivers



What gets done

Consume



Traced by activity drivers



Products and services  
Customers and suppliers  
Organizational elements

## Traditional principles



All resources in the company

Allocate

*Allocation bases*



Products and services



## Consumption of activities versus resources

### Consumption of activities;

- Costs cannot be managed, but activities can
- Focus on the generic resource utilization
- ‘Bottom-Up’ management

### Consumption of resources;

- Costs can be managed
- Focus on cost reduction
- ‘Top Down’ management

# Multi-level drivers versus unit-level allocation bases

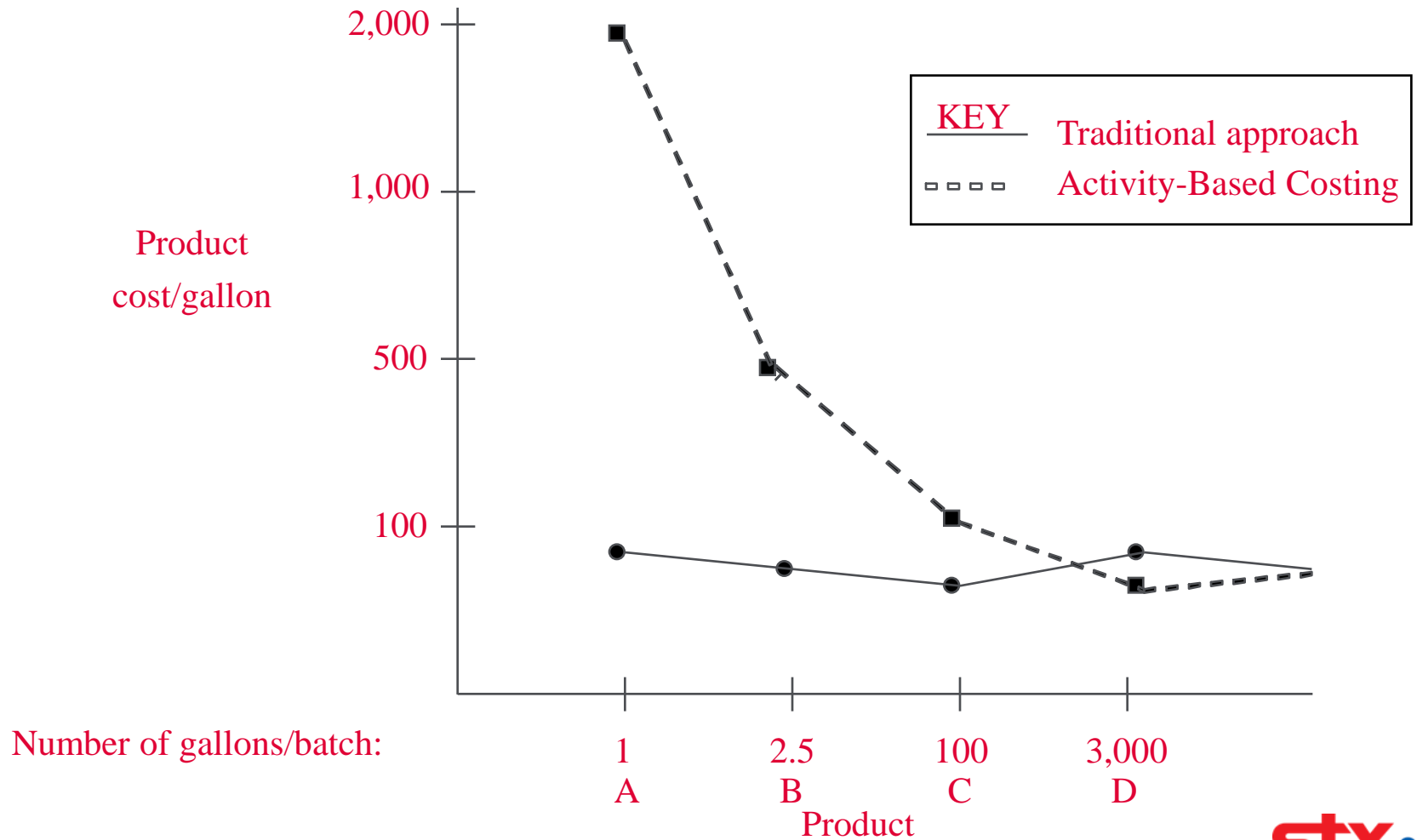
## Multi-level drivers;

