

# Elements of Perception Regarding the Implementation of ERP Systems in Swiss SMEs

Catherine Equey and Emmanuel Fragnière

Haute Ecole de Gestion, 7 route de Drize, 1227 Carouge, Switzerland

**Abstract.** ERP systems are more and more adopted in large companies. It seems that this trend is followed by small and medium companies too. We have conducted a questionnaire based survey to identify how Swiss SMEs perceive this phenomenon. The sample size is 687 of which 125 have actually implemented an ERP. Our main findings are twofold. First SMEs that have not implemented ERP invoke concerns (e.g. costs), which are typically not perceived as major problems by SMEs that went through an ERP implementation. Indeed the latter companies generally acknowledge that ultimately benefits (e.g. improved business information) significantly exceed costs and difficulties of implementation. Second, this survey brings new empirical knowledge on the implementation, utilization and benefits provided by ERP systems in Swiss SMEs. We primarily show that satisfaction provided by the use of the ERP system is not dependent on the size and sector of the SMEs.

## 1 Introduction

Since the late nineties, the vendors of integrated management tools also called ERP (Enterprise Resource Planning) are facing a saturation of their main market, which is essentially intended to large companies. To find new customers they are trying to sell their products to the “mid-market” (companies from 100 to 500 persons) represented partially by Small and Medium Enterprises (SMEs). However, it seems that few SMEs have actually implemented an ERP (which is confirmed by this present survey).

We have conducted a survey research (questionnaire based) to study the level of implementation and of use of ERP systems in Swiss SMEs. To our knowledge this is the first study of this type ever conducted in Switzerland. The originality of this work also lies on the qualitative aspects addressed in the questionnaire like the value added provided by ERP systems in terms of satisfaction, as well as managerial difficulties encountered when implementing and using ERP systems.

We learn for instance that the main difficulties encountered during the implementation phase correspond to the “complexity” of these systems. In terms of difficulty of use, companies cite on top of all the “resistance to change” as well as the “lack of training”. Satisfaction regarding expectations of benefits does not differ significantly between small and medium companies as well as types of industry. On the other hand

if size does not affect satisfaction perceptions, companies belonging to a group have been in general forced by the headquarter to adopt the ERP.

In this paper, we provide findings under the form of summarized descriptive statistics and hypothesis testing. For the hypothesis testing section, we solely focus on the satisfaction perceived by ERP users. All information gathered in the questionnaire related to cost is voluntary skipped because of the limited length of the paper. It is organized as follows. In Section 2, we present a literature review related to managerial implications of ERP systems in companies. In Section 3, we briefly present the questionnaire and the sampling strategy. In Section 4, we present the main descriptive statistics obtained from the survey. In Section 5, we test a few hypotheses related to the theme retained for this paper: the satisfaction of the companies having implemented an ERP. In conclusion, we indicate limitations of this study and directions for future research.

## 2 Literature Review

Authors of [1] present a consistent review of the research literature between 1990 and 2003. First of all, they present an overview of ERP systems and of their evolution. Then they explain the nature of the ERP market. There are, in 2001, more than a hundred providers worldwide. However, only five ERP software vendors control about 70 per cent of the market share (SAP, Oracle, JD Edwards, Peoplesoft and Bann). These authors also do a comparison of papers in the field of ERP selection criteria.

In [2], difficulties to come up with one definition of ERP are explained. Authors point out the diversity of perspectives of academic experts and outline that “ERP is not a term referring to a distinct object but rather a category (...) a range of similar products”. They show that ERP does not only focus on resources but, also on business processes and they reveal terminology deficiencies. These authors finally conduct a historical analysis of MRPII and ERP. They conclude that ERP-related concepts are complex and that we still need to provide a comprehensive definition.

[3] identified ten critical factors to the successful outcome of acquiring an ERP system. The factors that stand out the most are as follows: “clear and unambiguous authority, a structured, rigorous and user-driven process, its planning, the establishment of criteria and the sense of partnership that the team works to establish not only with various user commitments, but also with potential vendor.” They believe that the acquisition success depend on the combination of several critical factors.

[4] presents a new and dynamic model of ERP success factors which should to improve implementation strategies. They point out the relationships between critical successes factors such as: organizational context, supporters, project organization and outcomes.

[5] analyses software development failures that costs organizations billions of dollars. The author reveals that one-third of all software developments fail. He points out that generally this is the biggest and the most complex projects which fail. Clear and realistic goal and team’s expertise are also crucial to the success of these projects.

