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19th Bled eConference

eValues

Bled, Slovenia, June 5 - 7, 2006

The Importance of ICT: An Empirical Study in Swiss SMEs

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Abstract

The following paper presents results from a longitudinal study about the importance and use of information and communication technology in Swiss small and medium-sized companies. In an empirical survey, 989 questionnaires were collected and analysed (return rate 17 %). The results were weighted according to company size and industry sector and are thus representative for Switzerland. The findings show that Swiss SMEs – in their self assessment – manage to gain (competitive) advantages from the deployment of information and communication technology. ICT is universally used (even) in (small and medium-sized) companies. There is a high degree of inter-organisational ICT use. ICT know-how and awareness are strongly rooted in management. The general conclusion is that IT matters for Swiss SMEs.

Keywords: *Empirical study, SME, ICT use, IT strategy, Switzerland*

1. Introduction

The 19th Bled Conference is dedicated to the topic of eValue. The question of whether we gain “value” from electronic media is intriguing and most people would probably respond with a spontaneous “yes, of course”. Already, we cannot imagine a world without mobile phones, PDAs, and, of course, the Internet, the vast resource of information that we have at our disposal. Whereas the personal question of eValue will

almost always be affirmative in the Western world, we are likely to see a different image when we look at the economic equation in companies. In the specialised press experts dispute the significance information and communication technology (ICT) has so far achieved within companies. Within this debate there are often two diametrically opposed opinions. One fraction, following Porter and Millar's theories from 20 years ago, believes in the particular potential of ICT to attain a competitive advantage [Porter/Millar 1985; Porter 2001]. The other fraction has the view that the diffusion process in ICT is, in the meantime, so developed that it is already a "commodity" in a company (that is a basic utility available to all) and that it has therefore lost its effectiveness as a strategic instrument of differentiation. The discussion gained momentum in 2003 when Carr published an HBR article entitled "IT doesn't matter" [Carr 2003] and later a more extensive book on the topic with a slightly adjusted title "Does IT matter?" [Carr 2004a]. The article was followed by a whole flood of counterarguments that were collected on his personal Web site [Carr 2004b]. The bottom line of the discussion is that there are many opinions and little solid mechanisms to back them up. This paper contributes to the discussion on eValues in that it examines the role that ICT plays in SMEs today with the aim to discover whether there are different types of SMEs which can be differentiated from each other in terms of their use of ICT.

For this purpose we conducted an empirical study in Switzerland in the year 2005. The focus was on small and medium-sized companies as well as small and medium-sized organisations (e.g. hospitals, public administration, schools). The sample resulted from various considerations of the study partners. Firstly, the chosen size range (10 to 249 employees) in the business sectors two and three (industry and services) represents 94 % of Swiss companies which have ten or more employees and constitute therefore a large proportion of Swiss business. Secondly, other empirical studies [e.g. KPMG 2005; silicon.de 2003; Impulse 2005; IBM 2005] are often concerned with large companies which have different conditions and structures from small and medium-sized companies. Different conditions and structures are also found in "very small companies" with 0-10 employees. Both of these "marginal groups"; large companies and very small companies were therefore excluded from this study.

2. Objectives of the Study

Central to our discussion of the significance of ICT are the results of an empirical study [Schubert/Leimstoll 2006]. From the basis of theoretical considerations, hypotheses were formulated and tested, and the evidence of dependency between company size, sales volume, business environment, establishment of ICT in the organisation, and the use and relevance of ICT were analysed. The investigation was carried out in 2005 and represents the first step in a longitudinal study on the topic of the "Relevance of ICT Investments for Swiss SMEs". In this first step, it was the aim to find out whether SMEs intend to follow strategic goals with the use of ICT and accordingly achieve competitive advantage.

The following questions were raised and analysed:

- For which kind of SMEs does ICT have a strategic significance, for which kind only an operative significance?
- What is the priority for investments: Costs or benefits?
- In which area of an SME is ICT particularly important? (functions/range)
- Which aspects of ICT are particularly important for SMEs?
- How deeply has ICT penetrated SMEs? How established is ICT in company management? Which level of expertise is available? What is the status of acceptance of employees?

- How high are ICT budgets for maintenance and upgrading of hardware and software? Which developments are expected?

The following chapter provides a brief overview of the objectives of the study and the terms used. The research design is presented including the method of investigation and the characterisation of the control sample. Selected results of the descriptive analysis are then presented and the hypotheses tests are discussed. The main section contains the analytical findings. The paper ends with a summary and an outlook to future research.

3. Background and Terms Used

We take the term information and communication technology (ICT) to describe the entirety of hardware, software, networks, as well as the personnel to whom the provision and upkeep of the system is entrusted. In this way, the use of technology as well as the organisational and strategic aspects of application and use of the information systems are considered.

