

Conquering the after-market





☐ FACULTY OF LAW, ECONOMICS AND FINANCE



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``A little neglect may breed great mischief... for want of a nail the shoe was lost for want of a shoe the horse was lost for want of a horse the rider was lost."

- Benjamin Franklin



Capital Goods



LCI





Capital Goods (continued)









LCI







Total Cost of Ownership for an example system



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Öner et al. (2007)

Maintenance and service costs versus acquisition costs



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Van Dongen (2011)

INVESTMENT COST

Size capital goods industry Luxembourg

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- Cost of non-availability of Boeing 747 are 300 000 euro per day as of 2003
- Cost of non-availability of lithography machine are in the order of magnitude of 20 euro per second as of 2013 (1.7 Mio/day)
- High-tech industry: Service contracts with 2 hours, 4 hours, 8 hours, 1 day, and 2 days reaction time (e.g. IBM, ASML)
- Trend: Customers buy "Power by the hour" in-stead of capital good (e.g. Jet engines of Rolls Royce)

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- Worldwide revenues from after-sales services: 1500 billion USD per year in 2003 (Aberdeen group)
- Sales of service parts and services are <u>8% of GDP</u> in USA in 2003 (Aberdeen group)
- Sales of service parts (without services) are <u>8% of GDP</u> in USA in 2006 according to US bancorp, which is 700 billion USD (Jasper 2006)
- Service revenues are more than <u>25% of total business</u> for 120 large manufacturing companies in America, Asia Pacific and Europe (Deloitte, 2006)
- After-sales services account for <u>40% of the profit</u> for these 120 companies (Deloitte, 2006)

Long term trends



- Maintenance of complex systems becomes too complicated for users themselves
- Users require higher availabilities (less downtime)
- Users look at TCO
- Equipment condition monitored via sensors and IoT

Long term trends (2)

- LUXEMBOURG CENTRE FOR LOGISTICS AND SUPPLY CHAIN MANAGEMENT
- Maintenance of complex systems becomes too complicated for users themselves
- Users require higher availabilities (less downtime)
- Users look at TCO
- Equipment condition monitored via sensors and IoT



- Maintenance is outsourced to third party or OEM (pooling resources, pooling data, remote monitoring)
- More extreme: One sells function plus availability
- Feedback to design (better systems, higher sustainability)
- Sensor and IoT knowledge used to improve uptime





Service Parts





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Service engineers







Service tools





Transportation of capital good to service engineer or vice versa







Call centers



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Technological knowledge...







Printers are **not** the business, they are the **make business**, cartridges are the business.





Business model



- Service contracts generate steady revenue stream and cash flow
- Service contracts create an enduring customer relationship (and market)
- Servicing cannot easily be copied (cost effectively) by competitors because of resource and data pooling





Service supply chain



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Service supply chain



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- 1. Normal delivery: 2 hrs.
- 2. Lateral transshipment: 14 hrs.
- 3. Emergency replenishment: 48 hrs.

Service parts supply chain



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Characteristics of service parts

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• High prices





- Low demand rates and inventory turnover
 - Demand of 5 items per year around the world is considered a "fast mover"

"For every complex problem, there is an answer that is clear, simple, and wrong" – Henry Mencken



Service vs Investment



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How to get a good average on a report card



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Subject	Grade	
Math		15
Physics		15
Chemistry		15
Economics		15
French		15
German		15
English		15
Average		15

How to get a good average on a report card





Report card 1

Subject	Grade	
Math		15
Physics		15
Chemistry		15
Economics		15
French		15
German		15
English		15
Average		15

Optimized per subject

Report card 2

Subject	Grade	
Math		17
Physics		16
Chemistry		18
Economics		15
French		14
German		13
English		12
Average		15

Optimized for average

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Service vs Investment



How to satisfy the customer efficiently

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Service vs Investment



Insight from analytics spare part classification

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Annual demand volume

Predictive analytics in the service supply chain

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50

"An ounce of prevention is worth a pound of cure" – Benjamin Franklin





Predictive analytics in the service supply chain



Printed Circuit Board (PCB) case





Predictive analytics in the service supply chain

Ball bearing case







"Essentially all models are wrong, but some are useful." – George Box



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What about coordination?

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Future challenge to align analytics across components





- After-sales services is a large market
- After-sales services can provide a competitive advantage and stable revenue for equipment manufacturing companies
- The supply chain of after-sales services requires a different approach from fast moving consumer goods or commodities (optimize report card)
- The after-sales supply chain inspires many advanced applications of analytics that save cost and improve service











Low demand levels (implications in forecasting)



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Month	1	2	3	4	5	6	7	8	9	10	11	12
Demand	0	0	1	0	0	0	0	1	0	0	0	0



Life cycle of products and installed base (implications in forecasting)



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..... Installs --- Retirements — Installed base — ·Spare part sales