[6] compares the perceptions of managers and end-users on selected implementation factors. He proposes, by understanding these differences of perception, interventions such as training and communication that can help implementation success.

[7] shows that expert groups seek to influence the ERP's implementation and development. Especially accountants use their position and their professional expertise to influence the introduction of ERP system.

[8] studies informal control mechanisms on information system (IS) adoption. His study shows that informal controls should be applied to the ERP systems implementation in order to enhance tacit and social aspects of IS management. He points out that "uncertainty avoidance culture and intrinsic motivation of end users in ERP implementation influence individual user's ease of use and usefulness of such systems".

[9] studies differences between ERP's user expectations and managerial policy by a case study of SAP implementation.

As per large companies, the literature about ERP and SMEs is rich and varied. Again critical success factors and ERP selection processes have the favor of the authors. [10] adopts the case study research methodology to study the implementation activities in order to point out criteria which allow a successful installation. They indicate that "effective executive management commitment can help a project to achieve success" and that the choice of the "executive sponsor" is important.

[11] studies critical success factors of ERP in order to propose a structured approach to help SMEs. Based on the literature, they consider five critical success factors (CSFs): management and organization, process, technology, data and people. They emphasize that some CSFs are more important than others. For instance, "people" is the main CSF.

[12] studies factors affecting ERP system adoption and compares SMEs to large companies. Their empirical research shows a strong correlation between company size and ERP adoption. In the opposite, the business complexity seems to be a "weak predictor of ERP adoption".

[13] studies differences in ERP system selection processes between SMEs and large sized organizations. The main differences are "a different approach to staffing the group performing the selection process", for instance large organizations engage more persons in decision making processes than SMEs. SMEs also select ERP with less complex models and less expensive methods.

In conclusion, we see that solely the paper [12] studies the criteria which affect the adoption of ERP but their research focus on the differences between SMEs and large companies. Research papers do not explore the situation of SMEs in relation to the adoption of ERP (rate of use), neither in Switzerland nor in any other country. Typically, the profile of SMEs which use ERP and their "perception" regarding the ERP implementation are unknown. For instance, data about cost, project length and number of employees involved in ERP implementation are rarely raised. Perceived rate of success and satisfaction are also not very much explored in the literature.

### 3 Questionnaire and Sampling Plan

The methodology to address the research question is based on a questionnaire survey. In the first phase of the research project, we have conducted in-depth interviews with Swiss-French companies. This multiple cases study (see [14]) led to the development of a few research questions along with associated research hypotheses. We had then the material to design the questionnaire. The first version of the questionnaire was built with the help of Abacus (which is the leader of ERP vendors' for SMEs in the German part of Switzerland), Microsoft, Oracle and SAP senior consultants. The final version of the questionnaire included 7 major parts: contact, activities and financial information about the enterprise, specificities of ERP implemented, implementation project description, project organization, benefits and outcomes related to the use of the ERP system, difficulties and troubles encountered.

From November 2005 to April 2006 more than 4'000 Swiss SMEs (evenly spread in the Swiss territory, so this is actually a national survey) were contacted to take part to this study. The questionnaire was administered essentially by mail. An online version of the questionnaire was also available. The questionnaire was declined in four versions: French, German, Italian and English. The French version is integrated in the appendix of the French technical report (see [15], for the other versions, please contact the authors of this paper).

Addresses of Swiss' SMEs were received from the Swiss office of statistics (OFS) and the selection was made according to the main two following criteria: the size (in terms of numbers of employees only) as well as the linguistic area.

The stratification of the sample was realized in such manner that 75% of the sample are companies of the German part of Switzerland, 20% are companies of the French part of Switzerland, and 5% are companies of the Italian part of Switzerland. Moreover, we took into account that 84% of companies employ 1 to 49 employees, and 16% of companies employ 50 to 249 employees.

In order to increase the number of answers, a follow up was done by phone's interviews. We ultimately obtained a response rate of about 17, 2%. Finally, a total of 687 Swiss SMEs have answered the questionnaire. Out of the 687 answers received only 18.2% of SMEs are indicating using an ERP (ERP users: 18.2% or 125, non ERP users: 81.5% or 560, no response: 0.3% or 2). This indicates a low level of penetration in Swiss SMEs (less than 20%). Data have been analyzed with the STATA and SPSS statistical packages.