- **Costs are traced more logically;**
  - Unit level
  - Batch level
  - Product level
  - Customer level
  - Facility level
- **More accurate estimate**
- **Tracing of critical success factors**

## •Unit-level allocation bases;

- **Costs are allocated according to direct labor or similar**
- **Inaccurate estimate;**
  - Several hundred percent off
  - The more overhead, the worse
- **Little/no tracing of critical success factors**

# Multi-level drivers versus unit-level allocation bases



# Process-Orientation versus Structure-orientation

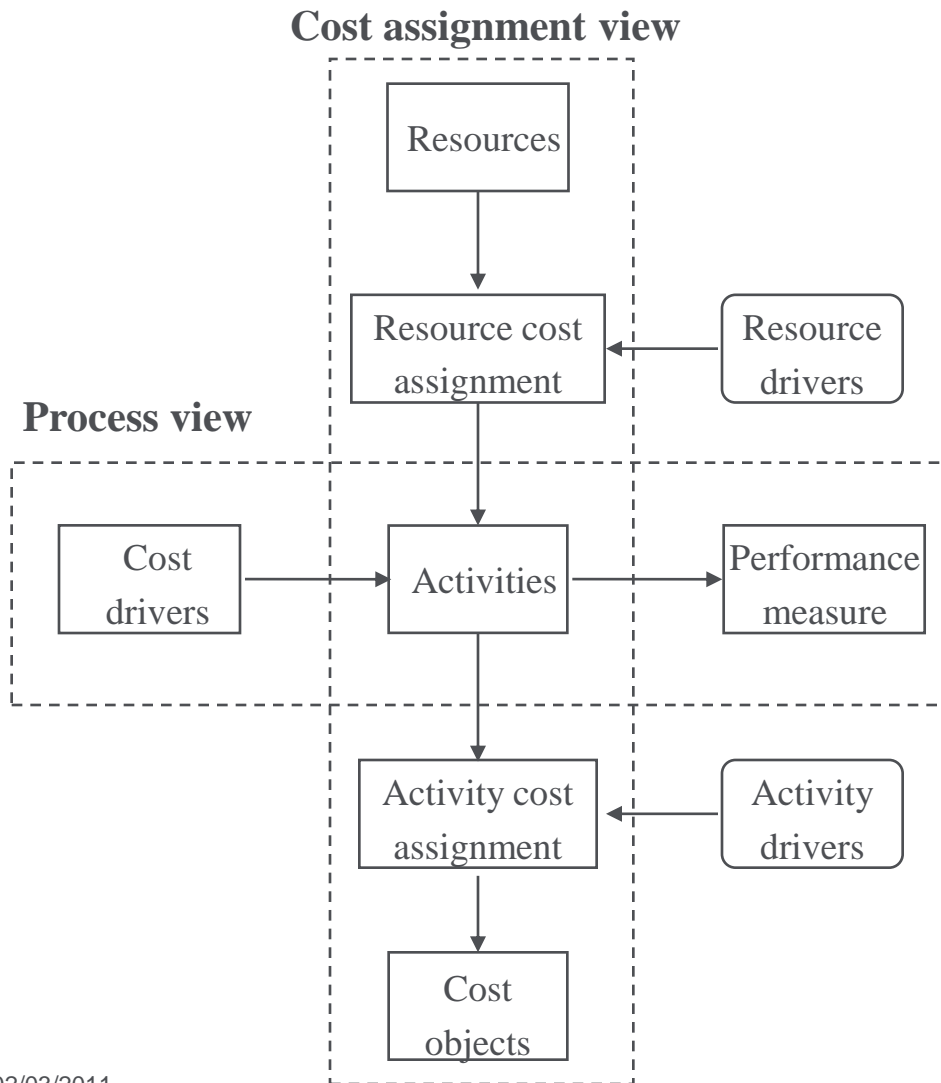
## Process-orientation;