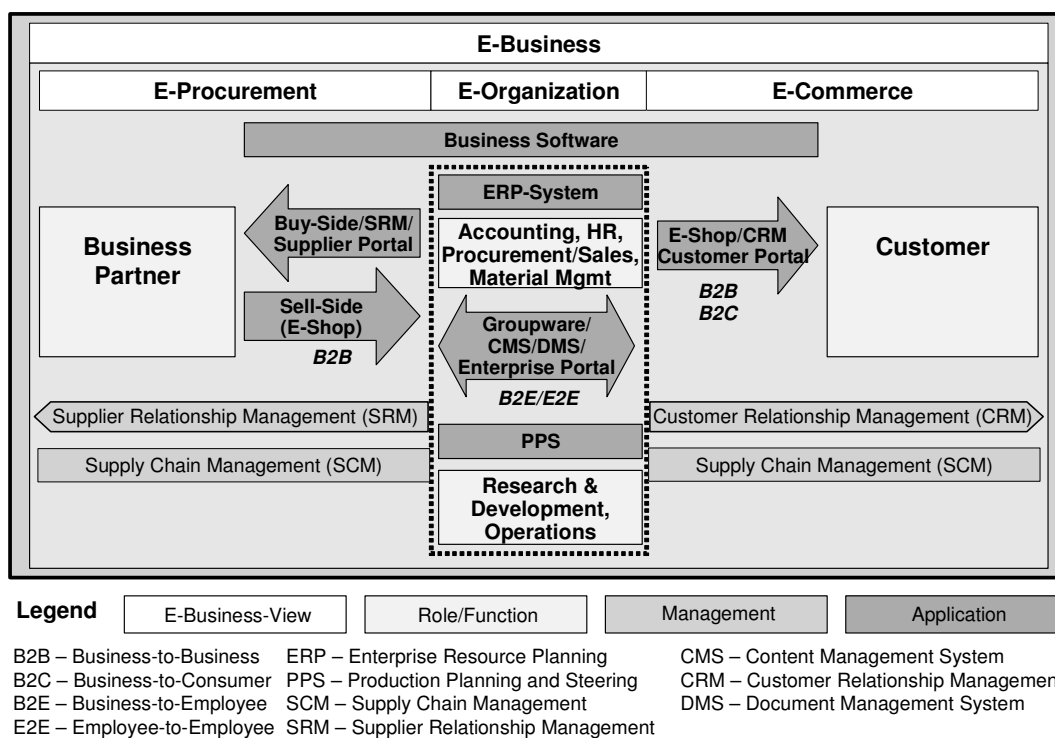


Figure 1: Overview of terms used in the context of business software [Wölfle/Schubert 2005, p. 18]

Figure 1 provides an overview of the terms with mention of the management concepts, applications, and involved parties which formed the basis at the conception of the questionnaire. It is a general framework to describe the systematic of business software and corresponding management concepts. Within the figure is a view of a real/specific company in the centre (sketched through the dotted line). The company has an ERP system at its disposal with which the activities in various departments can be integrated. At the same time, the ERP system is almost always the connection point for the integration of external applications. The specialist terms contained in the figure were not used explicitly in the questionnaire but were put in place for the evaluation of the results.

A detailed discussion of the overview of terms in the context of business software can be found in [Wölfle/Schubert 2005] in German and in [Sigrist/Schubert 2004] in English.

4. Research Design

4.1 Method of Investigation

The present study concentrates on the analysis of companies with 10 to 249 employees in business sectors two (industry) and three (services). It covers therein a universal set of 38'016 companies. The Federal Office for Statistics drew a stratified and weighted control sample of 5'796 companies from this universal set, based on sector and company size.

The establishment of contact with the companies took place in several phases and with various measures. The basis of the survey comprised of a standardised online questionnaire in German and French with predominantly closed questions. The questionnaire was developed in cooperation with business partners and trialled several times in pre-test interviews. It was aimed at members of senior management in small and medium-sized Swiss companies and other organisations.

Because of extensive internet access in Swiss SMEs a print version was not sent by post in the first stage. However, a print version of the questionnaire was available on request. The companies were made aware of the survey by post. After a period of time, a reminder was sent. Following a further time period, companies who had not answered were contacted by telephone. Those companies who were prepared to be interviewed were directly interviewed there and then. The interviews followed the original questionnaire.

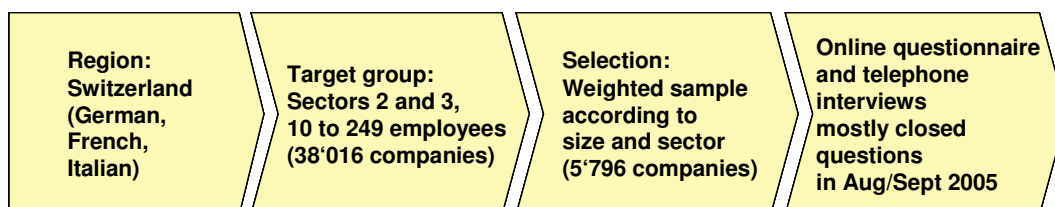


Figure 2: Research Steps

Altogether, 1'101 companies participated in the study either by completing the questionnaire (638) or by being interviewed (463). This corresponds to a return rate of 19 %. After the discarding of the questionnaires which could not be analysed and classified, there were 989 questionnaires to evaluate. This corresponds to a return rate of 17.1 %. Not every company answered every question; this means the given number of valid datasets (N) in the graphics and tables is sometimes smaller.

A comparison of the distribution of those companies which answered with the universal set shows that the companies with 50 to 100 employees are very under-proportionally represented. The distribution according to sector, however, shows a better correspondence with the universal set. Public administration, power and water supply and processing industries are exceptions. In order to ensure that the results were representative in terms of sector and size distribution, the data was weighted according to company size and sector [Kromrey 2002, p. 281]. The weighting causes the smaller companies (10 to 49 employees) to increase in importance. As an effect, the weighted results differ from the

gross results wherever the answers of this particular group diverge from the other two groups.

4.2 Characterisation of the Control Sample

In order to convey an impression of the control sample, the next section describes some fundamental characteristics of the respondents and the companies. In order to portray the control sample unchanged, the results in this chapter are not weighted.

Most of the respondents are members of senior management. 30 % of the questionnaires were answered by CEOs, 35 % by CIOs, and 24 % by other executives in commercial and technical areas. Only 11 % of the respondents have other functions in the company. In smaller companies with 10 to 49 employees, the majority of the respondents were CEOs (42 %). In larger companies with 100 to 249 employees CIOs prevail (53 %). The differences are highly significant. In companies with 50 to 99 employees CEOs and CIOs are evenly represented.

The distribution of companies according to their size shows a balanced picture. The company size was measured from the number of employees, by which the full-time equivalent was calculated. The majority of the businesses in the control sample (39.6 %) have between 10 and 49 employees. 29.0 % of the companies have between 50-99 employees, 31.3 % between 100 and 249 employees (Figure 3).