### 4 Descriptive Statistics

The main part of the questionnaire was dedicated to companies which use an ERP. However, companies that had not implemented an ERP were asked about their motivation for not implementing an ERP. "High cost" (21%), "non necessity" (11%) and "lack of knowledge" (5%) are the main reasons invoked by Swiss SMEs. More than 40% of the respondents gave no answer to this question, indicating that a large part of the respondents do not seem to be concerned by ERP systems.

As indicated in the literature review, [12] provided findings regarding the ERP system adoption based on a survey analysis by comparing a sample of large companies with a sample of SMEs. They rejected the hypothesis that, the reasons of not implementing an ERP in a SMEs is due to the business complexity. Indeed they showed that the main reason invoked is a perception of high cost related to the implementation of an ERP system.

It is relevant that, as we would see further, to emphasize that the reasons for not implementing an ERP in SMEs are not similar to the difficulties meet up by SMEs' users of ERP. SMEs that have implemented an ERP are frequently dissatisfied by the complexity of these tools. On the other hand, our study shows that cost is rarely an issue of dissatisfaction for ERP users. An explanation that could be added based on our study (i.e. 40% of respondents give no answer) is that this perception of high cost comes from the lack of knowledge about ERP systems. However this point should be investigated in a further research to validate this hypothesis.

In this paper, we skip most of the detailed results related to the ERP software specificities (for more information, the reader can have a look at [15]). We just report the main figures. The following descriptive statistics are drawn from the sample of 125 respondents corresponding to ERP users who had to fill in the detailed version of the questionnaire.

The choice to implement or not an ERP is not related to the cultural and/or linguistic characteristics of the companies. The language and canton (i.e. Swiss states) of residence, variables capturing this kind of cultural differences, confirm this statement.

The size of SMEs, in terms of number of employees, is an important factor explaining the adoption of ERP systems. Indeed, the comparison with the Swiss national average and our sample reveals that close to 86% of the Swiss companies have less than 50 employees. In our sample of ERP users, companies with less than 50 employees accounts for only 53% of them. In the same way, the Swiss economy counts only 1% of SMEs of more than 100 employees, whereas our sample of ERP users is composed with nearly 26% of companies of more than 100 employees. These descriptive statistics indicate that larger SMEs are more inclined to adopt an ERP system.

Most of the respondents indicate that they are in a phase of growth. Only 7% of the ERP users sample acknowledges a reduction in their sales turnover. Among these companies in phase of recession, 75% installed their ERP more than 5 years ago, period during which their financial situation might have been different.

Industry (or the secondary sector as opposed to the tertiary and primary sectors) is over-represented in the sample of ERP users regarding the actual importance of the tertiary sector in Switzerland. Is it due to the fact that ERP systems are built upon the Material Requirement Planning (MRP) structure and are thus naturally more employed in manufacturing plants (i.e. secondary sector)? The question remains open.

Only 36% of the companies belonging to the ERP users sample have declared to be a subsidiary of a Swiss company and 19% a subsidiary of a foreign company. However, globally, 44% of the companies declare to belong to a group. We can think that the group imposes the use of the ERP on the subsidiary company and that without this obligation, the use ratio of ERP by SMEs could be even weaker.

A significant part of the companies does not turn to the most known vendors like SAP or ORACLE. Indeed, 50.4% of the respondents ticked the item titled “other” in the question related to the ERP system installed in the company. It is also notable that no particular program dominates in the category titled "other". This result is quite surprising, since we might have thought that to ensure business sustainability companies would relate to software well positioned in the market.

Another astonishing point is that certain companies mention programs which do not have the characteristics of an ERP (e.g. AS400, Clipper). This confirms the lack of consensus regarding a clear definition of ERP systems.

Regarding the choice of the ERP system, Swiss French and Swiss German companies differs significantly. "Oracle" is the first choice of Swiss French companies. "Abacus" and "Microsoft" are the first choices of Swiss German companies. So it shows that the Swiss market for ERP systems is segmented in 2 distinct markets (the Italian part is insignificant).

The installation of an ERP lasts in 80% of the cases less than 1 year (including, for 53% of the cases, less than 6 months). Nevertheless, in 4.6% of the cases, the installation seems problematic because it requires more than 1 year and half.

The number of consultants (relative with the interns) also does not appear related to the duration of the installation of an ERP. The number of consultants required by the implementation of an ERP remains however important (one consultant for 1 employee involved in the implementation project). The companies evaluate in 71% of the cases a need for an external assistance.

The more or less important implication of the direction in project ERP has also only a moderated impact on the duration of the installation even if a strong implication of the direction contributes to drastically reduce the probability of seeing the installation lasting more than a year and half.

