



# Investment in Business Software and Perceived Utility: An Empirical Study

**Petra Schubert**

University of Koblenz-Landau, Department of Computer  
Science, Institute for IS Research

**Gianfranco Walsh**

University of Koblenz-Landau, Department of Computer  
Science, Institute for Management



## Background and Motivation

- **Theme of the 21st Bled Conference: Business Collaboration**
- **Assumption: Business software could provide a standard tool suite for the easy facilitation of electronic exchange processes**
- **Research questions:**
  - **What is the current state of electronic data exchange in Swiss SMEs?**
  - **How much do SMEs invest in business software in order to achieve electronic business collaboration?**
  - **What are the expected returns from these investments?**
  - **Are there any typical patterns for investment behaviour?**

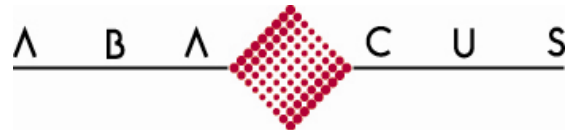


## Objectives of the Study

- Compare *investment* in business software modules and the *perceived utility* of the investment
- Identify company clusters based on their way of achieving competitive advantage in the market
- Analyse these company clusters regarding their attitude towards business software

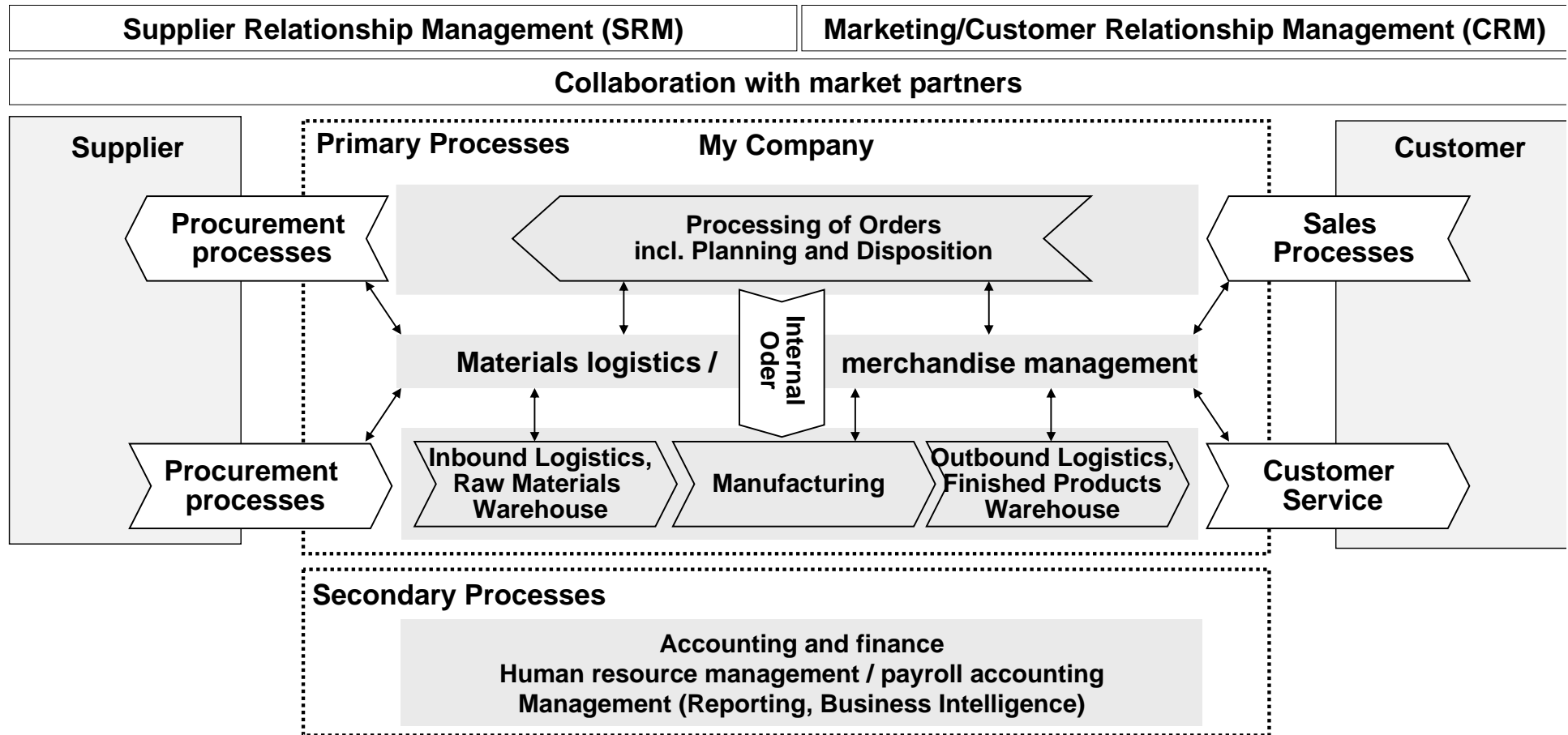


## Research Partners





# eXperience Taxonomy of Processes



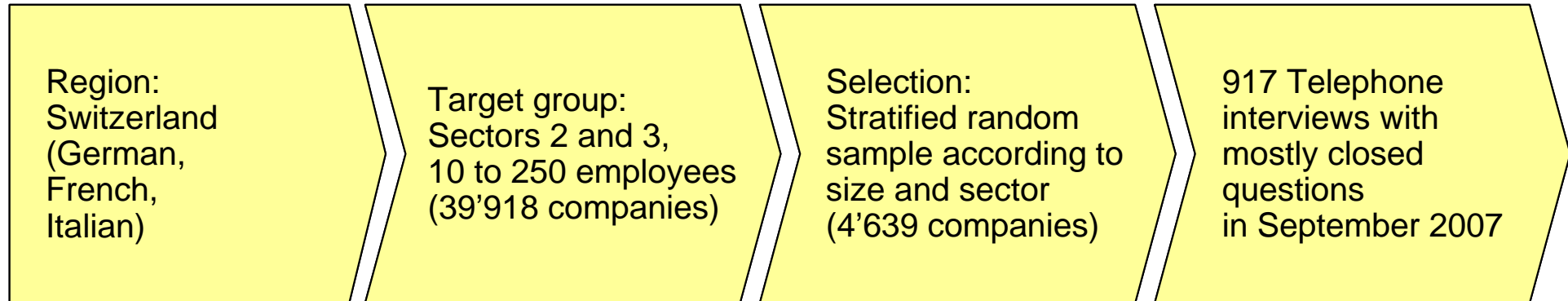


## Process Areas

- Accounting and finance (Q01)
- Human resource management/Payroll accounting (Q02)
- Management (Reporting, Business Intelligence) (Q03)
  