Responses in terms of company size; N=989

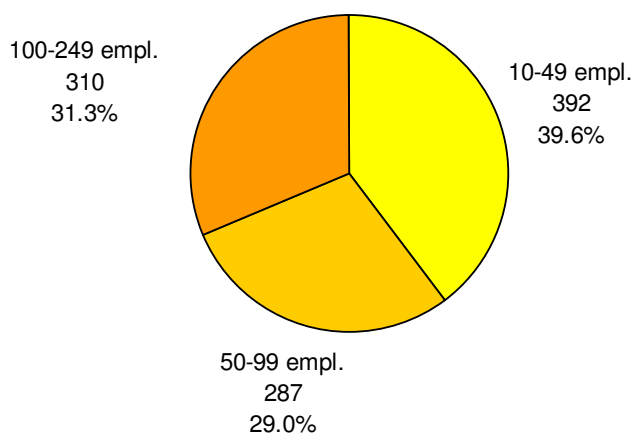


Figure 3: Companies in the sample according to the number of employees (full-time equivalent)

Companies from business sectors 2 (industry) and 3 (service) are represented in the control sample; almost all business fields. The largest proportion is taken up by *Manufacturing and industry* (30.4 %), followed by *Trade and repair of used goods* (10.3 %) as well as *Public Administration* (10.0 %) (Figure 4).

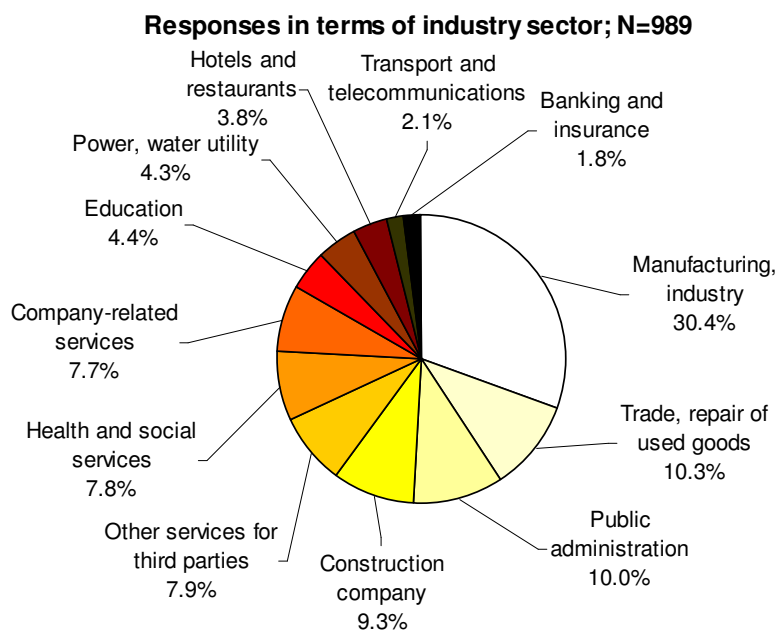


Figure 4: Companies in the sample according to industry sector

The distribution according to size and sector in the control sample does not correspond to the universal set, in which the small companies would comprise a larger proportion. The results of the descriptive analysis are based, therefore, on data which is weighted according to the company size and the sector as explained above. In this way, representative conclusions about SMEs in Switzerland are presented.

5. Descriptive Analysis

The following three sections highlight the *use* and *organisation* of ICT. The “*Use of ICT*” (0) portrays the effects that can be achieved by the use of ICT. In the section “*ICT and Competitive Strategy*” (0) we investigated as to whether Swiss SMEs can achieve competitive advantage with the help of ICT. To this end, a comparison of competitive strategies and support of these strategies with ICT was drawn.

5.1 ICT Deployment

The objectives which can be principally pursued with ICT are multifaceted and can hardly be investigated in their entirety. In Figure 5, some selected objectives are shown which refer to operative business processes, processing times and access to information.

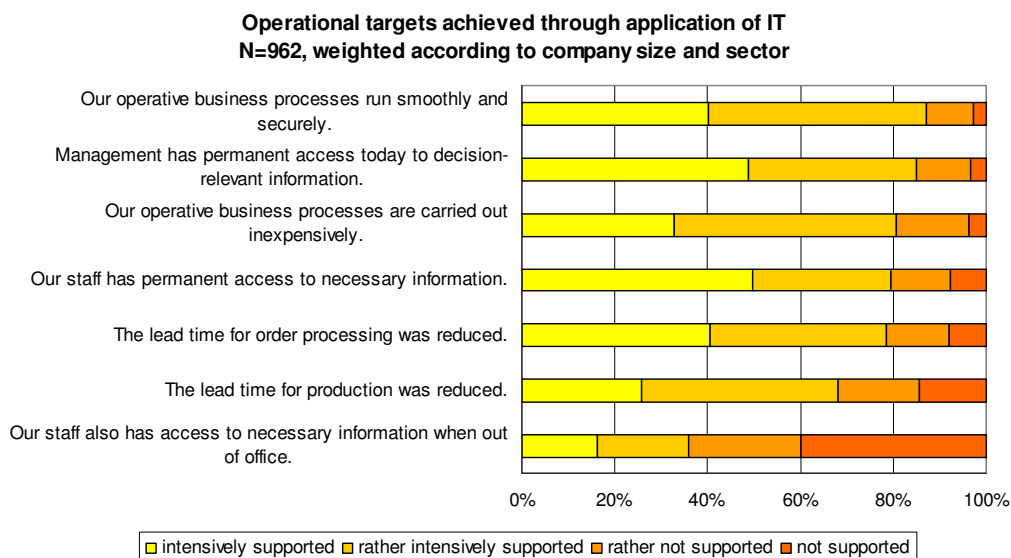


Figure 5: Operational targets achieved through application of IT

The results show that operative business processes are effectively supported with the help of ICT. Achieving the objective of *smoothly operating business processes* found more agreement (87.1 %) than *low cost operations* (80.1 %). In most of the companies, *processing times* are reduced with the use of ICT. The effects achieved in *order processing* (78.7 % agreement) outweigh the effects in *production* (68.0 %). The differences between the company sizes are minimal.

ICT solutions are now so developed that the majority of the SMEs state that *employees have access to required information* at any time (79.4 %). The high agreement regarding *management access to decision-relevant information* is certainly surprising. Altogether 85 % of SMEs agree that they have access at any time to decision-relevant information, e.g. key performance indicators (48.7 % fully agree, 36.3 % tend to agree). The differences between larger and smaller companies in this respect are rather slight.

Altogether, the questioned companies were, to a high percentage, in agreement that the mentioned objectives can be reached through the use of ICT. It can then be concluded that SMEs are quite capable of supporting their business processes successfully and in a targeted manner through ICT.

