ERP Adoption Lifecycle in SMEs

A focus on cost issues

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Agenda

1) Presentation background
2) Business Process and functions
3) ERP Systems overview
4) Research problem
5) Research motivations
6) Research questions
7) Research results
8) Future research
9) Summary
A little bit about me

- Name: Moutaz Haddara.
- Country of origin: The land of Pharaohs.
- Research interests: Enterprise systems, ERP systems, DB, benefits & costs management.
This presentation provides:

- SME definition
- A brief introduction to ERP systems;
- An overview of ERP costs and benefits management challenges;
- An example of research conducted during my PhD study on Egyptian SMEs.
According to CEC (1996), enterprises can be classified as SMEs class when they have more than 10 employees but less than 250 employees, together with an annual turnover of less than 50 million euro or 43 million euro on the balance sheet.
Single Department Business Process (BP)

Employee Vacation Request
Functional Areas

KIND OF INFORMATION SYSTEM

FUNCTIONAL AREAS
- Sales and Marketing
- Manufacturing and Production
- Finance and Accounting
- Human Resources

GROUPS SERVED
- Operational Managers
- Middle Managers
- Senior Managers
- Strategic Level
- Management Level
Cross-functional BP

Order Fulfillment Process

Enterprise Resource Planning (ERP) System

ES vs. ERP

- SCM
- ERP
- KMS
- CRM

Employees
Suppliers
Partners

ERP II

Employees
Customers
## Motivations for ERP adoptions

<table>
<thead>
<tr>
<th>Technical</th>
<th>Operational</th>
<th>Strategic</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Common platform &amp; standardization</td>
<td>• Data visibility and transparency</td>
<td>• Partnerships &amp; value networks</td>
</tr>
<tr>
<td>• Scattered &amp; incompatible systems</td>
<td>• Enhance reporting</td>
<td>• Facilitate enterprise growth</td>
</tr>
<tr>
<td>• Database capacity overload and inconsistency</td>
<td>• Process enhancements/best practices</td>
<td>• Enhanced decision making</td>
</tr>
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<td></td>
<td>• Improve financial management</td>
<td>• Globalization</td>
</tr>
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<td></td>
<td>• Ensure data security &amp; control</td>
<td>• Compliance with government regulations</td>
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<td></td>
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<td>(e.g. Sarbanes-Oxley Act)</td>
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<tr>
<td></td>
<td></td>
<td>• Cost reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Enhance customer responsiveness</td>
</tr>
</tbody>
</table>
ERP Lifecycle

ERP Lifecycle framework. Adapted from Esteves & Pastor, 1999.
Arguments for BR

IT has no inherent value

Extra effort on BR will pay off

Many benefits and impacts are emergent

mature towards more formal BR practices

Organizations should develop their structures and cultures towards more active BR practices
ERP expected benefits

■ Well-designed ERP system benefits:
  ■ Unified database;
  ■ Increased availability and timeliness of information;
  ■ Increased data accuracy and improved response time;
  ■ Enhanced logistics operations;
  ■ Improved customer satisfaction;
  ■ Increased employee satisfaction;
  ■ Improved planning and scheduling;
  ■ Enhanced supplier relationship;
  ■ Improved reliability of information;
  ■ Reduction in inventory costs and cycles;
  ■ Cuts in labor costs;
  ■ Reduction in order-to-fulfillment time;
  ■ Reduction in lead time.

Challenges in realization?
Why ERP in SMEs research?

- ERP vendors’ focus nowadays;
- Increasing number of ERP adoptions;
- SMEs represent majority of enterprises in global economies;
- Increasing number of alliances and value-webs;
- In the case of Egypt, around 75% of total employment falls within SMEs category [1];
- Limited resources;
- Cost-sensitive;
- ......
When organizations take the first steps towards implementing an ERP, they need to think about a lot of things, foremost among which is cost of adoption.
What Does ERP Cost?

- The ERP adoption has many variables and total cost will depend on:
  - Number of divisions it will serve;
  - Number of modules implemented;
  - Number of licenses;
  - Needed customizations;
  - Amount of integration with existing systems;
  - Existing IT infrastructure;
  - BPR;
  - Business engagement;
  - Etc…
What Does ERP ‘Really’ Cost?

Direct costs & Indirect costs

Costs Vs. Benefits
There is no such thing as a “free lunch”

Most of the ERP implementations projects fail because they have exceeded their estimated budgets or behind their schedules [2], A.K.A exceeded their estimated budgets.
The problem

- ERP system adoption are very costly.

- Failures within ERP adoptions in some cases have lead to the plunge of some companies [2,3].