- Procurement and procurement processes (Q04)
- Supplier Relationship Management (SRM) (Q05)
- Materials logistics / merchandise management (Q06)
  
- Processing of orders (Q07)
- Sales processes (Q08)
- Marketing/Customer Relationship Management (CRM) (Q09)
- Customer service (Q10)
  
- Collaboration with market partners (Q11)



## Study Design



### ■ Company size:

- 10 – 49 employees
- 50 – 99 employees
- 100 – 250 employees

### ■ Standardized questionnaire

### ■ Telephone interviews (CATI)

### ■ Industry sectors:

- Two (Industry) and
- Three (Services)
- = 94 % of Swiss companies with more than 10 employees



## Survey and Return Rate

- Autumn 2007
- Target group: senior management
- Sample size: 4'639
- Total usable: 917 questionnaires  
Return rate: 19,8 %
- Weighting according to industry sector and company size

Business Sector	Company Size [number of employees (full-time equivalent)]		
	>=10 & <50	>=50 & <100	>=100 & <=250
Manufacturing, Industry	2.6674	0.4604	0.3073
Power, Water Utility	0.1682	0.0582	0.0477
Construction Company	5.4334	0.7274	0.2193
Trade, Repair of Durable Goods	2.8134	0.2493	0.1266
Hotels and Restaurants	2.9021	0.2584	0.1127
Transport and Telecommunications	1.3494	0.2512	0.1072
Banking and Insurance	0.9115	0.1577	0.1214
Company-related Services	4.0164	0.7715	0.2197
Public Administration	0.6560	0.2078	0.1464
Education	1.3256	0.4055	0.2540
Health and Social Services	2.3707	0.6356	0.3227
Other services for Third Parties	1.5227	0.1620	0.0769