In terms of difficulties encountered during the implementation phase, we see that 45% of the respondents indicated the “complexity” of these systems. It is followed by the “work overload” (38%) and the “difficulties adapting the ERP system to your process (customization)” (32%). In terms of difficulties encountered when using the ERP system, we see that 32% of the respondents indicated the “resistance to change”. It is followed by the “lack of training” (29%) and again the “complexity” of these systems (25%). We thus conclude that managerial issues are the prominent difficulties associated with ERP systems. Indeed, all technical difficulties were always ranked at the bottom.

We have skipped all the results related to the costs of implementation and use, since it appears to be a minor element regarding the overall satisfaction provided by the use of ERP systems (for more details see [15]).

## 5 Hypotheses Testing

The main research question developed in this paper is: “Is the satisfaction regarding the benefits provided by ERP systems evenly spread among Swiss SMEs”? We have

chosen to focus in this paper on one of the qualitative aspects developed in our survey. Indeed, we believe that the originality of this study lies on the measurement of qualitative variables such as the satisfaction of the use of ERP systems, and the difficulties (e.g. resistance to change).

To address this research question we propose first to test the following hypothesis scheme:

**H0:** Satisfaction provided by the use of the ERP system is not dependent on the size and sector of the SME

**Ha:** Satisfaction provided by the use of the ERP system is dependent on the size and sector of the SME

The satisfaction variable corresponds to the average for all ERP modules (finance, SCM, HR, inventory, production ...) employed by each given respondent. This variable is expressed as a "likert" scale, with 1 being the weakest value and 5 being the strongest value. The size variable is expressed over 4 levels: between 10 and 49 employees, between 50 and 99 employees, between 100 and 199, and 200 and 249 employees. The sector variable is defined as either the secondary or the tertiary sector.

**Table 1.** Satisfaction means and standard deviation regarding the size and sector.

Size	N	Mean	Standard Deviation
10 to 49	64	3.76	0.83
50 to 99	25	3.66	0.48
100 to 199	22	4.02	0.57
200 to 249	9	3.86	0.70
Total	120	3.80	0.72
Sector	N	Mean	Standard Deviation
Secondary	63	3.69	0.78
Tertiary	57	3.91	0.63
Total	120	3.80	0.72

The statistical test we have employed to analyse this hypothesis is to compare means (of satisfaction) for every sample of size or sector involved (see Table 1). In a general manner, we notice that satisfaction is on average quite high. Practically, we have conducted an ANOVA (Analysis of Variance) for the size case, which is the method for comparing means of more than 2 independent samples. For the sector case it is just a t-test for 2 independent samples. We have retained a significance level of 5% that is the first-type error (or the risk to reject the null hypothesis when it is actually correct).

The p-value of 0.355 for the size case indicates that we cannot reject the null hypothesis at the significance level of 5%. So we conclude that satisfaction is not affected by size. The (2 tailed) p-value of 0.09 for the sector case indicates that we cannot reject the null hypothesis. However, this is not clear as it is for the size case. Nevertheless, we can conclude that the overall satisfaction related to the use of ERP systems is generally good in SMEs whatever their size or sector.

Other statistical tests can be conducted, that are typically suited for dealing with variables defined upon nominal scales (e.g. "yes" or "no", which is often the case

with qualitative variables). Still related to the notion of satisfaction, Table 2 presents descriptive statistics about value different “attributes” of value added provided by ERP systems.

**Table 2.** Value-added by ERP Systems.

	Yes	No	No response
Improved Information	96%	3%	1%
Cost savings	48%	38%	14%
Time Saved	74%	20%	6%
Improved quality of work	95%	5%	0%

For instance, for the “Time saved” variable which was defined over the nominal scale “yes” or “no”, we could explore the relationship between this variable and again the size and sector variables (see [16]). We thus test the hypothesis whether there is really a relationship between the time saved and the SME size or sector of activity. This is done through a Chi-square test, which can treat nominal variables. Here a detailed analysis would show that there is unlikely a relationship between the time saved and the size and sector variables. This analysis shows that satisfaction is on average quite high and homogeneous among the population of Swiss SMEs (other aspects than size and sector such as language have also been tested). This is the same for the benefits provided by the use of the ERP system (except maybe for the cost savings with only 48% of yes). We can thus infer that vendors and consultants should specifically address the needs and expectations of Swiss SMEs. On the other hand, there is likely no necessity to segment the SMEs market due to its homogeneity.