In order to find out in which company fields and processes ICT has been widespread up to now, ten company fields were decided upon. They are essentially oriented on Porter's Value Chain, to which an additional structuring of primary and secondary activities was carried out (Porter 1985). *Primary activities* according to Porter are Inbound Logistics, Operations (Production), Marketing and Sales, Outbound Logistics, and Customer Services. *Secondary activities* include Procurement, Technological Development, Human Resource Management, and Company Infrastructure.

The company areas listed in Figure 6 are likewise based on this structure. Finance and accounting, Human Resources Management, Management, as well as Internal Services can be counted as secondary activities in Porter's sense [Porter 1985]. Procurement and Purchasing, Product Development, Material and merchandise management, Production, Marketing and distribution as well as Customer service belong to the primary value activities.

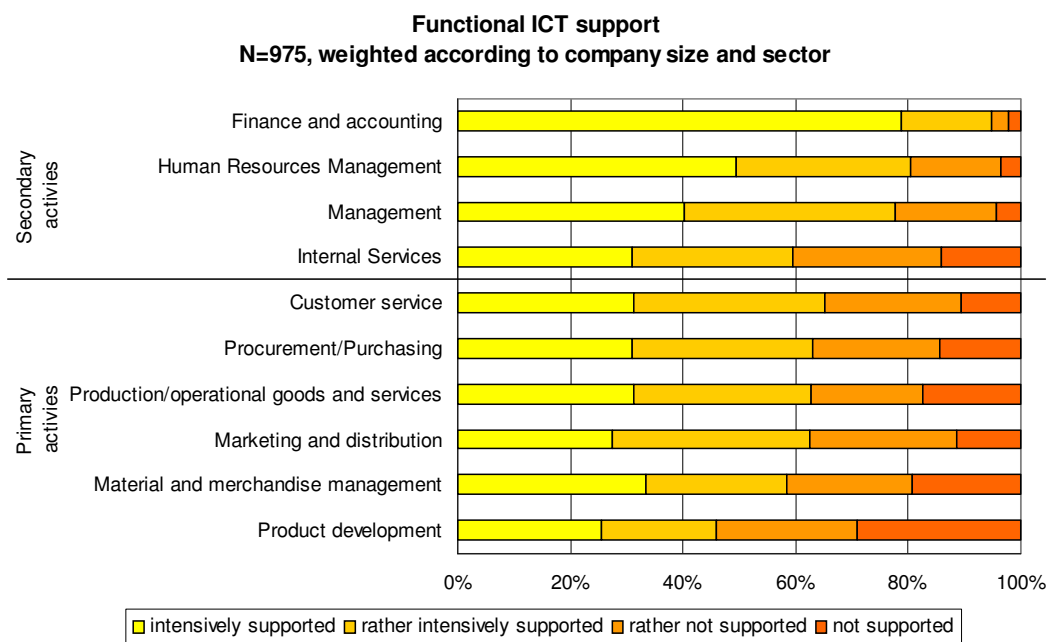


Figure 6: Areas supported with ICT

The results in Figure 6 show that the secondary activities, with the exception of Internal Services, are more strongly supported by ICT than the primary activities. This can be explained in that the processed transactions in the secondary activities are as a rule more strongly structured and they therefore constitute the traditional area of ICT use.

The most intensive use of ICT is in the classical sectors of *finance and accounting* (almost all responses: 94.9 % of the SMEs support this sector intensively or rather intensively, companies with 100-249 employees reach 98.4 % here), followed by *Human Resource Management* (80.5 %) and *Management Information Systems* (77.7 %). All these activities can be counted among the secondary activities.

This result confirms the results of a previous study [Dettling et al. 2004]. In the question about the future use (“foreseen intensity of use two years from now”) the modules Finance, Human Resources, Controlling, and Management Information Systems were mentioned most often. The frequency, however, did not achieve the value of the current study.

Out of the primary activities, Customer Service is the most strongly supported by ICT (65.3 %) (Figure 6). It is followed by more or less identical results by Marketing and Distribution (62.8 %), Procurement and Purchasing (63.0 %) as well as Production (62.8 %). In the order of choices the categories of “rather not supported” and “not supported” are additionally taken into consideration. The grading of Internal Services (59.6 %) as well as Material and Merchandise Management (58.5 %) is also rather low. The area of Product Development is least supported by ICT, an area where, as a rule, less structured or unstructured activities and processes prevail.

5.2 ICT and Competitive Strategy

The decisive success factor in competition is, for the questioned SMEs, the *quality of products and services* (Figure 7). 63.4 % of the companies fully agree with this statement, 29.9 % rather agree (altogether 93.3 % agreement). The *quality of complementary services* has an agreement rate of 87.8 % (51.3 % fully agree, 36.5 % rather agree). Also

at a high level (86.3 %) is the concentration on the *needs of niche markets*. *Unique product features* play an important role in competition according to three quarters of the SMEs.

With an agreement rate of 58.7 %, the arrangement of *inter-company coordination and transaction processes* mentioned as a strategy for creating competitive advantage scores second place. Both small and medium-sized companies have recognised the potential of inter-company processes to improve competitiveness in their field and actively use it to differentiate themselves from others. In this field, ICT is particularly relevant between business partners.

Only 34.3 % of the SMEs state that they would stand out from the competition because they are *low cost suppliers*. This is consistent with the image of Switzerland as a production location for expensive and high quality products. Because of the high numbers of positive responses which occurred in other statements, it can be concluded that hardly any companies pursue a strategy based on mere price leadership.