- **Continuous improvement**
  - Tracing critical success factors
  - Accurate estimates
- **Cross-functional team from;**
  - Sales & Marketing
  - Accounting / Finance
  - Product development
  - Production
- **General ledger should be rearranged**

## Structure-orientation;

- **Small possibilities of asking “Why?”**
- **Hierarchical organization and little contact between functions**
- **General ledger is used as it is**

# Implementation



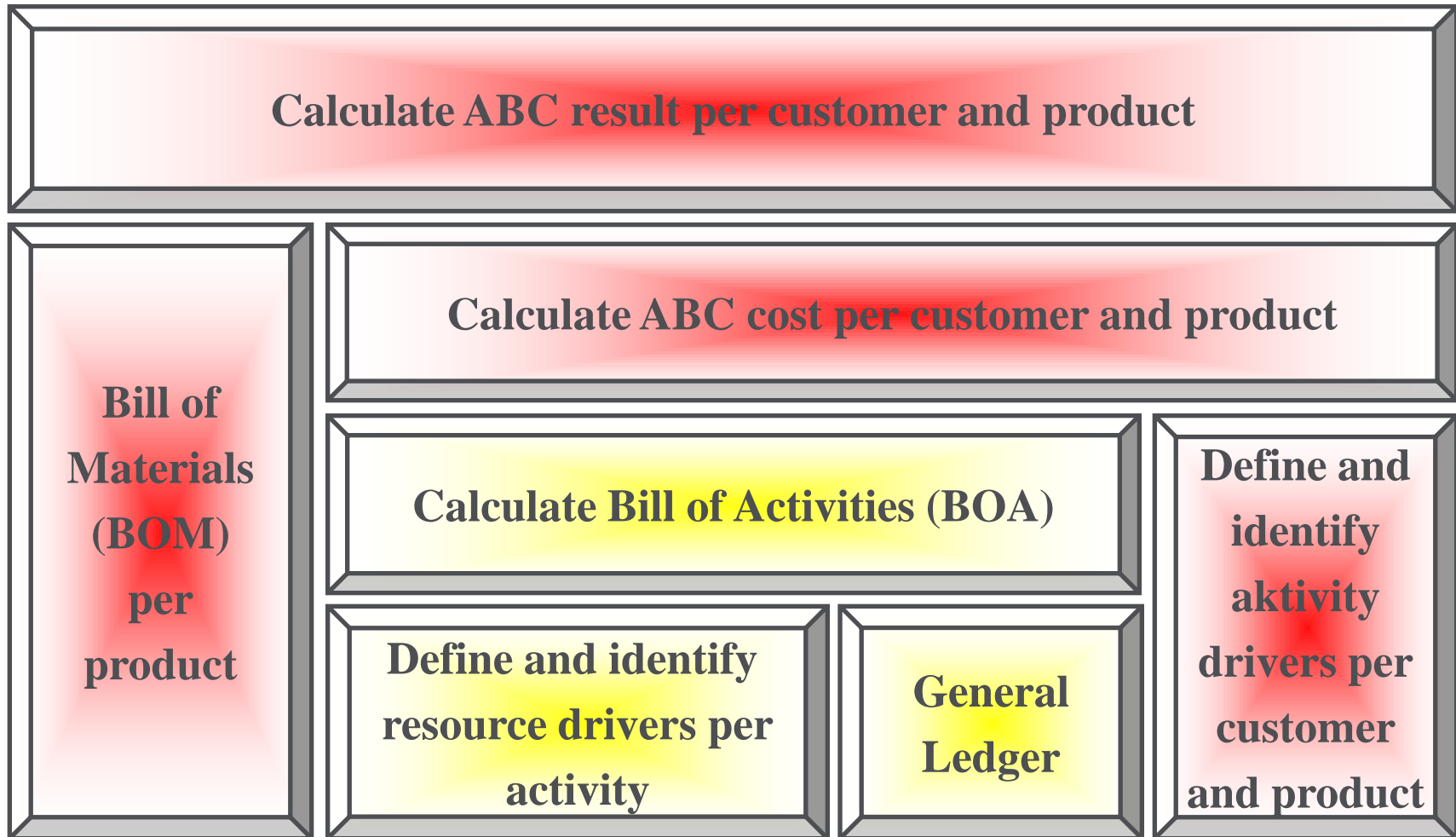
The simple approach lacks the process perspective;

