Personalization of E-Commerce Applications in SMEs: Conclusions from an Empirical Study in Switzerland

Petra Schubert and Uwe Leimstoll
University of Applied Sciences, Basel (FHBB), Switzerland

ABSTRACT

Personalization of e-commerce applications is an issue that is gaining increasing importance with the advancing maturity of such systems. There is already e-commerce software on the market offering integrated e-shop and personalization functions. However, the available software is too time-consuming and expensive for SMEs. With this in mind we saw a need to investigate the potential for personalization from the particular angle of SMEs. In addition to some theoretical fundamentals of personalization, this paper presents the results of an empirical study. With the help of a survey, we investigated the application potential for personalization tools in Swiss companies. The conclusions show that SMEs are (still) skeptical towards e-commerce applications which use personalization. It furthermore becomes clear that the heterogeneity of organizational and technical conditions impedes the development of standardized tools.

Keywords: e-commerce; personalization; SMEs.

INTRODUCTION

The paper presents the results of a longitudinal, publicly funded research project about "personalization of e-commerce applications run by SMEs". The quality of e-commerce applications has been constantly improved over the last few years. Especially the major suppliers run Web sites that are of noticeable usefulness and are reliable enough to assure the customer's trust (Schubert & Dettling, 2002). This is confirmed by continuously positive growth figures in online business.

Personalization is always targeted at the fulfillment of a special requirement. It can be aimed at people as well as at organizational roles in companies (e.g., a pur-

chasing agent). Personalization—as we understand it—starts AFTER THE LOGIN. The mere speculation about a user on the basis of local cookies on the client PC which has the smack of spying on someone does not fall into the scope of our discussion. Personalization is context sensitive (regarding output for a certain user) and requires learning (by the system). The interface between the customer and the system is called "point of interaction" (POI). Personalization can be an important component for the success of an e-commerce application because it is beneficial to all interested parties (Buxel, 2001).

For the personalization of e-shops there are integrated software packages available, such as, e.g., One-to-One (Broadvision), Dynamo Relationship Commerce Suite (Art Technology Group), Personalization Manager (Net Perceptions) or ADAPTe (ResponseLogic), which already supply the full range of e-commerce applications. These products are expensive applications generally destined for use in large companies. The standardized online shops partially used in SMEs only contain rudimentary tools for the personalization of transactions.

We believe that a separate consideration of these companies is significant because SMEs differ from large corporations in many respects. In the context of the personalization of e-commerce applications the specific features of SMEs become particularly relevant. SMEs are generally characterized by the fact that they have limited resources and often lack the benefits of economies of scale. With regard to using e-commerce applications, above all limited financial resources, poor conceptual knowledge, lacking IT resources and low economies of scale can all have a negative effect. The low economies of scale result primarily from the small size of the company because the usefulness of e-commerce applications increases with the number of transactions completed and the volume of turnover generated. SMEs offer specialized, qualitative high value products in their small market segment which are tailored to customers' needs (product differentiation). It is precisely for this reason that elements of personalization should also be applied in e-commerce.

At the beginning of the project, we had to examine if the essential technical preconditions are fulfilled in SMEs and how much demand there is for personalization. The potential for personalized e-commerce applications in SMEs as well as the requirements for the development of a personalization tool, result from these aspects.

The paper starts with the description of the research design and a short literature review on personalization. The following sections present the findings of an empirical study. We summarize the findings and draw some conclusions for the currently emerging potential for the implementation of personalization software in SMEs in Switzerland.

RESEARCH DESIGN

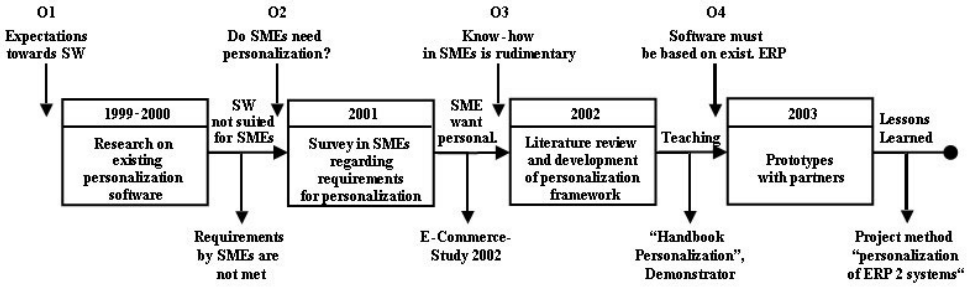
The research findings presented in this paper stem from a project which has been carried out since 1999 together with different SMEs in Switzerland. The rea-

son to start this project was a perceived disadvantage regarding personalization possibilities in e-business applications suitable for SMEs, as compared to the possibilities of big companies. As mentioned earlier there are software packages for personalization available on the market but those systems are often too expensive for SMEs. The situation is comparable to the adoption of SAP in big companies and "light-weight ERP solutions" like Abacus in SMEs. SMEs need "easy" solutions—preferably standard software—which are cost-effective and can be customized according to the company's special purposes.