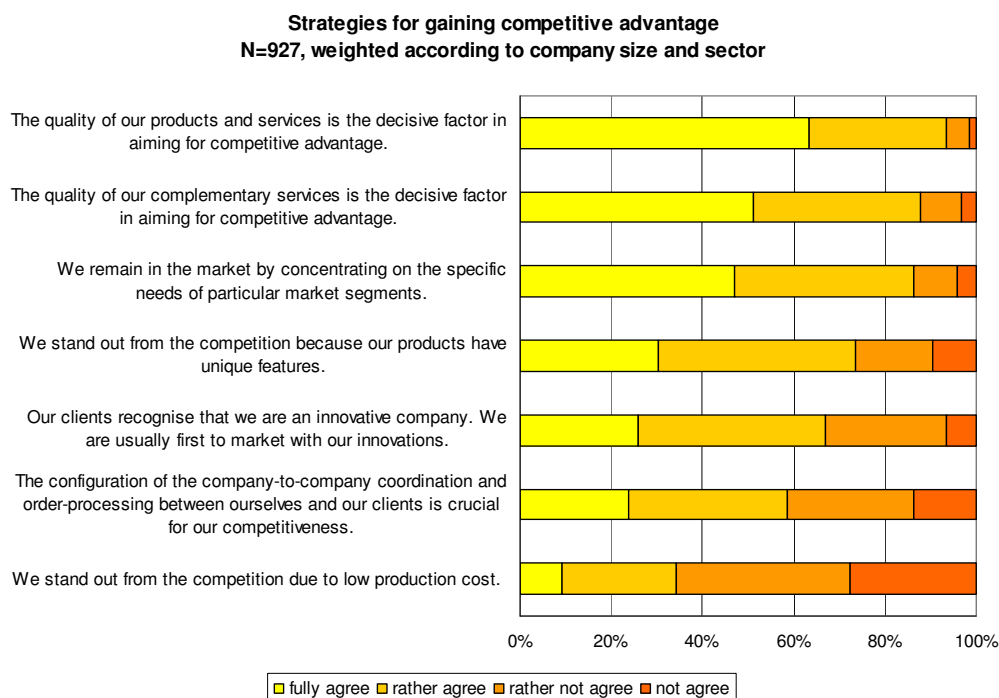


Figure 7: Strategies for gaining competitive advantage

The high level of agreement of the statements in total makes it clear that most of the companies follow several strategies in order to achieve competitive advantage. Quality and particular features of products and services are most often mentioned.

A comparison of the Swiss SMEs' competitive strategies (Figure 7) and the ICT-achieved effects of these strategies allow us to recognise a certain structure (Figure 8). In the attribute combination of *strategy* and *ICT support*, the following strategies receive the highest valuation (order corresponds to the characteristic/attribute combination valuation):

- Quality leadership in products (4)
- Quality leadership in services (5)

- Niche strategies (3)

These strategies are highly significant in the achievement of competitive advantage. Simultaneously, ICT use allows for the implementation of the strategies. It follows that these strategies bear a high strategic potential of ICT in SMEs.

A second group of strategies has a rather lesser significance in competition and is also, on the whole, supported by ICT to a lesser degree (order corresponds to the valuation of attribute/characteristic combination):

- Implementation of innovation (7)
- Support of inter-company processes (6)
- Differentiation advantages (2)

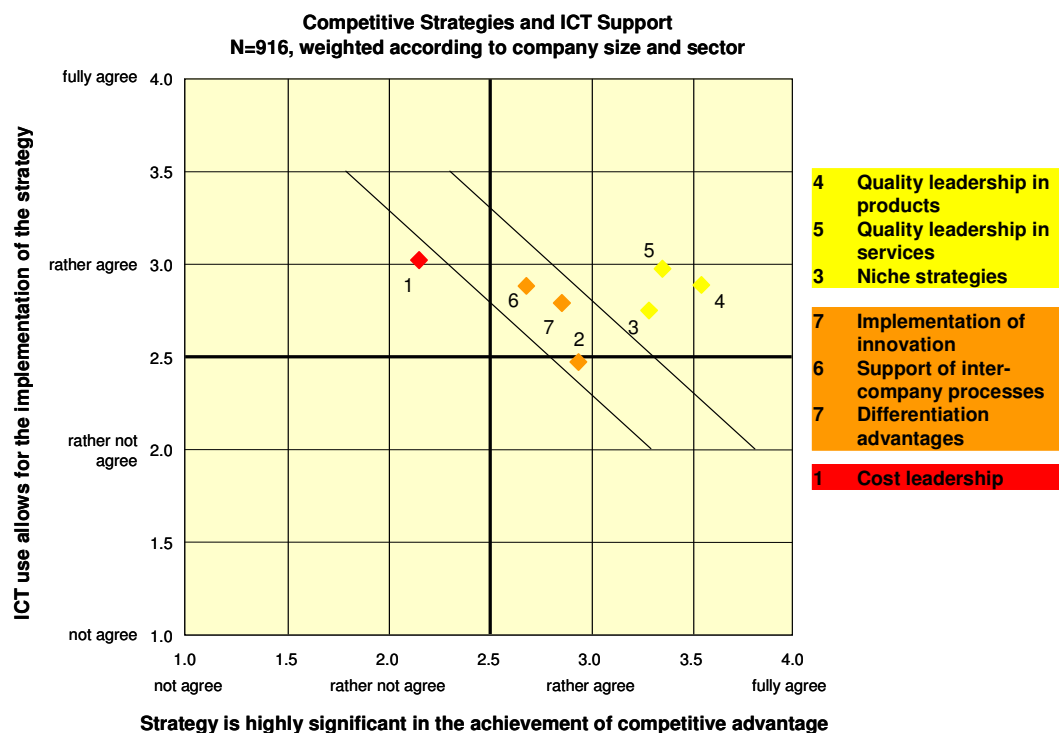


Figure 8: Competitive Strategies and ICT Support

Figure 8 draws a comparison between the strategic alignment and the possibility to support the strategy using ICT. The “perfect world” would be represented by a diagonal drawn from the lower left to the upper right of the figure where (in the assessment of our respondents) the importance of a strategy and the possibility to support this very strategy coincide. In the figure, we identify three different areas in respect to this diagonal. Area 1, “cost leadership” is above the diagonal and thus “over-equipped”. Area 2, comprising “differentiation advantages”, “support of inter-company processes”, and “implementation of innovation” is close to the diagonal (well equipped). Area 3, with the most important strategies “niche strategies”, “quality leadership in services”, and “quality leadership in products” falls below the diagonal and bears room for improvement.

The cost advantages which are to a large extent achieved by ICT use, play a rather subordinate role in the achievement of competitive advantage. Although ICT constitutes an important instrument for achieving cost advantages, its use cannot, to that effect, be

described as strategic. Cost saving is, therefore, better regarded as an operative potential of ICT.