- Inaccurate
- Poorer tracing
- Cost focus

**Performance Measures;**

- Value Added
- Quality
- KPI

## Modules in standard ABC



# The ABC model

## General ledger

Salaries	Kr 80 "
Facilities	Kr 12 "
Travel	Kr 14 "
IT	Kr 14 "
Other	Kr 36 "
Total	Kr156 "

## Activity analysis

Order handling	27%
Service customers	23%
Procurement	14%
Packaging	11%
Set-up machines	9%
Handle invoices	9%
Other	7%
Total	100%

**Tells us how we spend  
our resources**

# The ABC model

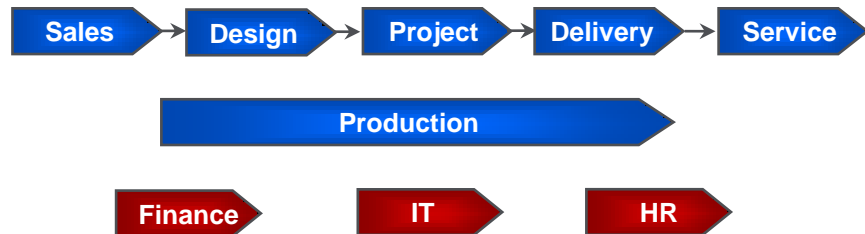
## General ledger

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Total	100%

## Process analysis



# The ABC model

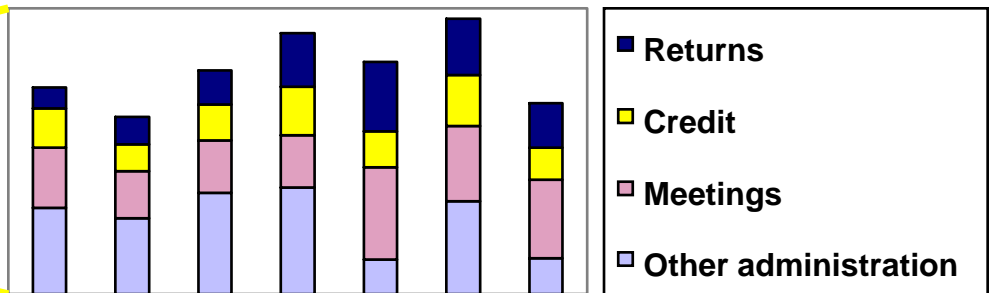
## General ledger

Salaries	Kr 80 "
Facilities	Kr 12 "
Travel	Kr 14 "
IT	Kr 14 "
Other	Kr 36 "
<b>Total</b>	<b>Kr156 "</b>

## Activity analysis

Order handling	27%
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Packaging	11%
Set-up machines	9%
Handle invoices	9%
Other	7%
<b>Total</b>	<b>100%</b>

