

ICT and Innovation in Small Companies

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Background

“Companies must be able to innovate on a global frontier. They must create and commercialize a stream of new products and processes that shift the technology frontier, progressing as fast as their rivals catch up.” (Porter 2001)

- ★ Innovation important for both large and small organisations and is a significant factor in determining a firm’s success.
- ★ Research suggests small businesses are not innovative.
- ★ This paper focuses on small Swiss businesses (10-49 employees) and examines the extent to which they are innovative in terms of ICT.

Innovation

- ★ We use Roger's (2003) theory of Diffusion of Innovations to examine small businesses and their level of innovation in terms of technology in particular "internal characteristics of organisational structure". This has six sub variables.
 - ★ *Centralization*: level to which organisational leaders have power
 - ★ *Complexity*: relates to knowledge and expertise of staff and how difficult an innovation is to use
 - ★ *Formalization*: is procedures put in place by an organisation
 - ★ *Interconnectedness*: links social networks of staff with the organisation
 - ★ *Organizational slack*: resources available for innovation
 - ★ *Size*: measured by number of staff and budget size.

Why small businesses?

- ★ Small business not simply scaled-down large business
- ★ Theory designed for large organisations often inapplicable to small-business
- ★ Cannot think of small businesses as a homogeneous group. “By their very nature, small firms are different and have special characteristics, operating contexts, objectives and qualities.”
Beaver and Prince (2004)
- ★ Of the research to date, much in this area has failed to understand special problems in conducting small business research, issues and contexts.
- ★ Limited research reported on ICT and small business

ICT skills of staff and management

- ★ Complexity: knowledge and expertise of employees. Where employees have knowledge and expertise more likely to grasp innovation.
- ★ Skills: impacts on level to which a small business can be innovative. Small companies do not have resources, less spent on training also more likely to employ generalist not specialist staff

H1: A high level of ICT skills in staff and management and the involvement of management in ICT have a positive influence on a company's ability for innovation through ICT.

H2: If the level of ICT skills in staff and management and the involvement of management in ICT are high, the company is recognised as innovative by its customers.

Use of ICT to achieve operational targets

- ★ Information important for business planning and innovation for SMEs and to understand how an innovation works

H3: A high degree of access to relevant information and ICT-improved operational business processes has a positive influence on a company's ability for innovation through ICT.

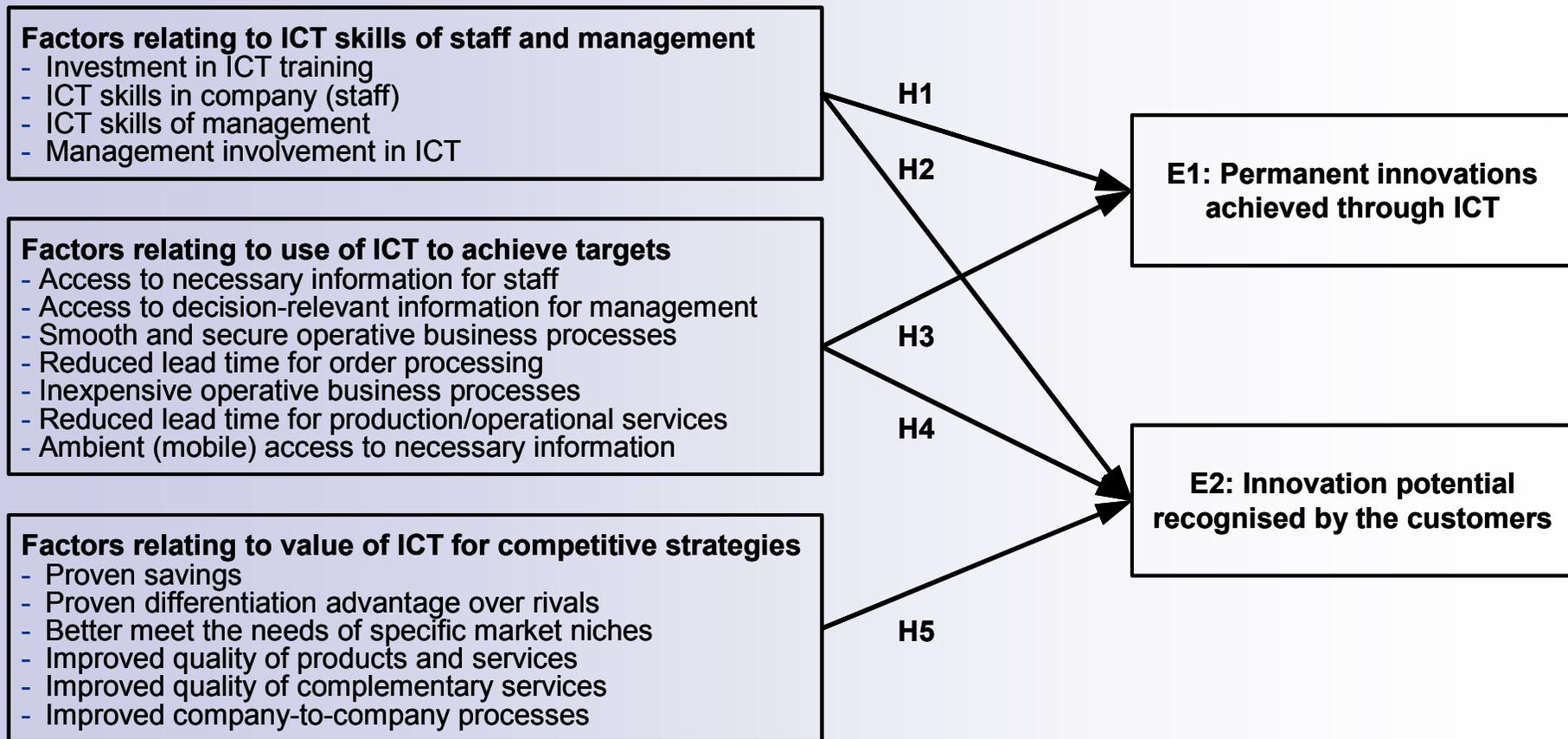
H4: If the degree of access to relevant information is high and operational business processes are improved by ICT the company is perceived as being innovative by its customers.