Source: Swiss Federal Statistical Office (SFSO); own calculations



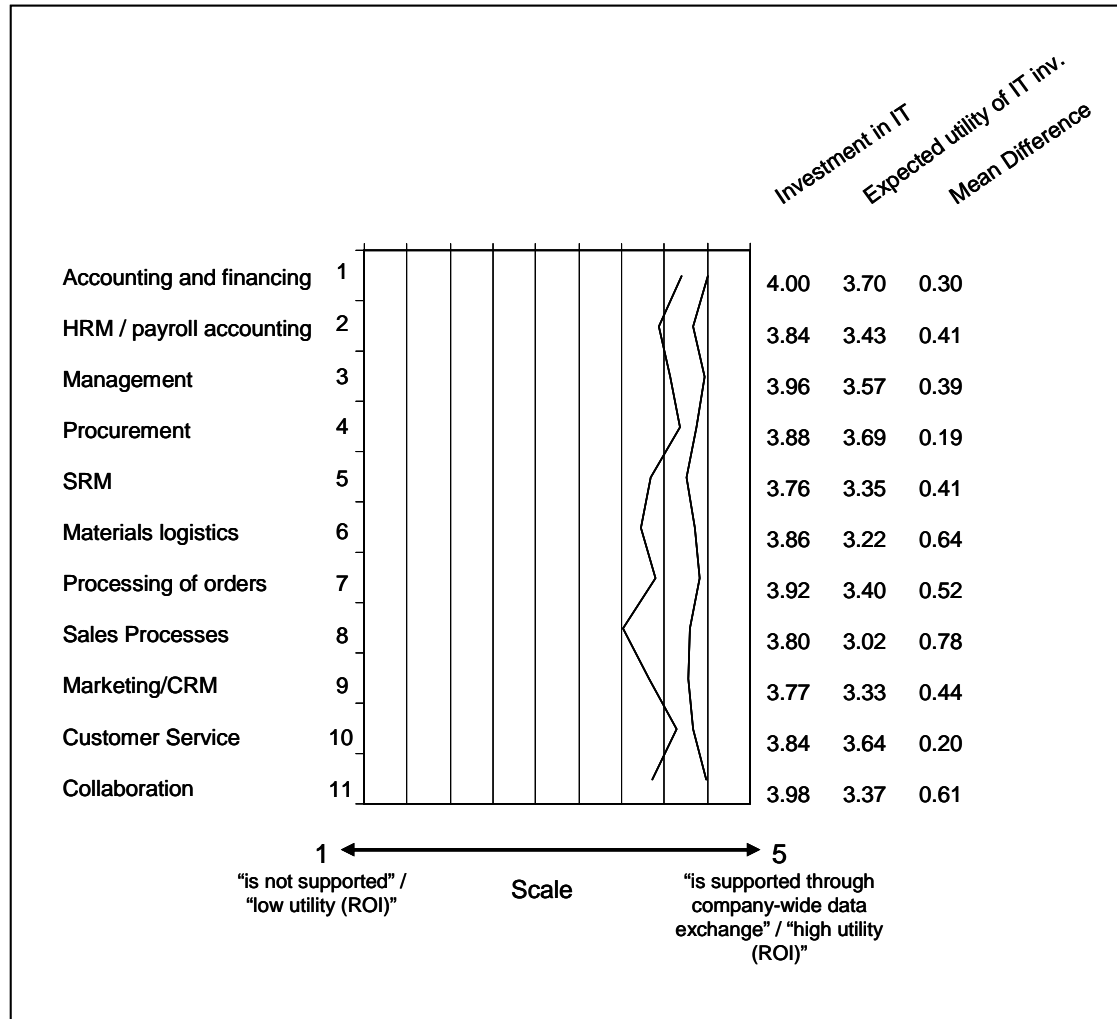


## Research Steps

- **Comparison between the *business areas* that are *already supported* by ERP modules and the *planned investments* (investment in process support and perceived utility)**
- **Step 1: Exploratory Factor Analysis (EFA)**
- **Step 2: Cluster Analysis (followed by k-means analysis)**
- **Step 3: Profiling of clusters (e.g. industry sectors, attitudes towards ICT use)**