As shown in Figure 1, the project started with an empirical survey in the region. The result encouraged the authors to proceed with the project. On the one hand, SMEs attribute a high value to their relationship with the customer and recognize the potential of the electronic relationship which comes with an e-shop. On the other hand, the survey showed that the situation for the implementation of personalization (state of know-how, existing hard- and software, willingness to invest, etc.) is not very favorable in most SMEs. One important result was the need for setting a focus on the further development of existing ERP systems, which were already in use by SMEs (ERP II).

In order to illustrate the potentials of personalization we created a "handbook personalization" which shows the possibilities from a perspective we thought adequate for SMEs (Schubert & Leimstoll, 2002). Additionally, we built a "software demonstrator" that is publicly accessible on the Internet. It displays the possibilities in a graphical form. The following development of the personalization framework was the basis for the current development of prototypes of ERP extensions with four industry partners. The last objective was the development of a generic project method for the introduction of personalization of e-commerce applications on the basis of ERP II systems which is still going on. ERP II is a term coined by Gartner Group which they define as an application and deployment strategy to integrate all things enterprise centric. It is basically the further development of the inherently internal ERP system into a boundary-spanning system, which integrates into its peer systems run by business partners and customers. Figure 1 shows the steps of the project with its premises (01-04) and its milestones.

Figure 1: Steps and Results of the Longitudinal Research Project



This article does not reflect PhD research. It is an experience report from a joint project with different small- and medium-sized companies in Switzerland. The empirical study presented in this report was not intended to be statistically sound, but was used as a guidance reference for the further orientation of the project. We intended to test some of our assumptions about the current state of development of ERP-based e-business applications at the beginning of the project. The study was meant to either confirm or refute our assumptions. Since most SMEs in Switzerland are not yet sophisticated Web users, most of the questions were phrased indirectly pointing at different aspects of personalization rather than naming the concept specifically. The outcome of the study was used for the setting of project objectives (which resulted in the development of a project method). Although the survey was based on a questionnaire and we gathered data, we did not perform a rigorous statistical testing. The project would not have benefited from a statistical analysis, but we were in need of getting some answers to our assumptions. We were especially interested in the state of technological equipment, the starting point for personalization, and a major prerequisite for our future project.

We are aware that the following analysis is focused more on the relevance of our research objectives than on academic rigor. The analysis of the survey data is simplistic. Only descriptive statistics are given and conclusions are drawn from these. This choice was made deliberately. In past projects we learned that dealing with SMEs requires a pragmatic rather than a theoretical approach. Otherwise the results cannot be made accessible because SMEs reject them as being "too academic". Given these limitations we are still convinced that academia can profit from our findings.

LITERATURE REVIEW ON PERSONALIZATION

Personalization is about selecting or filtering information objects or products for an individual by using information about the individual (his customer profile). The information displayed on the screen is specifically tailored for the user. From a technical point of view, meta information of products or information objects is matched against meta information of users (stored in the customer profile). Personalization can be tailored to a group of people or to a specific individual. In the latter case, where the information or products are only customized for one single individual, we speak of individualization as a special form of personalization. Personalization uses information about customers. The general term for stored customer information is "user profile" or in the context of electronic shopping "customer profile". There are various ways how e-shop operators can cultivate customer profiles e.g., "historically" by storing (1) interaction with the Web site (click stream) or (2) purchase transactions or "explicitly" by (3) asking for preferences or (4) ratings or by recording (5) contextual information (e.g., time, date, place). What formerly seemed to be possible only for the corner shop whose storekeeper knew all her clients personally, reaches a new potential in the

online medium where every client leaves traces and thus "teaches" the system how to treat him differently from the other customers. This form of mass customization becomes feasible with the use of predefined rules, which can be built into e-commerce environments. These automatically personalized Web sites do not achieve the high quality of corner shops, but they help to establish a personal dialogue with the customer, tying him or her closer to the electronic offer. Additionally, the time spent by the client to "teach" the system leads to increased switching cost. The underlying prerequisite is that the customer really wants to be addressed personally.