Value of ICT for developing competitive strategies

- ★ Business strategy important for companies to achieve innovation.
- ★ Need to view competitive advantage from the perspective of resources, particularly information systems resources. Technological resources are amongst the most important factors for innovativeness.

H5: If a company manages to achieve competitive advantages with the use of ICT the company is perceived as being innovative by its customers.

Hypotheses testing



Empirical study

Region:
Switzerland
(German,
French,
Italian)

Target group:
Sectors 2 and 3,
10 to 249 employees
(38'016 companies)

Selection:
Stratified sample
according to
size and sector
(5'796 companies)

Data Collection:
Online
questionnaire and
telephone
interviews
in Aug/Sept 2005

★ Company size:

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

★ Industry sectors:

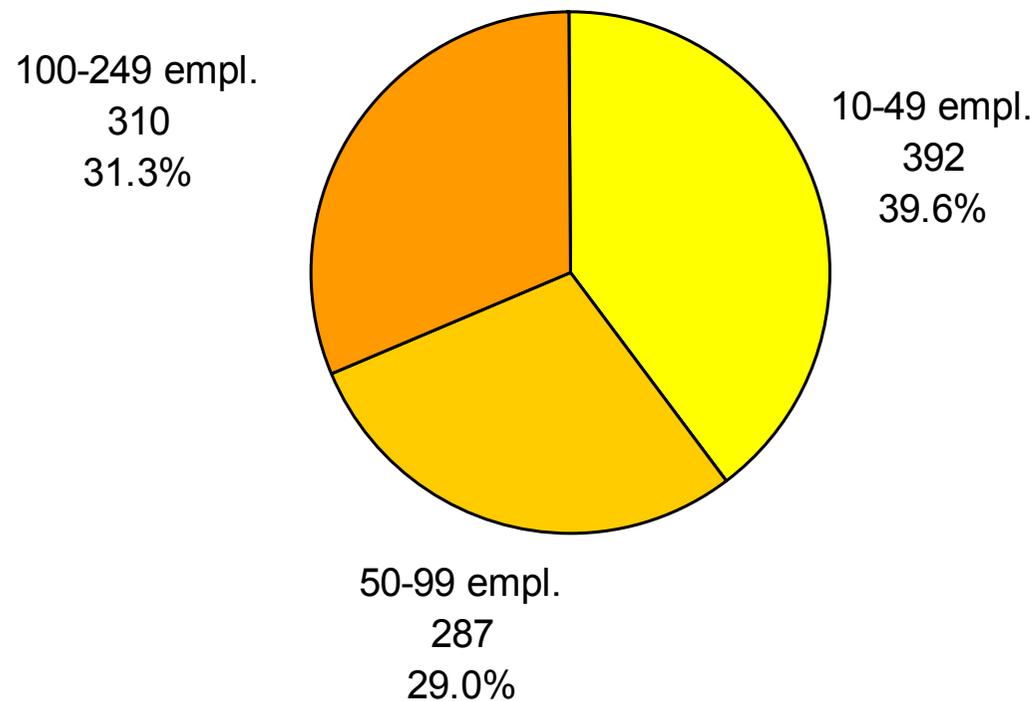
- ★ Two (Industry) and
- ★ Three (Services)
- ★ = 94 % of Swiss companies
with more than 10 employees

