The Evolution of Enterprise Information Systems

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1972-1990

• The industry sees a plethora of computer systems developed for many applications
  – Firms hire large IT staffs, to write their own code
• SAP develops their accounting-oriented system
  – Business process reengineering
  – Best practices
The 1990s

- Industry so successful in generating software that they cannot link them into a cohesive system
- ERP vendors (SAP, PeopleSoft, BAAN, JD Edwards) move in to provide integrated software
Late 1990s

• 1999 industry panics with respect to fears of Y2K

• ERP vendors prosper
  – Proactive in marketing Y2K?
2000

• Y2K survived
  – US Government – see, we prepared you well!
• ERP market plummets
  – Large organization market saturated in Y2K scare
ERP Research

• New area
  – By necessity, research base is weaker
  – Start with Vendor claims
    • Marketing material, not scientific
  – Cases
    • There are many
    • Hard to generalize
  – Surveys
    • Categorical scales (hard to anchor)
  – Theory development & testing
    • Hard to be convincing in MIS in general
    • Too dynamic an environment
## Reasons for Implementing ERP

**1-5 scale**

Extracted from Mabert et al. (2000), Olhager and Selldin (2003), Katerattanakul et al. (2006)

<table>
<thead>
<tr>
<th>Reason</th>
<th>US</th>
<th>Sweden</th>
<th>South Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace legacy systems</td>
<td>4.06</td>
<td>4.11</td>
<td>3.42</td>
</tr>
<tr>
<td>Simplify and standardize systems</td>
<td>3.85</td>
<td>3.67</td>
<td>3.88</td>
</tr>
<tr>
<td>Improve interactions w/suppliers &amp; customers</td>
<td>3.55</td>
<td>3.16</td>
<td>3.45</td>
</tr>
<tr>
<td>Gain strategic advantage</td>
<td>3.46</td>
<td>3.18</td>
<td>3.63</td>
</tr>
<tr>
<td>Link to global activities</td>
<td>3.17</td>
<td>2.85</td>
<td>3.54</td>
</tr>
<tr>
<td>Solve the Y2K problem</td>
<td>3.08</td>
<td>2.48</td>
<td>NA</td>
</tr>
<tr>
<td>Pressure to keep up with competitors</td>
<td>2.99</td>
<td>2.48</td>
<td>2.94</td>
</tr>
<tr>
<td>Ease of upgrading systems</td>
<td>2.91</td>
<td>2.96</td>
<td>3.55</td>
</tr>
<tr>
<td>Restructure organization</td>
<td>2.58</td>
<td>2.70</td>
<td>3.33</td>
</tr>
</tbody>
</table>
## Relative Module Use

Extracted from Mabert et al. (2000), Olhager and Selldin (2003), Katerattanakul et al. (2006)

<table>
<thead>
<tr>
<th>Module</th>
<th>US</th>
<th>Sweden</th>
<th>South Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial &amp; Accounting</td>
<td>91.5%</td>
<td>87.3%</td>
<td>92.5%</td>
</tr>
<tr>
<td>Materials Management</td>
<td>89.2%</td>
<td>91.8%</td>
<td>94.1%</td>
</tr>
<tr>
<td>Production Planning</td>
<td>88.5%</td>
<td>90.5%</td>
<td>91.5%</td>
</tr>
<tr>
<td>Order Entry</td>
<td>87.7%</td>
<td>92.4%</td>
<td>90.5%</td>
</tr>
<tr>
<td>Purchasing</td>
<td>86.9%</td>
<td>93.0%</td>
<td>93.1%</td>
</tr>
<tr>
<td>Financial Control</td>
<td>81.5%</td>
<td>82.3%</td>
<td>85.0%</td>
</tr>
<tr>
<td>Distribution/Logistics</td>
<td>75.4%</td>
<td>84.8%</td>
<td>85.9%</td>
</tr>
<tr>
<td>Asset Management</td>
<td>57.7%</td>
<td>63.3%</td>
<td>81.4%</td>
</tr>
<tr>
<td>Quality Management</td>
<td>44.6%</td>
<td>47.5%</td>
<td>77.6%</td>
</tr>
<tr>
<td>Personnel/Human Resources</td>
<td>44.6%</td>
<td>57.6%</td>
<td>78.4%</td>
</tr>
<tr>
<td>Maintenance</td>
<td>40.8%</td>
<td>44.3%</td>
<td>72.2%</td>
</tr>
<tr>
<td>R&amp;D Management</td>
<td>30.8%</td>
<td>34.2%</td>
<td>69.5%</td>
</tr>
</tbody>
</table>
# Expected Installation Time