- Increasing tension between ERP clients and vendors or implementation partners [4].

- There is an increasing number of law suit cases related to ERP’s erroneous adoption cost estimations [2].

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>2010 Average</th>
<th>2009 Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Take Longer Than Expected</td>
<td>61.1%</td>
<td>35.5%</td>
</tr>
<tr>
<td>% Cost Exceeds Budget</td>
<td>74.1%</td>
<td>51.4%</td>
</tr>
</tbody>
</table>

Source: Panorama Consulting Report 2011
The problem

- Rigorous cost underestimations could happen due to unwarranted optimism or opportunism in cost and schedule estimations, rather than project management pitfalls [2,3].
Research motivation - ERP cost management and estimation challenges

- Research gap in ERP costs identification and estimation [2,5];
- ERP adoptions frequently cross their estimated budgets [2];
- Challenges in cost factors identification [6];
- Unforeseen costs popup and/or escalate during projects;
- Non-adequacy of current budgeting methods [5];
- Misfit of established cost estimation models with ERP settings (e.g. COCOMO II) [2,5,7].
It’s all about costs!

“I can make more generals, but horses cost money.”

Abraham Lincoln
Costs
## Publications included in thesis

<table>
<thead>
<tr>
<th>Publication</th>
<th>Publication outlet</th>
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</thead>
</table>
Research Questions

- What are the current issues discussed in ERP in SMEs literature?
- What are the common ERP adoption cost factors between SMEs?
- What is the priority of these cost factors? (ordered by cost impact on overall costs)
- Are the established budgeting methods suitable for ERP cost estimation?
- Which costs unpredictably escalate? And why?
- Whether and why SMEs would adopt formal cost management and benefits realization practices in connection to their ERP investments?
- How do organizations select their ERP systems?
- How could the state-of-the-art technologies and methods enhance the ERP adoption experiences in organizations i.e. SMEs?
Data Collection & Research Methods

The data collection efforts involved various stakeholders including: SMEs’ representatives, implementation partners, consultants and vendors.

- Experts panel (8 participants);
- Multiple case study. Four case studies in Egyptian SMEs (3 medium & 1 small);
- In-depth case study in one SME.
Research contributions…

- Reviewed the current ERP in SMEs literature;

- Identified and validated a list of potential cost factors that occur in ERP adoptions;

- Identified associations & relationship of cost factors with SME-specific contextual characteristics, and other cost factors;

- Ranked the influence of cost factors on the ERP adoption total costs;
Research contributions...

- Recognized potential indirect costs;

- Discussed Egyptian SMEs’ challenges with cost management and estimation;

- Elaborated on benefits realization practices and issues in Egyptian SMEs;

- Provided one of the very first ERP retirement cases in literature;

- Presented suggestions on how state-of-the-art technologies could contribute to future ERP implementations research.
Sharing some results
Literature Review

Figure 3. ERP life cycle

Figure 2. Research methods
### Table 3. Article categorization

<table>
<thead>
<tr>
<th>Life-cycle phase</th>
<th>Issues</th>
<th>Reference articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption decision</td>
<td>Adoption drivers</td>
<td>[6, 7, 17-26]</td>
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<tr>
<td></td>
<td>Adoption evaluation</td>
<td>[17, 22, 24-31]</td>
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<tr>
<td></td>
<td>Organizational characteristics</td>
<td>[6, 7, 22, 24, 26, 31, 32]</td>
</tr>
<tr>
<td></td>
<td>Other adoption issues</td>
<td>[8, 14, 28, 33-35]</td>
</tr>
<tr>
<td>Acquisition</td>
<td>Factors affecting selection</td>
<td>[18, 19, 36-41]</td>
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<td>Selection criteria</td>
<td>[29, 38, 39, 42-44]</td>
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<tr>
<td></td>
<td>In-house developed systems</td>
<td>[45-47]</td>
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<tr>
<td></td>
<td>Other acquisition issues</td>
<td>[8, 14, 33, 42, 47-52]</td>
</tr>
</tbody>
</table>
## Literature Review

### Table 4. Adopted theories & frameworks

<table>
<thead>
<tr>
<th>Theory/framework</th>
<th>Reference articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialectic perspective</td>
<td>[60, 81]</td>
</tr>
<tr>
<td>Process theory</td>
<td>[9, 14]</td>
</tr>
<tr>
<td>Technology-Organization Environment framework</td>
<td>[20, 21]</td>
</tr>
<tr>
<td>IT Conversion theory</td>
<td>[88]</td>
</tr>
<tr>
<td>Punctuated Equilibrium theory</td>
<td>[66]</td>
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<tr>
<td>Social Process theory</td>
<td>[66]</td>
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<tr>
<td>Grounded Theory</td>
<td>[14, 61, 62]</td>
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<tr>
<td>Innovation Diffusion theory</td>
<td>[33, 51]</td>
</tr>
<tr>
<td>Organizational Change theory</td>
<td>[33]</td>
</tr>
<tr>
<td>Neo-institutional theory</td>
<td>[33]</td>
</tr>
<tr>
<td>Complexity theory</td>
<td>[33]</td>
</tr>
</tbody>
</table>
Literature Review