Survey and return rate

- ★ Target group: senior management
- ★ Sample size: 5'796
- ★ Total: 1'101 questionnaires
(Gross) return rate: 19 %
- ★ Total usable: 989 questionnaires
(Net) return rate: 17 %

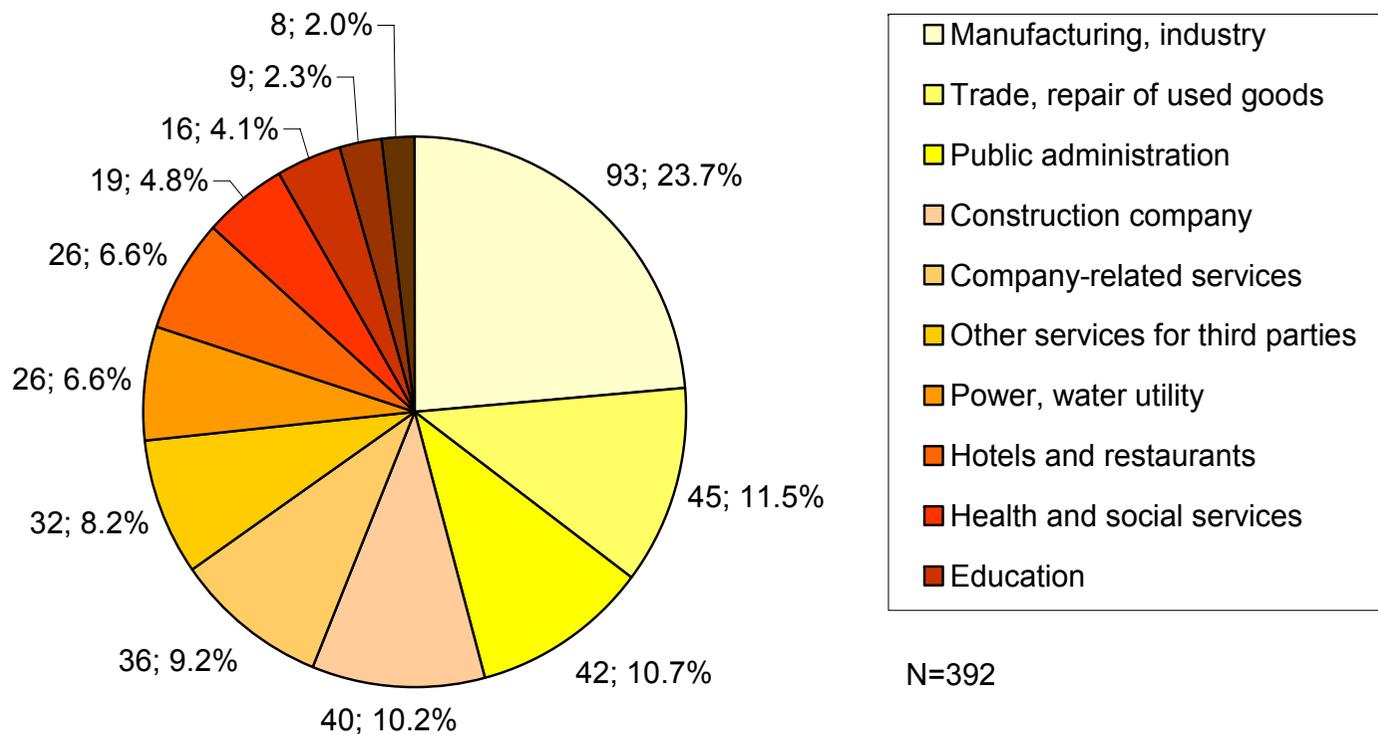
Company size

Responses in terms of company size; N=989

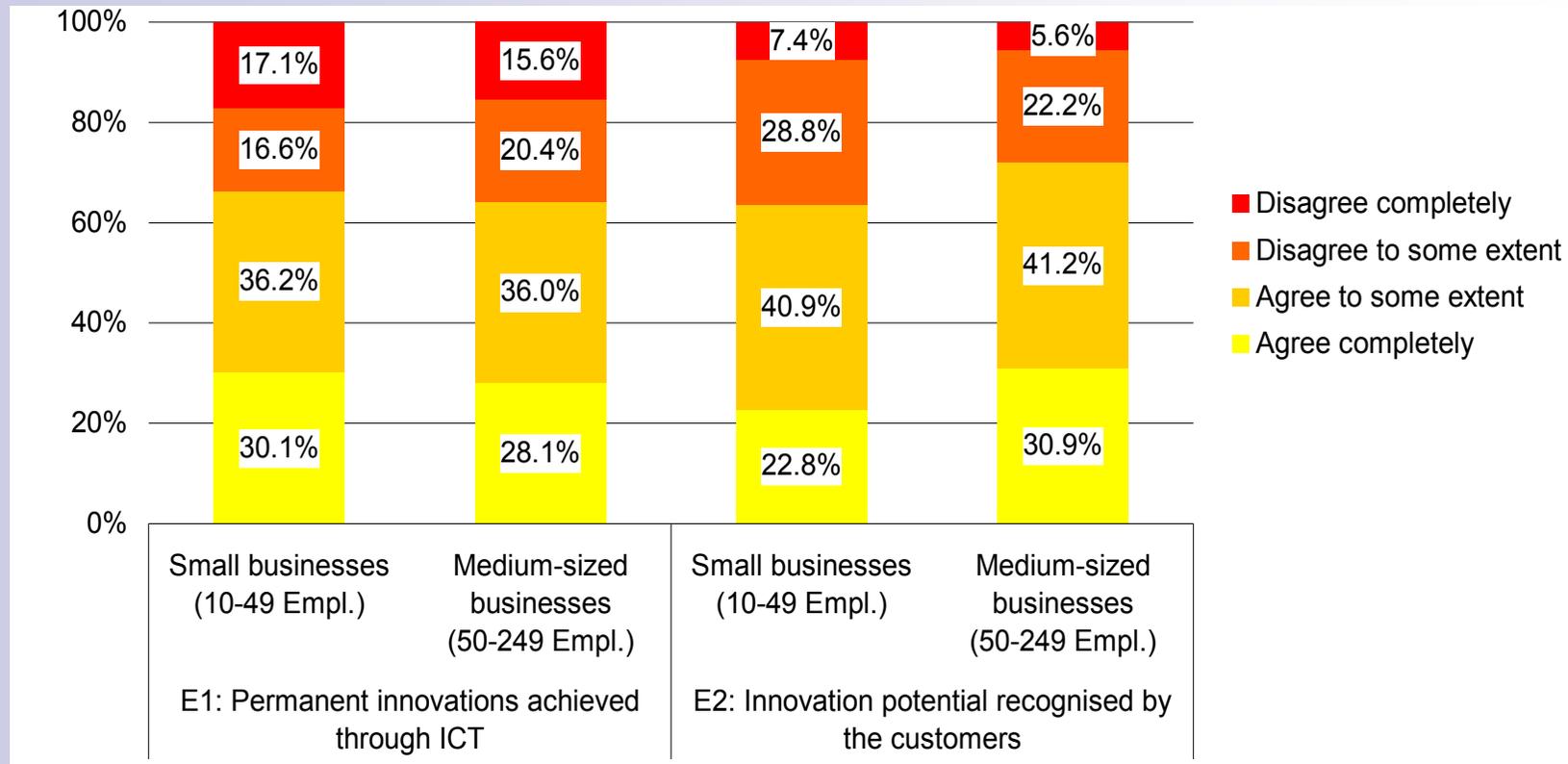


Industries sector (10-49 empl.)