Extracted from Mabert et al. (2000), Olhager and Selldin (2003), Katerattanakul et al. (2006)

<table>
<thead>
<tr>
<th>Installation Time</th>
<th>US</th>
<th>Sweden</th>
<th>South Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 months or less</td>
<td>34%</td>
<td>38%</td>
<td>49%</td>
</tr>
<tr>
<td>13 to 24 months</td>
<td>45%</td>
<td>49%</td>
<td>40%</td>
</tr>
<tr>
<td>25 to 36 months</td>
<td>11%</td>
<td>8%</td>
<td>7%</td>
</tr>
<tr>
<td>37 to 48 months</td>
<td>6%</td>
<td>4%</td>
<td>2%</td>
</tr>
<tr>
<td>Over 48 months</td>
<td>2%</td>
<td>1%</td>
<td>3%</td>
</tr>
</tbody>
</table>
## Installation Cost Proportions


<table>
<thead>
<tr>
<th>Category</th>
<th>US</th>
<th>Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software</strong></td>
<td>30%</td>
<td>24%</td>
</tr>
<tr>
<td>Consulting</td>
<td>24%</td>
<td>30%</td>
</tr>
<tr>
<td>Hardware</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>Implementation team</td>
<td>14%</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td>11%</td>
<td>14%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
<td>1%</td>
</tr>
</tbody>
</table>
# Proposal Evaluation Technique Used

Extracted from Mabert et al. (2000), Olhager and Selldin (2003), Katerattanakul et al. (2006)

<table>
<thead>
<tr>
<th></th>
<th>US</th>
<th>Sweden</th>
<th>South Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI</td>
<td>53%</td>
<td>30%</td>
<td>37%</td>
</tr>
<tr>
<td>Payback</td>
<td>35%</td>
<td>67%</td>
<td>36%</td>
</tr>
<tr>
<td>Expected NPV/value added</td>
<td>15%</td>
<td>12%</td>
<td>15%</td>
</tr>
<tr>
<td>Other</td>
<td>11%</td>
<td>20%</td>
<td>16%</td>
</tr>
</tbody>
</table>
## Relative Use of Implementation Strategies

Mabert et al. (2000), Katerattanakul et al. (2006)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>US</th>
<th>South Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single ERP package with modifications</td>
<td>50</td>
<td>43</td>
</tr>
<tr>
<td>Single ERP package</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Vendor packages with modifications</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Best-of-breed</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>In-house plus specialized packages</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Total in-house system</td>
<td>0.5</td>
<td>16</td>
</tr>
</tbody>
</table>
# Implementation Strategies Adopted


<table>
<thead>
<tr>
<th>Strategy</th>
<th>Time US</th>
<th>Time Sweden</th>
<th>% US</th>
<th>% Sweden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Bang</td>
<td>15 mos.</td>
<td>14 mos.</td>
<td>41%</td>
<td>42%</td>
</tr>
<tr>
<td>Phased rollout by site</td>
<td>30 mos.</td>
<td>23 mos.</td>
<td>23%</td>
<td>20%</td>
</tr>
<tr>
<td>Phased rollout by module</td>
<td>22 mos.</td>
<td>20 mos.</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>Mini big bang</td>
<td>17 mos.</td>
<td>16 mos.</td>
<td>17%</td>
<td>20%</td>
</tr>
<tr>
<td>Phased rollout by module &amp; site</td>
<td>25 mos.</td>
<td></td>
<td>2%</td>
<td></td>
</tr>
</tbody>
</table>
2001