ICT is becoming an operative as well as a strategic significance in Swiss SMEs. The strategic potential lies primarily in the improvement of products and service quality as well as the support of niche strategies. The operative potential lies primarily in cost reduction. As for the use of ICT to achieve innovation, to support inter-company processes, and to create distinctive advantage, it is impossible to generalise. Only the (particular) orientation of a specific company can determine here whether the operative or strategic significance predominates.

Of all things, the strategies that are stated to be most important for Swiss SMEs are obviously the ones that are most difficult to support by ICT. This third area (below the diagonal) represents an interesting potential for software vendors where future efforts for the improvement of business software could be aligned.

6. Discussion of Analytical Findings

Due to the large number of responses (989) almost all test values are significant. This means that the probability of error is quite low for the results of our hypotheses tests. Although significance is high, the contingency coefficient is in many cases only low to middle. The following figures show the correlation between different areas of questions in the sample. The arrows show the dependency relations. The dotted or solid line indicates the intensity of the association.

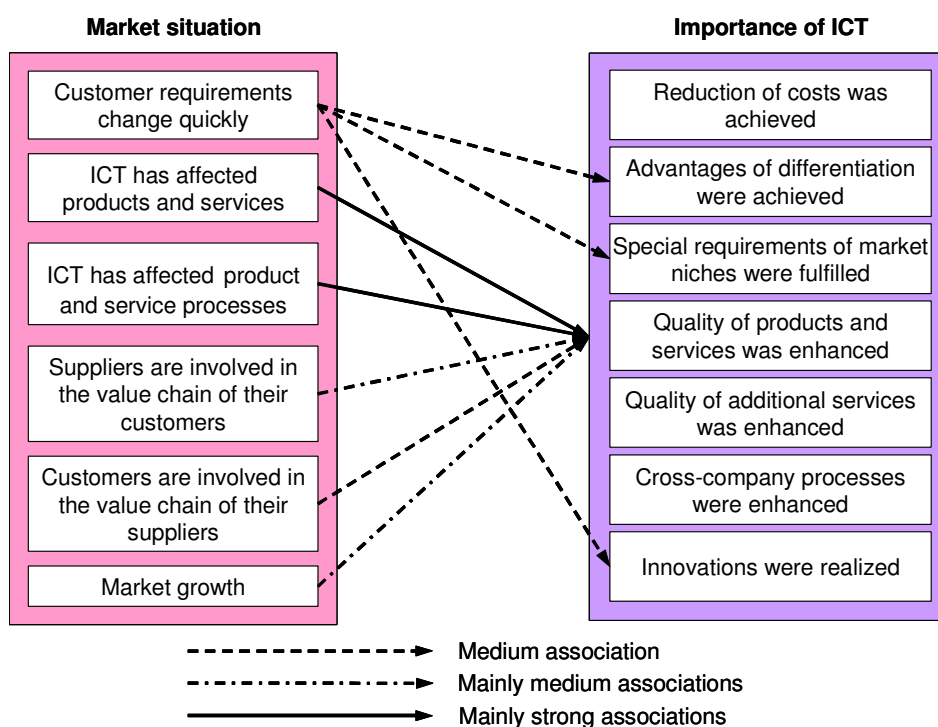


Figure 9: Correlations between market situation and importance of ICT

In a first step, questions regarding *product and market situation* were taken as the exogenous factors in order to examine whether they have an influence on the *importance of ICT* in a company. The underlying hypotheses displayed in Figure 9 were examined.

The formulated hypotheses make categorical data available shown in contingency tables [Steinborn 1993]. Pearson's chi-square test was used for the statistical analysis of the contingency tables [cf. Backhaus 1996; Sachs 1992]. It allows qualitative conclusions on the dependency between two attributes (independency test) as well as the identification of respective levels of significance. Table 1 gives an exemplary overview of such a contingency table.

Table 1: Exemplary contingency table for market situation and importance of ICT

Criterion 1	Criterion 2	X ² *)	df **)	α ***)	CC ****)	Association
Customer requirements reg. products & services change quickly	Reduction of costs was achieved	15.519	9	0.01	0.130	weak
	Advantages of differentiation were achieved	40.134	9	0.0005	0.213	medium
	Special requirements of market niches were fulfilled	52.471	9	0.0005	0.239	medium
	Quality of products and services was enhanced	36.382	9	0.0005	0.196	weak
	Quality of additional services was enhanced	32.367	9	0.0005	0.187	weak
	Cross-company processes were enhanced	32.438	9	0.0005	0.188	weak
ICT has affected products & services	Innovations were realized	41.074	9	0.0005	0.211	medium
	Reduction of costs was achieved	66.192	9	0.0005	0.260	medium
	Advantages of differentiation were achieved	86.875	9	0.0005	0.305	strong
	Special requirements of market niches were fulfilled	75.580	9	0.0005	0.282	medium
	Quality of products and services was enhanced	130.213	9	0.0005	0.352	strong
	Quality of additional services was enhanced	100.545	9	0.0005	0.318	strong
Production processes are characterised by the application of ICT	Cross-company processes were enhanced	98.670	9	0.0005	0.316	strong
	Innovations were realized	90.527	9	0.0005	0.303	strong
	Reduction of costs was achieved	80.604	9	0.0005	0.285	medium
	Advantages of differentiation were achieved	96.988	9	0.0005	0.320	strong
	Special requirements of market niches were fulfilled	110.513	9	0.0005	0.335	strong
	Quality of products and services was enhanced	173.613	9	0.0005	0.399	strong
ICT	Quality of additional services was enhanced	136.566	9	0.0005	0.364	strong
	Cross-company processes were enhanced	111.971	9	0.0005	0.335	strong
	Innovations were realized	97.028	9	0.0005	0.314	strong

*) Pearson's Chi-square; n.a. = test not applicable
 **) Degrees of freedom
 ***) Residual probability of error α; results are assumed to be significant, if α ? 0.01 (1 %); n.s. = not sign.
 ****) Pearson's contingency coefficient

As we can see from the table, almost all relations show a medium to strong relationship between the factors. The *importance of ICT* is higher in companies where *customer requirements* change quickly and where ICT has become an *integral part of products & services* or the *production processes* are characterised by ICT. Furthermore, ICT is more important for SMEs in which either *suppliers or customers are closely involved* in the value adding process. The market growth in the target markets also affects the importance of ICT. In companies focusing markets with high growth rates the importance of ICT is more important to support strategies than in other companies.