# Investment in Process Support and Perceived Utility





## Investment in Process Support and Perceived Utility

- **“Accounting and finance” is the functional area where the highest degree of electronic integration is reached.**
- **Possible explanation:**
  - **Most SMEs use electronic interfaces for the exchange of data with their banks or with government agencies (e.g., DATEV, ELSTER).**
- **In general, the high degree of data exchange is remarkable.**
- **Majority of Swiss SMEs make use of cross-area data exchange with the eleven business software modules.**
- **Possible explanation:**
  - **If companies use an integrated business software system (e.g., Abacus, SAP, or Sage Sesam) the cross-area integration comes with the implementation of the system.**
- **The values for the expected utility of investments in business software modules are lower (left line) than the prior investments (right line).**



## Factor Analysis Results

	Cronbach's $\alpha$ / Eigenvalue/ Factor loading (from EFA*)
<i>Factor 1: Specialized Modules</i>	$\alpha = 0.81$ Eigenvalue = 5.3
Q05: Supplier Relationship Management (SRM)	0.82
Q04: Procurement and procurement processes	0.73
Q06: Materials logistics / merchandise management	0.69
Q10: Customer Service	0.69
Q08: Sales Processes	0.66
Q09: Marketing/Customer Relationship Management (CRM)	0.66
Q11: Collaboration with market partners	0.60
Q07: Processing of orders	0.58
<i>Factor 2: Basic Modules</i>	$\alpha = 0.87$ Eigenvalue = 1.1
Q01: Accounting and finance	0.87
Q02: Human resource mgmt / payroll accounting	0.85
Q03: Management (Reporting, Business Intelligence)	0.69



## Profiling: Characterization of the Company Clusters

	Cluster 1 n=231	Cluster 2 n=165	Cluster 3 n=108	Cluster 4 n=79
<i>Identifying Firm Clusters</i>				
Factor 1: <i>Specialized Modules</i>	0.4678	0.6754	-1.0705	-1.3310
Factor 2: <i>Basic Modules</i>	0.6763	-0.8402	-0.9538	1.0457
<i>Profiling Firm Clusters</i>				
Mean number of full-time employees	84 <sup>a*</sup>	89 <sup>a, b</sup>	66 <sup>c</sup>	82 <sup>a, c, d</sup>
Activities to gain competitive advantage	3.00 <sup>a</sup>	2.92 <sup>a, b</sup>	2.77 <sup>b, c</sup>	2.69 <sup>c, d</sup>
Sales (development over last 3 years)**	3.95 <sup>a</sup>	4.01 <sup>a, b</sup>	3.71 <sup>c</sup>	3.82 <sup>a, b, d</sup>
<i>Current assessment regarding business processes</i>				
Need to be more flexible and more customer-specific	3.18 <sup>a</sup>	3.21 <sup>a, b</sup>	2.83 <sup>c</sup>	2.85 <sup>c, d</sup>
Have been optimized and are not going to change much	2.37 <sup>a</sup>	2.47 <sup>a, b</sup>	2.73 <sup>b, c</sup>	2.42 <sup>b, d</sup>
Need to apply new technologies	3.30 <sup>a</sup>	3.17 <sup>a, b</sup>	2.78 <sup>c</sup>	3.13 <sup>a, b, d</sup>
Competitive advantages with IT could be gained	3.13 <sup>a</sup>	2.99 <sup>a, b</sup>	2.69 <sup>c</sup>	2.57 <sup>c, d</sup>



## Clusters

- **Cluster 1: The IT convinced**
- **Cluster 2: The IT differentiators**
- **Cluster 3: The IT sceptics**
- **Cluster 4: The IT pragmatists**



## Cluster 1: The IT convinced

- Segment 1 is the largest of the four clusters and represents firms that can be described as *IT convinced*.
- Companies in this cluster score positively on both factors (*specialized modules* and *basic modules*) and are most likely to engage in activities that will give them a competitive advantage in the marketplace.
- They see a need to design more flexible business processes that are more customer-specific.
- Of all clusters, this group sees the greatest need to apply new technologies (such as SOA) within their IT landscape.
- They are also the ones most certain to have gained competitive advantages with IT.