**Cost of poor quality**



# The ABC model

Tells us how our customers and products consume our activities

## General ledger

Salaries	Kr 80 "
Facilities	Kr 12 "
Travel	Kr 14 "
IT	Kr 14 "
Other	Kr 36 "
<b>Total</b>	<b>Kr156 "</b>

## Activity analysis

Order handling	27%
Service customers	23%
Procurement	14%
Packaging	11%
Set-up machines	9%
Handle invoices	9%
Other	7%
<b>Total</b>	<b>100%</b>

## Bill of Activities

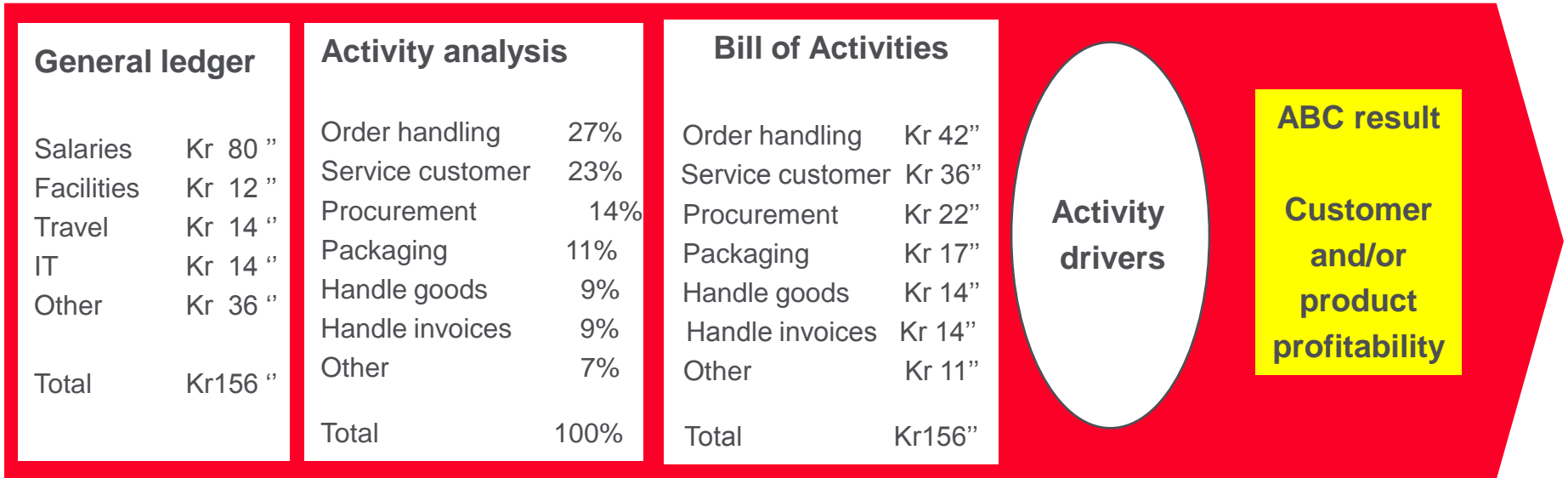
Order handling	Kr 42"
Service customers	Kr 36"
Procurement	Kr 22"
Packaging	Kr 17"
Set-up machines	Kr 14"
Handle invoices	Kr 14"
Other	Kr 11"
<b>Total</b>	<b>Kr156"</b>

**Activity drivers**

# The ABC model

General ledger		Activity analysis		Bill of Activities		Possible activity drivers	
Salaries	Kr 80 ”	Order handling	27%	Order handling	Kr 42”	1	No. of returns
Facilities	Kr 12 ”	Service customer	23%	Service customer	Kr 36”	2-5	No. of article no.
Travel	Kr 14 ”	Procurement	14%	Procurement	Kr 22”	6	No. of invoices
IT	Kr 14 ”	Packaging	11%	Packaging	Kr 17”	7-9	No. of articles
Other	Kr 36 ”	Handle goods	9%	Handle goods	Kr 14”	10-12	No. of customers
		Handle invoices	9%	Handle invoices	Kr 14”	13	No. of order lines
		Other	7%	Other	Kr 11”	14-19	No. of orders
Total	Kr156 ”	Total	100%	Total	Kr156”		