In a second step, we looked at the influences of *company size* and *development of sales volume* on the *importance of ICT* (Figure 10).

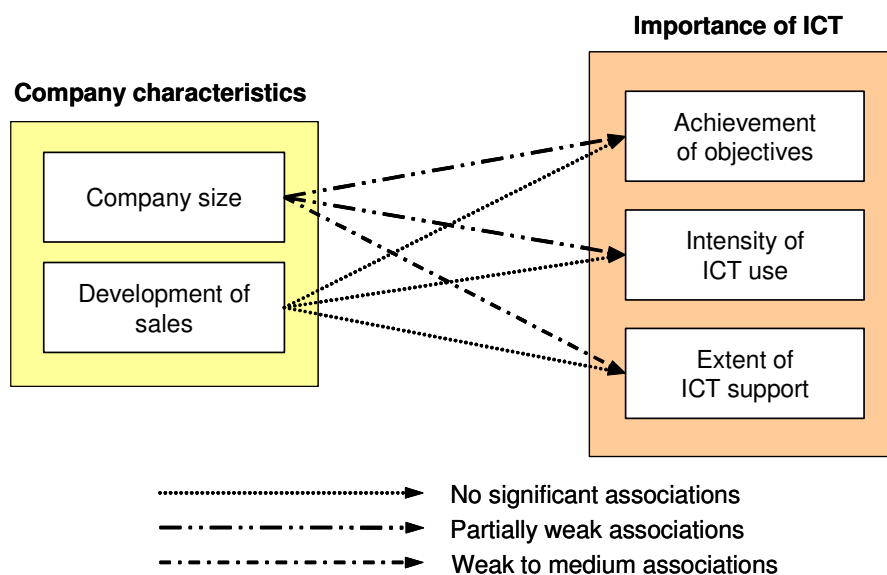


Figure 10: Correlations regarding the importance of ICT

We expected company size to have a major impact on the use of ICT. This assumption, however, was not as clearly confirmed as we anticipated. There is a weak correlation between *company size* and *achievement of objectives* (correlation coefficient: 0.141) and another weak correlation regarding *staff access to necessary information* when out of office (CC: 0.141). All other values are not significant.

The results for the relationship between *company size* and *intensity of use* in different functional areas were also disappointing. *Internal services* (CC: 0.192), *procurement/purchasing* (CC: 1.161), *material and merchandise management* (CC: 0.183) only showed weak correlations.

In this section we also asked for the *extent of ICT support* in the functional areas. The values were measured with a decreasing range from *company-to-company support*, *cross-company support*, *limited area support*, to *no support* at all. The *range of ICT support* is less dependent on *company size* than we expected. The two areas *Accounting* (CC: 0.205) and *Management* (CC: 0.244) showed a medium correlation. *Human Resources Management* (CC: 0.188), *Internal Services* (CC: 0.190), *Procurement/Purchasing* (CC: 0.176), *Material and merchandise management* (CC: 0.198), *Production/operational goods and services* (CC: 0.172), and *Customer service* (CC: 0.148) are characterised by weak correlations.

In the second part of Figure 10 we intended to confirm a dependency between the *development of sales volume* and the *importance of ICT*. *Development of sales volume* has only a weak relationship with the *reduced lead time for production* (CC: 0.187). Another weak relationship could be found with *intensity of use* (CC: 0.180). All other values are not significant. None of the relationships between the *development of sales volume* and the *extent of support* are significant.

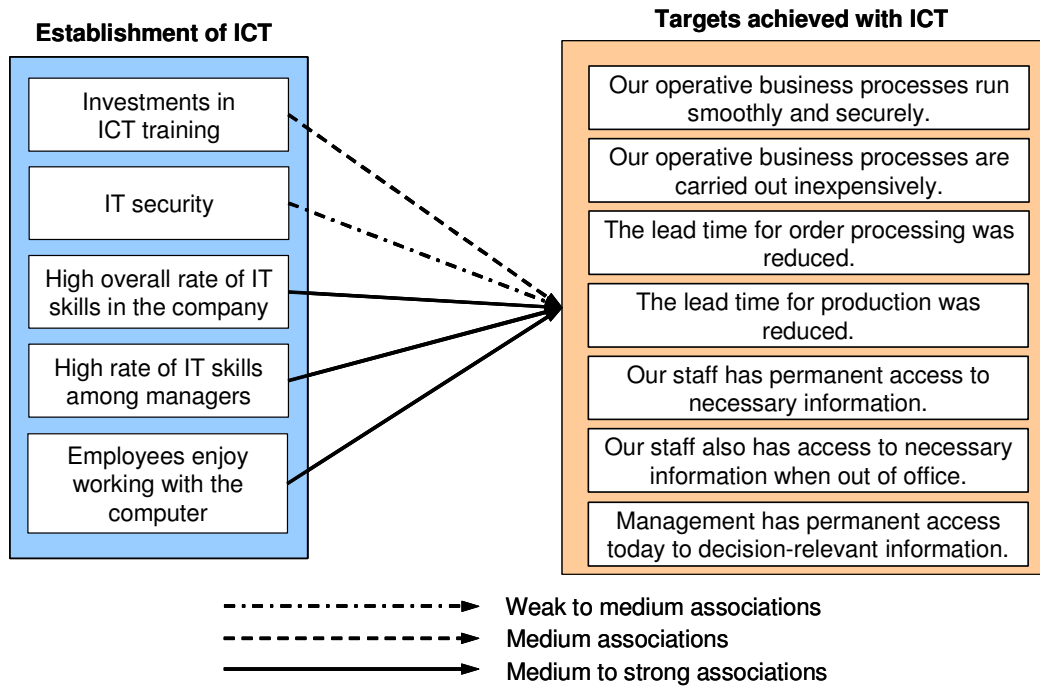


Figure 11: Correlations between establishment of ICT and ICT achievements

In a third step, we investigated the correlations between the *establishment (penetration) of ICT* in the company and the resulting *targets that could be achieved* by using information technology (Figure 11). *Investments in ICT training* (CC: 0.297) and the *awareness of IT security* (CC: 0.261) are two factors that influence the feeling about *well-informedness of the employees* of the company. This supports the assumption that the better people are trained in the use of technology the better their access to the necessary information. It can be confirmed that companies with a *high level of IT security* have a stronger feeling that their *operative business processes run smoothly and securely* (CC: 0.296).