## Cluster 2: The IT differentiators

- The firms in segment 2 are striving for *differentiation through IT*.
- They have the highest score of all segments for the factor *specialized modules*.
  - This would suggest that they consider IT investments as a means to differentiate themselves from their competitors.
- Indeed, similar to segment 1, these firms engage in activities to gain a competitive advantage.
- However, these firms are less likely to invest in IT supporting basic business functions.
  - Possible explanation: they have invested substantially in basic software modules in the past and are thus “saturated” in this area.
- Firms in this cluster report the highest growth in sales of all segments.
- They are most sensitive regarding the need to make business processes flexible and more customer-specific.
- These findings contradict Carr’s [2003] statement that “IT does not matter” and support his later statement that it only makes sense to be innovative with IT “if it is extremely difficult for the competitor to copy this innovation” [Kisseloff 2006].





## Cluster 3: The IT sceptics

- The *IT sceptic* firms in segment 3 contain firms with the lowest average number of employees.
- One of their defining characteristics is that they score low on both factors, having the smallest score of all segments on the factor *basic modules*
  - Suggests that these firms do not see much value in investing in IT at all.
- It is perhaps not surprising, that firms in this cluster report flat to low growth in sales.
- Typically, the sceptics believe that their business processes have already been optimized and they are not going to change much in the future.



## Cluster 4: The IT pragmatists

- Finally, segment 4, the smallest of the four clusters, represents firms that appear to agree that investing in *basic modules* makes good business sense, whilst investing in *specialized modules* does not.
- This finding is consistent with the fact that firms in this cluster are the least likely to engage in activities aimed at gaining a competitive advantage.
- Therefore, firms in this group can be described as *IT pragmatists*.
- They do not show any specific attitude towards the flexibility of their business processes or the need to change.
- It is worth mentioning that they are the ones which gained least competitive advantages with IT in their self-assessment.



## Note

- The answers given by companies in cluster 2 and 4 are significantly different in *all questions* regarding future requirements towards business processes.
- This indicates that the different standpoints of *IT differentiators* and *IT pragmatists* have a statistical significance and are thus the most important result of this part of the study.
- While the *differentiators* value the use of IT and identify business opportunities from it, the *IT pragmatists* are on the other side of the spectrum as where they use IT to run their business but not to improve it or to gain competitive advantage from it.



## Distribution of industries in the clusters (Swiss NOGA code)

convinced – differentiators – sceptics – pragmatists

Cluster No.:	1	2	3	4
(D) Manufacturing, industry	38	48	19	11
(E) Power, water utility	18	8	7	6
(F) Construction company	13	10	11	4
(G) Retail, repair of durable goods	50	32	16	10
(H) Hotels and restaurants	14	8	3	4
(I) Transport and telecommunications	21	6	7	3
(J) Banking and insurance	18	14	3	0
(K) Company-related services	25	13	9	10
(L) Public administration	7	7	4	7
(M) Education	6	8	14	11
(N) Health and social services	11	7	8	9
(O) Other services for third parties	10	4	7	4
<b>Total:</b>	<b>231</b>	<b>165</b>	<b>108</b>	<b>79</b>



## Summary and Conclusions 1/2

- Exploratory factor analysis showed two distinctive factors: *specialized* modules and *basic* modules
- These modules incidentally correspond with the *primary* and *secondary* processes from the research framework.
- Interestingly, Porter's distinction of company processes is also a valid means to differentiate attitudes towards IT investment in Swiss SMEs.
- Cluster analysis based on ability to achieve competitive advantages identified four different types of companies similar to earlier studies by McFarlan [1984] who identified a similar typology of companies: (1) turnaround, (2) strategic, (3) factory, and (4) support.
- The clusters demonstrate statistically significant differences regarding their attitude towards specialized modules and basic modules.



## Summary and Conclusions 2/2

- We found some tendencies for typical industry clusters but could not identify a clear relationship between *industries* and clusters.
- The more IT-welcoming clusters 1 and 2 agreed with the statements more strongly that their “processes need to be more flexible and more customer-specific” and that “competitive advantages with IT could be gained”.
- Additionally, the IT convinced were the strongest confirmers of “we need to apply new technologies”.
- The IT sceptics on the other hand believe that “our processes have been optimized and are not going to change much”.
- Not surprisingly, cluster 4, the IT pragmatists, were the ones who reported “least competitive advantage achieved with IT”.