## 6 Conclusion

In this paper, we have presented the first results of the national survey we conducted on the implementation and use of ERP systems in Swiss SMEs. We have tackled the population of Swiss SMEs, because they constitute in Switzerland the essential part of the economy. We unfortunately notice that the academic literature dedicated on ERP systems and SMEs essentially focuses on Critical Success Factor’s and not on satisfaction. Indeed the main contribution of this survey is to have included the perception of SMEs regarding qualitative aspects of the implementation and use of ERP systems. An ERP system leads to important organizational changes in the company. We believe that qualitative variables studied through a questionnaire-based approach can bring value to the current knowledge on ERP systems. In particular, we have shown that satisfaction of Swiss SMEs ERP users is good and quite homogenous in terms of industry type and size. However, an empirical research that attempts to measure business perceptions, is also associated with limitations. Perceptions biases are inevitable. So findings should be taken with precautions. The study also brings managerial or practical implications. In particular, developers and consultants should put more emphasis on making these systems more accessible for SMEs. We also noticed that the knowledge regarding ERP systems is quite weak among SMEs. This point will be investigated in a further research to validate this hypothesis. Moreover,



the few SMEs that use an ERP systems seems to be satisfied and to acknowledge important benefits such as improved information and quality of work. Consequently, ERP systems for SMEs should become a growing and sustainable market if properly handled.

## References

1. Shehab, E.M., Sharp, M.W., Supramaniam L., Spedding, T.A.: Enterprise resource planning / An integrative review. *Business Process Management*, Vol. 10. N°4 (2004) 359–386
2. Klaus, H., Rosemann, M., Gable, G.G.: What is ERP?. *Information Systems Frontiers*, Kluwer Academic Publishers (2000)
3. Verville, J., Bernadas, C., Haltingen, A.: So you're thinking of buying an ERP ? Ten critical factors for successful acquisitions. *Journal of Enterprise Information Management*, Vol. 18. N°6 (2005) 665–677
4. King, S., Burgess, T.: Beyond critical success factors : A dynamic model of enterprise system innovation. *International Journal of Information Management*, Vol. 26. N°1 (February 2006) 59–69
5. Ewusi-Mensah, K.: *Software Development Failures*. MIT Press (2003)
6. Amoako-Gyampah, K.: ERP implementation factors. A comparison of managerial and end-user perspectives. *Business Process Management*, Vol. 10. N°2 (2004) 171–183
7. Newman, M., Westrup, C.: Making ERPs work: accountants and the introduction of ERP systems. *European Journal of Information Systems*, Vol.14. N°3 (2005) 258–272
8. Hwang, Y.: Investigating enterprise systems adoption: uncertainty avoidance, intrinsic motivation, and the technology acceptance model. *European Journal of Information Systems*, Vol. 14. N°2 (June 2005) 150–161
9. Lim, E.T.K., Pan, S.L., Tan, C.W.: Managing user acceptance towards enterprise resource planning (ERP) systems – understanding the dissonance between user expectations and managerial policies. *European Journal of Information Systems*, Vol. 14. N°2 (2005) 135–149
10. Muscatello, J.R., Small, M.H., Chen, I.J.: Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms. *International Journal of Operations & Production Management*, Vol. 23. N°8 (2003) 850–871
11. Sun, A., Yazdani, A., Overend, J.: Achievement assessment for enterprise resource planning (ERP) system implementations based on critical success factors. *Int. J. Production Economics* 98 (2005) 189–203
12. Buonanno, G., Faverio, P., Pigni, F., Ravarini, A., Sciuto, D., Tagliavini, M.: Factors affecting ERP system adoption. A comparative analysis between SMES and large companies. *Journal of Enterprise Information Management*, Vol. 18. N°4 (2005) 384–426
13. Bernroider, E., Koch, S.: ERP selection process in midsize and large organization. *Business Process Management*, Vol. 7. N°3 (2001) 251–257
14. Equey, C., Rey, A.: La mise en place d'une solution de gestion moderne (ERP/PGI), quels enjeux pour une PME/PMI ?. 1ère partie : étude de cas détaillés, Working paper N°HES-SO/HEG-GE/C--06/1/4--CH (2004)
15. Equey, C.: Etude du comportement des PME/PMI suisses en matière d'adoption de système de gestion intégré, Working paper N°HES-SO/HEG-GE/C--06/12/1--CH (2006)
16. Bryman, A., Ducan C.: *Quantitative Data Analysis with SPSS Release 10 for Windows*. Routledge (2001).