# The ABC model



## ABC and lean

- The logic behind Activity-Based Costing is presented which clearly solves the problem of “wrong-costing”, but...
- As lean initiatives succeed, ABC is becoming increasingly irrelevant because lean eliminates/reduces the complexity ABC is good at handling
- Also, since lean is an all-encompassing business strategy, the production system sets the premises for the costing system, and not the other way around which is the traditional approach
- Cost management does not, however, become irrelevant – it just has to be adjusted to the reality of the production system
- In general, lean companies have simple costing systems;
  - To avoid incurring waste (cost accounting has no intrinsic value)
  - One Toyota factory in the US, for example, traces only input and output – what is going on inside is largely a black box from a costing perspective
  - But the overriding principle is that the costing system must be adapted to the production system, which means that one size does not fit all
  - There is no “correct” way – it must be designed in each case

## So what?

- STX OSV Søviknes, and other yards in the group, is currently implementing lean planning based on the Last Planner approach
- We have conducted a core/non-core study to determine what should be done where
- We are currently facing two issues that needs to be resolved, in which the costing system may inhibit correct development;
  1. Subcontracting – when is it beneficial and when it is counterproductive?
  2. Sourcing Norway or Romania – when should outfitting be done in Romania and when should it be done in Norway?
- These questions are now being resolved by building a process costing model in which the objectives are;
  1. Assess the “true” cost of a process (including overhead costs)
  2. Assess the indirect hourly rate irrespective of type of worker (own or hired)
  3. Assess the costs of sourcing to Romania and the costs of performing work in Norway

## So what?

- The results so far are clear
- The usage of the balance rate gives a totally wrong picture of process costs
- Comparison of indexed balance rate and indexed new alternative balance rate (grand average numbers from 2009 from Søviknes);