**Thank you for your attention.**

**Petra Schubert and Gianfranco Walsh**  
**University of Koblenz-Landau**  
**Department of Computer Science**

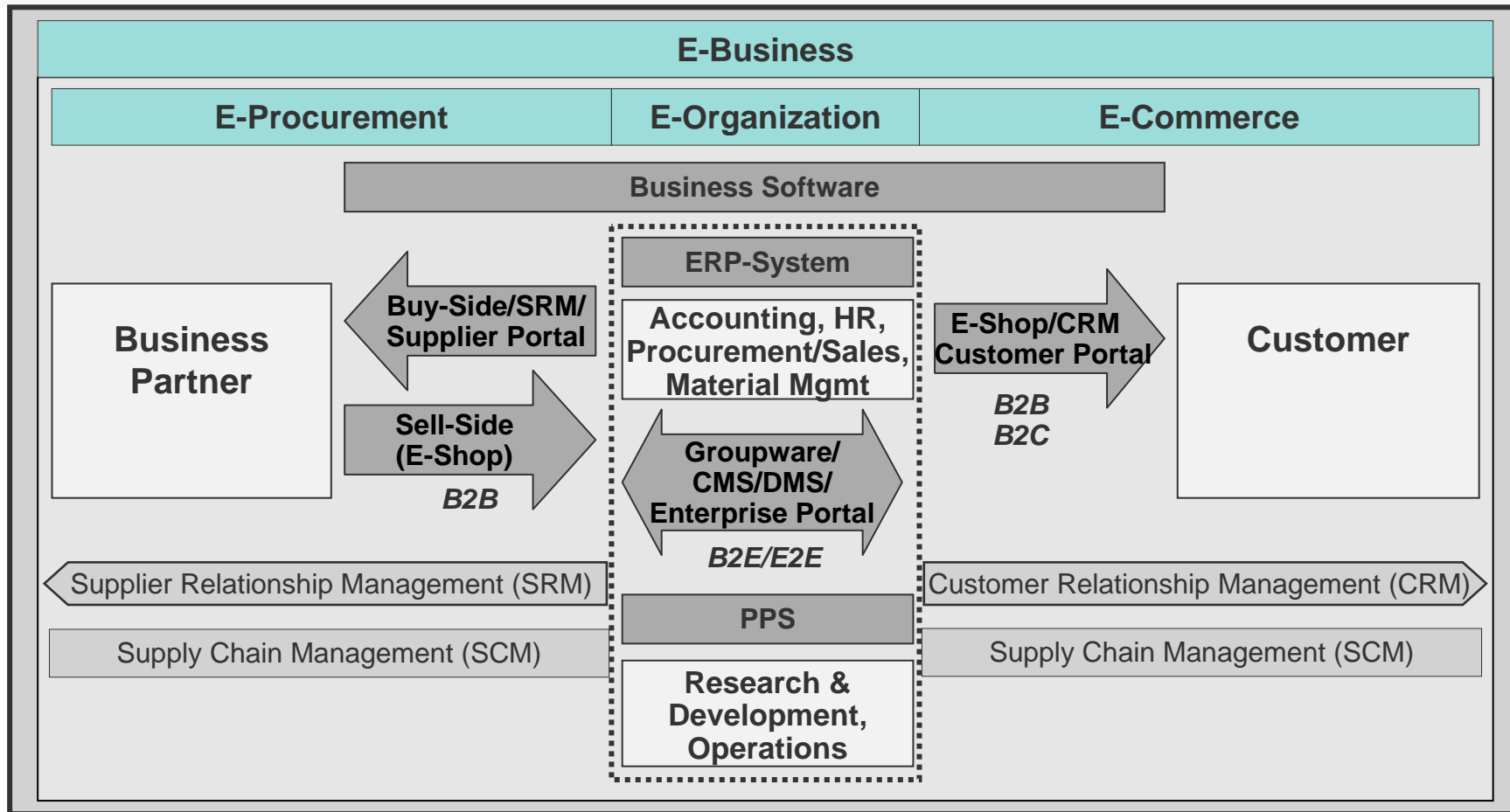


## Weighting factors according to company size and business sector

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**Legend**

E-Business-View	Role/Function	Management	Application
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- B2B – Business-to-Business      ERP – Enterprise Resource Planning      CMS – Content Management System
- B2C – Business-to-Consumer      PPS – Production Planning and Steering      CRM – Customer Relationship Management
- B2E – Business-to-Employee      SCM – Supply Chain Management      DMS – Document Management System
- E2E – Employee-to-Employee      SRM – Supplier Relationship Management



# The Questionnaire