- Dot.com bubble bursts
- Firms need to downsize
  - IT especially vulnerable
  - ERP makes it possible to do more computing with less staff
- ERP firms change tactics
  - Redesign products
    - Seek more of SME market
    - More open systems (portals, to support supply chains, mobile users)
    - Focus on industry applications
      - Including non-profits
c. 2005

- **Recovery**
- **ERP consolidation**
  - Oracle acquires PeopleSoft (who acquired JDEdwards)
  - Upgrades
    - SAP discontinues R/3 support to focus on MySAP (backed off)
  - System expansion
    - Oracle purchases Siebel Systems
    - SAP adds CRM module

- **Entry of Microsoft**
  - Focus on SME
Upgrades

• Driven by vendor system improvement
  – SAP announced dropping R/3 support
  – Outcry from customers
  – Delayed support drop until 2011

• Upgrades go much smoother than initial installations
  – Olson & Zhao (2007)
  – A risk factor
    • Vendors hold clients at their mercy
Lately: International ERP

– Each country finds a market internally
– Taiwan, South Korea, China
  • Many local vendors
    – More attuned to culture
    – Much less cost
Open Source Software

- Operates under license allowing release of source code free of charge for others to use & modify
  - Free redistribution
  - Open source code allowing modifications
    - Modifications to be distributed same as source code
Open Source

- Linux: 24% market share
  - 52% replacing Windows with Linux

- Gains
  - Constant testing & improvement
    - Better quality & security
  - Break Vendor Lock-in
  - Cost, obviously
SourceForge.net

• Large online community
• Over 1000 open source ERP projects registered
• Sampled 447
  – Looked at focus
  – More support (human resources, accounting, finance)
  – Less value-chain (materials management, operations, sales & distribution)
Open Source ERP Benefits

• **Agility & Scale**
  – Can modify, grow
  – Paypal increased server farm to meet demand
    • Linux enabled upward scalability
  – Chicago Mercantile Exchange
    • Switched to Linux
    • 20% drop in time to process trades
    • Higher customer satisfaction
Open Source ERP Benefits

• **Quality & Security**
  – Constant testing & improvement

• **Breaking Vendor Lock-in**
  – High investment in vendor software leads to stickiness
  – Open source avoids this
    • Compiere maintains lift of available consulting partners
Open Source ERP Benefits

- **Cost**
  - Blue-Star reengineered, switched to new open platform
  - Total investment $2.5 to 3 million
    - Much lower than proprietary would have been
  - Saved $100,000 to $150,000 per year
    - Streamlined processes
    - Updated best practices
    - Eliminated third-party vendors
  - Save $25 million in license & maintenance fees
Open Source Risks

• ADOPTION NOT WIDESPREAD
  • Licensing issues
    – Often written by software engineers, not lawyers
    – License-detection agents exist
  • Competitive worries
    – Any competitor can obtain the same system
    – Can customize
• Expertise required
• Documentation
• Support
Open source ERP

- **ERP**: Compiere
  - Don’t sell software – sell security & support
  - Over 1.4 million downloads (don’t know degree of commitment)

OpenMFG allows users to participate in developing

OpenOffice – plug & play

- **SCM**
- **CRM**
Content Analysis: SourceForge.net

- Web community for open source projects
- Over 348,000 software projects
- 15 groups
  - One group is ERP
  - In ERP about 1,000 projects
  - Selected 450 biggest
SourceForge.net Results

• Used Mabert et al., other surveys for modules

• Categorized modules into:
  – **Value adding**: (Materials Management, Production Planning, Distribution/Logistics)
  – **Supporting**: (Financial & Accounting, Maintenance, Personnel/HR)

• **INERENCE**:
  – Open source used more for supporting category
Conclusion

• **Open source ERP projects are increasing**
  – Not all projects are highly structured

• Reluctance to use open source ERP in firm’s core activities

• PROVIDES OPTION FOR SME

• **VENDORS CAN USE TO REFINE THEIR SYSTEMS**
  – Open source an access to free labor
ERP’s Future

• SAP, Oracle prospering
  – High end of the market will continue to be strong
  – Upgrades

• Microsoft moving into **SME market**
  – Very large potential

• **International** vendors finding niche
  – Local advantages

• **Open Source opportunities**
  – Parallel to Linux