The majority of respondents felt that the employees in their company enjoy working with the computer. Since this seems to be common in Swiss companies, it is plausible that we could not measure a special influence on the *achievement of ICT targets*. An existing *high overall rate of IT skills in the company* has a medium to strong impact on all other *targets achieved*. It is thus the highest impact factor for successfully deploying information technology in the tests we have performed so far.

7. Conclusions and Future Research

The paper contributes to the discussion about the value of ICT for companies. We have shown that there are noticeable dependencies between company characteristics and the degree in which a company succeeds in reaping benefits from the use of ICT. Swiss SMEs – in their self assessment – manage to gain (competitive) advantages from the deployment of information and communication technology.

This study is the first step in a longitudinal research process on the topic of “ICT use in Swiss SMEs”. According to the best knowledge of the authors, there has never been a comparably extensive and long-term-oriented series of studies about this topic. The findings have a high explanatory power due to the large amount of responses; more than 1’000 questionnaires were returned. The results are representative for Switzerland with regard to company size and industry sector.

In summary, the results show that the use of ICT is on a surprisingly high level in Swiss SMEs. This is above all reflected in the following outcomes:

- ICT is extensively used (even) in (small and medium-sized) companies
- There is a high degree of inter-organisational ICT use (interorganisational systems)
- ICT is strongly rooted in management (high involvement and skills of managers)
- ICT successfully supports competitive strategies (= IT matters!)

In the first part of the questionnaire we asked the respondents about the characteristics of their current business environment. The predominant amount of Swiss SMEs offers customer-specific products and services that are recurrent and clearly specifiable. ICT is deployed in order to efficiently support customer-specific orders. The decisive success factor for competitive advantage is the quality of products and services. The competition in the target markets is fierce (quoted by almost all participants). Companies need to stand up to powerful competitors. At the same time, markets suffer in most cases from a low growth rate. ICT is therefore mainly used for *increased efficiency and process optimisation*. Since the increase in sales is difficult, the optimisation of production and business process becomes the centre of attention. Requirements of customers regarding products and services are constantly and quickly changing. This hints at high demands towards adaptiveness both in terms of product changes as well as the adaptation to inter-company coordination processes. Not only production processes but also the products themselves are to a large extent permeated by ICT.

The second part of the questionnaire was geared at the actual deployment of ICT. The findings confirm that operative business processes are effectively supported by ICT. Many companies feel that they have smooth and secure processes. Information systems are today apparently so mature that the majority of respondents claims that employees have access to required information at all times. In total, the companies agree that the proposed objectives can be achieved with the help of ICT. We conclude that SMEs are by all means capable of using ICT purposefully and successfully to support their business processes.

In part three the participants were asked about the organisation of their ICT. It could be shown that a number of small companies do not have employees who are especially dedicated to ICT. These companies either do not use ICT or have totally outsourced ICT to service providers. As a general rule, hardware is renewed every one to three years, at least all four to six years. This shows, that the majority of respondents works with quite current IT equipment. It is remarkable that most employees enjoy working with the computer. IT security is a top priority in many companies. ICT skills are surprisingly high on the management level. It can be noted that investments in ICT training are quite low at the moment.

The companies that responded to our survey are surpassingly successful. "Success" was defined by comparing the development of sales of one single company with the development of sales in its respective industry. We assume that there is a slight systematic distortion of the results because the participants that took (deliberately) part in the survey had an above-average interest for ICT questions and had been intensively involved in ICT issues in the past. The authors are confident that this possible distortion was levelled with the help of the telephone interviews (47 % of the responses). Most of the people that were called answered to the questions without having a predisposition for or against ICT.

The final objective of our study on ICT use in SMEs is the identification of typical ICT company patterns. The resulting clusters are intended to be characterised by a combination of *observable characteristics* and the *typical attitude* towards strategic and operational use of ICT. Let's assume the following example (

Figure 12): a company operating in the manufacturing industry (140 employees) has most of its customers in Germany. This company would – by means of matching it with a cluster of similar companies – have a high likeliness of not using ICT very intensively, tend to spend little in ICT training and could be characterised by a high level of ICT outsourcing.

We are thus trying to develop an “ICT classification” for *SMEs*. Looking at their typical peer group they could run a “fitness test” on their ICT deployment and find out if ICT could benefit their business more effectively.

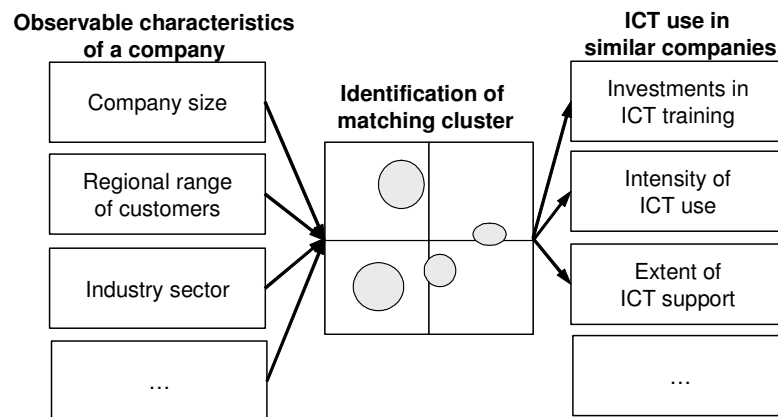


Figure 12: Search for typical ICT company clusters

The building of clusters and typical ICT company profiles aims at two additional target groups: (1) It should offer orientation for *ICT consultants*: knowing the external characteristics of a lead customer they should get an idea how to best serve him. What are the typical needs and opportunities for such a company? (2) The second target group are *ICT vendors*. They should be able to improve their products and services knowing better what their customers actually need.

The study in 2005 presented the first step towards the identification of clusters. The future surveys will validate and refine the profiling of companies. The longitudinal orientation of the research helps to gradually improve the theoretical model which is currently being developed.

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