Information, Organization, and Management

Unit 2: From Scientific Management to BPR

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Overview

• Industrial Engineering and Work Organization: 1920s - today
• Taylor: Scientific Management
• Ford: Standardization and Mass Production
• Hammer: Business Process Reengineering
• Criticism of BPR
• Reference Process Libraries
• The Cradle-Building-Problem
• Long-tail Automation
Industrial Engineering and Work Organization: 1920s – today

- How should work processes be organized in order to maximize efficiency?
- Which machinery to use?
- How to organize the workforce?
- Which processes to follow?
Business Processes and Computer Systems

- **Business Process**: A sequence of activities that creates value
- Implementing a process using IT takes time and money
- Thus, we should evaluate the quality of the original process first.
Three Dimensions of Competitiveness

- **Efficiency**: Output per input
- **Agility**: Delay for changing a process
- **Viscosity**: Ability to adapt to small change requests, limited by fixed costs for changes

Hepp et al. (2005, 2007)
Taylor: Scientific Management

- Hierarchy, Functional division of labor
- „One best way conceptualization of labor“
- Core Principles:
  - Maximal work specialization
  - Separation of managerial from operational work
  - Physical exclusion of...
Taylor: Incentives for Workers

• Avoid that workers purposely operate well below their capabilities

• Reasons:
  – Fear of elimination of jobs
  – Lack of incentive components in wage systems
  – Workers’ inability to find the ideal work process by rule-of-thumb methods
Taylor: Tooling – The Science of Shoveling

- Tool design and usage can be optimized by scientific analysis
- Shoveling example
Taylor: Workforce selection

• Using scientific methods for determining the ideal task-employee assignment

• Example: Inspection of bearing balls
Babbage Effect

• Reduction of labor cost by differentiation in wages per individual skill / task.
Work and Motion Studies

- Use scientific methods for determining the ideal execution of a production process
- Eliminate unnecessary movements or steps
- Gilbreth's method of bricklaying

Chronocyclegraph of bricklaying by Frank Gilbreth (1912)

From: http://www.lumen.nu/rekveld/wp/?page_id=339
Motion Studies (2)

3D motion models by Frank Gilbreth (1918)

Ideal hammer motion by A.K. Gastev (ca. 1926)

Taken from: http://www.lumen.nu/rekveld/wp/?page_id=339
Henry Ford: Standardization and Mass Production

Images from http://www.vanderbilt.edu/AnS/Anthro/Anth101/taylorism_and_fordism.htm
Taylorism: Successful in the Early 20th Century

- Comparatively long life-cycles of products
- Relatively stable consumption and preferences
- Limited and stable number of competitors with known strengths and weaknesses
- High entrance barriers for new participants
- Low costs of natural resources and low environmental burdens
- High supply of motivated, skilled or easily qualifiable staff

cf. Wigand/Picot/Reichwald (1997)
The Crisis of Taylorism and Fordism

• Adapts to change only very slowly
• Changes in capacities and processes expensive
• Limited ability to acquire and process market information

**Bottomline:** Taylor‘s approach works well only under stable conditions
Fundamental Changes After the 1960s

• Shift towards **buyer markets**
  – No need for buyers to accept organization-related limitations

• **Ever-changing market demands**

• **Omnipresence of global competition**

• **Dynamics at all levels**
  – speed of processing of innovation and advancement

*cf. Wigand/Picot/Reichwald (1997)*
Decentralization and Modularization

- Problems with Tayloristic Organizations: Adapt slowly to change in circumstances
- Organizational arrangements that enable agile adaptation and evolution
  - re-integration of production and service functions into self-contained processes focussing on customer value
  - direct communication between all participants
  - capture and processing of market feedback by employees
  - new roles for managers and employees in less hierarchical organizations.

cf. Wigand/Picot/Reichwald (1997)
Changes in the Value Systems

• Reluctance to subordination and pure execution of tasks after 1960s/1970s
• Scarcity of resources, namely space, environment, highly-qualified labor,…

cf. Wigand/Picot/Reichwald (1997)
**Hammer: Business Process Reengineering**

- **Idea:** “...the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service, and speed.”

- **Led to a lot** of process documentation, analysis, and improvement projects

- **Often combined with** the introduction of new IT systems

[HaCh2001]
BPR: Disruptive Technologies

New technologies that can challenge current best practices:

- Shared databases
- Expert systems
- Telecommunication networks
- Decision-support tools
- Wireless data communication and portable computers
- Interactive videodisk
- Automatic identification and tracking
- High performance computing

[HaCh2001]
Implications of Information and Communication Technology

• Dramatic increase in the enterprise’s ability to receive, process, and transmit information
  – Automation: -> less costs, more consistent, faster

• Speed of innovation makes machinery age faster.

• Overcoming rigid organizational structures that were created mainly for information processing purposes.
Implications of Information and Communication Technology

- Overcoming rigid organizational structures that were created mainly for information processing purposes.
Innovative Organizational Arrangements

• Regional border decreasingly important
• Technical integration of external parties into business processes
• Facilitated coordination in time and space
• Capacity restrictions vs. flexible integration of required resources

cf. Wigand/Picot/Reichwald (1997)
Criticism of BPR

- Businesses are in a state of constant flux
  - **Everything changes**: Markets, technology, knowledge
  - Consistent snapshot impossible
  - Ideal process outdated when implemented
- Ignores the mutual interplay between ICT and business processes
  - ICT empowers new processes
  - ICT requires new processes
Criticism of BPR (2)

• Documenting existing processes often useless
  – „Archiving proprietary inefficiency“
  – Common-off-the-shelf software prescribes target processes

• Industry-wide best practives can make up to 80% of the overall processes
  – No point in developing proprietary optimalizations

• Repeats shortcomings of „Scientific Management“
Reference Process Libraries

- In many cases, industry-wide best practices exist.
- They are available either in the form of business software or workflow specifications
- Examples:
  - SAP Reference Processes
  - MIT Process Handbook
  - RosettaNet PIPs
The Cradle-Building-Problem

- Birth
- Documentation and requirements specification completed
- Ideal solution found
- Ideal solution implemented and available

Time
Long-tail Processes and the Economics of Automation

- Only frequently executed processes can be fully automated

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Review Question 1

• What are Tayloristic Industrial Organizations and under which environmental characteristics did they became popular?
Review Question 2

• Why have Tayloristic Industrial Organizations difficulties with environmental change? (also: spotting environmental change)
Review Question 3

• Why does Division of Labor increase productivity?
Review Question 4

• How does the advancement in ICT enable and demand new forms of work and enterprise organization?
Review Question 5

• What is meant by the term „border-less enterprise“?
Thank you!

The slides of today‘s class will be available at http://www.heppnetz.de/teaching/img/ shortly.