In which industry sector is your organisation mainly active?



Innovation by company size



N = 915
Δ not significant

N = 854
α = 0.024

Results hypotheses 1 and 2

H1: E1: Permanent innovations achieved through ICT

Factors relating to ICT skills of staff and management	N	X ² *)	df **)	α ***)	CC ****)	Association
Investment in ICT training	356	71.344	9	0.0005	0.409	very strong
ICT skills in company (staff)	353	72.941	9	0.0005	0.414	very strong
ICT skills of management	353	42.268	9	0.0005	0.327	strong
Management involvement in ICT	330	53.335	9	0.0005	0.373	strong

H2: E2: Innovation potential recognised by the customers

Factors relating to ICT skills of staff and management	N	X ² *)	df **)	α ***)	CC ****)	Association
Investment in ICT training	336	24.253	9	0.0040	0.259	medium
ICT skills in company (staff)	334	37.221	9	0.0005	0.317	strong
ICT skills of management	336	24.623	9	0.0030	0.261	medium
Management involvement in ICT	318	18.614	9	0.0290	0.235	medium

*) Pearson's Chi-square; n.a. = test not applicable

***) Degrees of freedom

****) Residual probability of error α , asymptotic, 2-sided test; n.s. = not significant

*****) Pearson's contingency coefficient

Results hypotheses 3 and 4

E1: Permanent innovations achieved through ICT						
H3						
Factors relating to the use of ICT to achieve operational targets	N	X ² *)	df **)	α ***)	CC ****)	Association
Access to necessary information for staff	349	6.097	3	n.s.		
Access to decision-relevant information for management	347	7.722	3	n.s.		
Smooth and secure operative business processes	348	4.859	3	n.s.		

E1: Permanent innovations achieved through ICT						
H3						
Factors relating to the use of ICT to achieve operational targets	N	X ² *)	df **)	α ***)	CC ****)	Association
Reduced lead time for order processing	337	9.188	3	0.0270	0.163	medium
Inexpensive operative business processes	344	18.960	3	0.0005	0.229	strong
Reduced lead time for production/operational services	316	18.769	3	0.0005	0.237	strong
Ambient (mobile) access to necessary information	334	9.771	3	0.0210	0.169	medium
Reduced lead time for order processing	324	3.057	3	n.s.		
Inexpensive operative business processes	331	7.783	3	n.s.		
Reduced lead time for production/operational services	304	7.465	3	n.s.		
Ambient (mobile) access to necessary information	321	5.891	3	n.s.		

*) Pearson's Chi-square; n.a. = test not applicable
 **) Degrees of freedom; merging of cells leads to a lower degree of freedom
 ***) Residual probability of error α, asymptotic, 2-sided test; n.s. = not significant
 ****) Pearson's contingency coefficient

Results hypothesis 5

H5	E2: Innovation potential recognised by the customers					
Factors relating to the value of ICT for competitive strategies	N	χ^2 *)	df **)	α ***)	CC ****)	Association
Proven savings	324	20.041	9	0.0180	0.241	medium
Proven differentiation advantage over rivals	313	61.855	9	0.0005	0.406	very strong
Better meet the needs of specific market niches	322	37.211	9	0.0005	0.322	strong
Improved quality of products and services	330	25.651	9	0.0020	0.269	medium
Improved quality of complementary services	322	24.045	9	0.0040	0.264	medium
Improved company-to-company processes	321	32.373	9	0.0005	0.303	strong

*) Pearson's Chi-square; n.a. = test not applicable
 **) Degrees of freedom
 ***) Residual probability of error α , asymptotic, 2-sided test; n.s. = not significant
 ****) Pearson's contingency coefficient

Conclusions (1/2)

- ★ Rogers (2003) argues that companies who have spare resources to invest are more likely to be innovative. Our research did not support that.
- ★ In contrast to the literature we found out that small businesses are innovative.
- ★ There is little difference between small and medium sized businesses in terms of the level to which they use ICT to support innovation.
- ★ The capacity of a company to invest in ICT is not related to how innovative a company is.

Conclusions (2/2)

- ★ Innovative companies ...
 - ★ ...include ICT managers on their business management team.
 - ★ ...have strong ICT skills.
 - ★ ...invest in ICT training.

Thank you for your attention.

Questions?

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