Figure 4. Adopted research approaches
ERP adoption cost factors

- ERP License
- Customization
- Modules
- Integration
- Implementation
- Vendor Project Management
- Annual Maintenance
- Hosting
- VPN
- Services
- Business Process Reengineering
- External Consulting
- Quality Assurance
- Upgrading
- Buying
- Machinery
- ERP Cost Factors
- Hardware
- Servers
- Clients
- Storage
- DBMS
- OS
- Backup
- Application Server
- Software
- HR Costs
- Hiring
- Business
- Training
- IT
- Project Management
- Business engagement
- Change Management
- Planning
- Executing
<table>
<thead>
<tr>
<th>Cost factor</th>
<th>Very High (5)</th>
<th>High (4)</th>
<th>Medium (3)</th>
<th>Low (2)</th>
<th>Very Low (1)</th>
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</thead>
<tbody>
<tr>
<td>Vendor</td>
<td>X</td>
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<td>BPR</td>
<td></td>
<td>X</td>
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<tr>
<td>External Consultants</td>
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<td></td>
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<td>X</td>
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<tr>
<td>Hardware</td>
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<td>X</td>
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<tr>
<td>Software</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>HR &amp; project management</td>
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<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Change management</td>
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<td>X</td>
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<tr>
<td>Quality assurance</td>
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<td>X</td>
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<td>Logistics</td>
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<td>X</td>
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<tr>
<td>Services (Hosting &amp; VPN)</td>
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<td></td>
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<td>X</td>
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<tr>
<td>Machinery</td>
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<td>X</td>
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</table>

Influencing factor(s):

- **Vendor**
  - Responsibility matrix; implementation method, experience; project size; licensing; product performance
- **Nature of business**
  - (multinational, local, public organization); Local/international ERP vendor; International or Local implementation; ERP scope/generic
- **External Consultants**
  - Scope of acts; business complexity; type of business; experience
- **Hardware**
  - Buy or lease; business requirements
- **Software**
  - Open source Vs. licensed/proprietary
- **HR & project management**
  - Business engagement
- **Change management**
  - Company size
- **Quality assurance**
  - Business engagement
- **Logistics**
  - Business size, distribution and distance of facilities & inlets/outlets
- **Services (Hosting & VPN)**
  - Type of business (e.g. manufacturing); scope
Benefits realization findings summary

- ERP matters "self-evidently" (infrastructurally, operationally)
- Perceived political nature of evaluation processes
- National IMC funding policy
- "Extra effort on BR will not pay off"
- Lack of BR practices not necessarily an issue of maturity
- No drivers to change the prevailing organization culture
Trending technologies/research areas

- Social Nets
- Decision 2.0
- ERP research
- Cloud computing
- Enterprise 2.0
Proposed research integration

As-Is ERP research
- Implementation Lifecycle
- CSF/PM
- Benefits/Costs
- History/Development

To-be ERP research
- Social Networks
- Cloud Computing
- Enterprise 2.0
- Decision 2.0
While conducting this study, however, I had difficulty in classifying Egyptian enterprises according to these standard classifications and characteristics.

For example, in Egypt, employees’ salaries and wages are generally not high in typical SMEs in Egypt. As a result, Egyptian SMEs might employ more employees in comparison with, for example, European companies.
Contributions to practice

- The research results could:
  - Help SMEs to clearly identify and visualize the potential cost factors;
  - Aid SMEs, consultants, and vendors to estimate budgets needed to adopt ERP systems more realistically;
  - Avoid common adoption pitfalls.
Future research avenues

- Check the validity of the cost factors list in other contexts (e.g. SMEs in the Sweden);

- Develop a novel ERP cost estimation model that targets SMEs;

- Test the applicability of the cost factors and estimation model on large enterprises.
Summary

- This presentation:
  - Offered an introduction to ERP systems and their adoption in SMEs.
  - Discussed the current challenges with cost identification, management and estimation efforts.
  - Presented the difficulties that SMEs face in the benefits realization process.
  - Demonstrated a segment of my research efforts and findings in the Egyptian context.
Questions/suggestions?

Thank You
References