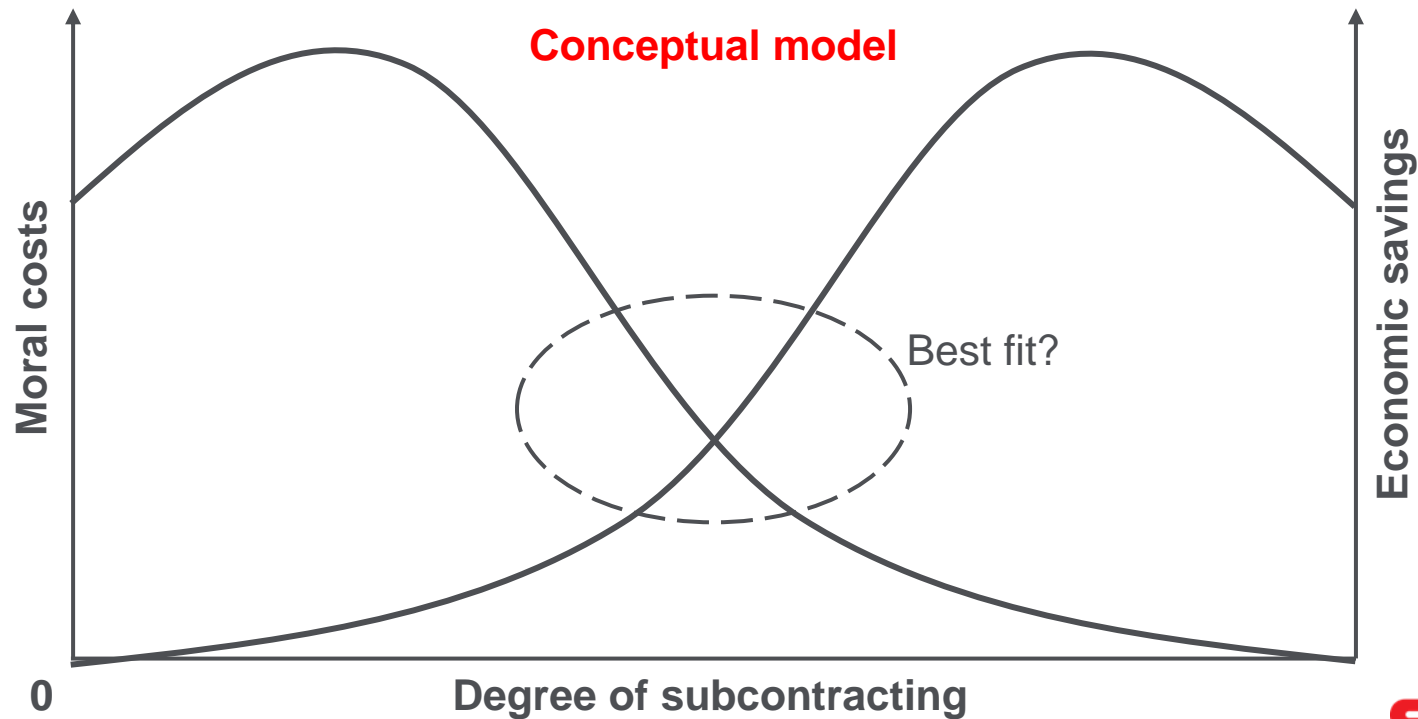
	<b>Steel</b>	<b>Welding</b>	<b>Piping</b>	<b>Machine</b>	<b>Service</b>	<b>Yard</b>
Balance rate	225	154	149	125	145	135
Alternative balance rate	100	101	106	105	115	100
Sub-contractor costs	116	116	121	120	130	116
<b>Differanse</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>16</b>

- We see that on average, subcontractors were 16% more expensive than own people in 2009 (assuming the same productivity and quality of workmanship)
- We also see that there are large internal differences if old balance rate is used due to various levels of subcontracting and process costs (some differences are real due to different process costs)

## So what?

The true issues involved are;

1. What is the point at which the cost of temporary layoffs supersedes the potential savings of performing work ourselves?
2. What are the “moral costs” of leading people on to employment knowing that there is a significant risk of temporary layoffs (and hence economic problems for the people involved)?



## Some reflections...

- Then, what is wrong with the balance rate?
  1. It assumes that subcontractors incur no overhead/indirect costs
  2. It assumes that subcontractors do not need facilities, management, systems, etc.
- The consequences of this are many;
  1. Our own employees systematically appear as more expensive than they are
  2. Subcontractors systematically appear less expensive than they are
  3. Sourcing decisions are based on potentially wrong information
  4. The balance rate increases as subcontracting increases, leading to even more subcontracting – a vicious circle
  5. This undermines lean planning and lean initiatives in general, which all rely on employee involvement, trust and long term commitment
- The balance rate thinking must be either abolished or changed significantly – we have come to this crossroad... 😊

## Possible solutions...

- Adapt the balance rate, but what about issues like;
  - Should fixed price contractors be included or only subcontractors that are hired on the hour?
  - How about budgeting?
  - How about indirect costs in years of low work-load – full cost absorption or only partial?
  - How about assignment of indirect costs to only hours?
- Implement contribution-margin costing, but what about issues like;
  - The problem of assigning indirect costs?
  - What behavioral issues will result?
- Implement Activity-Based Costing, but what about issues like;
  - The organizational challenge of handling such complex costing systems?
  - Striking a suitable balance between being exactly wrong and approximately right?
- There is no ideal solution... it is a matter of what improvements in decision-support we want to achieve versus the cost of this improvement
- We have to clarify strategy and then design the costing system accordingly...

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