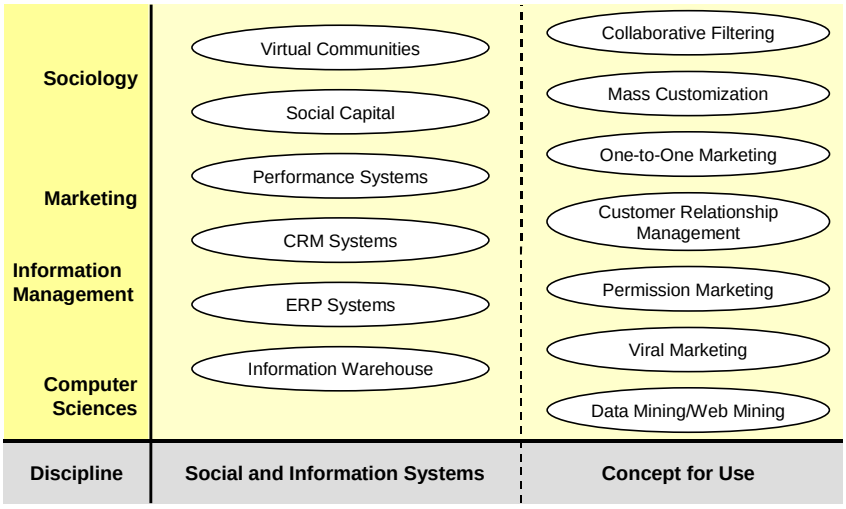
What Makes Personalization Possible?

The ability to deliver personalization rests upon (1) the acquisition of a "virtual image" of the user, (2) the availability of product meta information and (3) the availability of methods to combine the datasets in order to derive recommendations for the customer.

In this section we will give an overview of the main concepts and systems that make (automatic) personalization possible in today's businesses. These driving forces can be categorized by disciplines, which are involved in personalization. The consideration of personalization ranges from a technical view in computer sciences, to the economic principles of information management and marketing, as far as to the global perspective of sociology. Figure 2 displays a matrix of disciplines in which personalization plays an important role.

Virtual Communities are groups of people who come together on Internet-based platforms for communication and collaboration around a common topic of interest. These community platforms gather community knowledge (stored in

Figure 2: A Multi-Disciplinary View of Systems and Concepts in which Personalization Plays an Important Role



customer profiles), which according to Peppers and Rogers is the following:

"Community knowledge comes from the accumulation of information about a whole community of customer tastes and preferences. It is the body of knowledge that a 1:1 enterprise acquires with respect to customers who have similar tastes and needs, enabling the firm actually to anticipate what an individual customer needs, even before the customer knows he needs it" (Peppers & Rogers, 1997, p. 231).

This way, knowledge about the community can help to customize and even personalize the service for an individual member.

Social Capital was defined by Pennar (1997) as "the web of social relationships that influences individual behavior and thereby affects economic growth". The existence of social capital is the basis of many virtual communities. An example for this is the Internet Chess Club (ICC). The ICC is a virtual gaming platform on the Internet, where a large part of the leading chess masters and more than 45,000 paying members are interacting (Ginsburg & Weisband, 2002). A large number of volunteers is contributing to the smooth operation of this community. The information of all members of the community—moderators, chess masters and other active members—forms the social capital of the community. Another example is the Internet auction platform eBay (Schonfeld, 2002). Social capital enables eBay to make use of the creativity of millions of entrepreneurs (the sellers and buyers) on their Web site. By adding information themselves and by publishing their own marketing the users take on the main work on the platform. Social capital additionally leads to the subjective feeling of objectivity, which Peppers and Rogers call "agent objectivity":

"Every customer wants genuinely objective, unbiased advice in a commercial transaction, and every customer knows that sometimes this advice will run counter to the seller's own interests." (Peppers & Roger, 1997, p. 244)

If the recommendations of a seller are only based on the comparison of customer feedback, then this information is objective and without bias – it represents the subjective attitudes of other customers. Amazon.com also uses this idea in their customer reviews. The result is the development of an "objective agent", an intermediary, that just provides opinions of others on its platform.

Performance Systems were developed by product vendors in the 1990s as a solution for differentiating their own products from the competition (Belz et al., 1991). Performance systems bundle the core product or service with different additional products or services in order to propose a specific solution for individual customers or specific target groups. They thus represent a "personalization" of the standard set of products which a company offers. Peppers and Rogers (1997) call these combinations "product-service bundles". The additional services make the product unique and attractive for the customer. To design these product bundles

an information basis is needed that allows the anticipation of the customers needs. An electronic offer could additionally enable bundles that include complementary products of other manufacturers, delivery, installation and training, service and an emotional customer experience. Ratings or experience reports supplied by the virtual community can e.g. be seen as such additional services.

Customer Relationship Management systems are enterprise information systems which support the relationship with the customer. They are used to communicate with the customer or to assist communication with the customer. CRM systems store all kinds of information about the customer, ranging from basic information such as name and address to the full history of company-customer interaction (e.g., inquiries, purchase transactions, claims). The databases contained in CRM systems are a valuable information source which can be harnessed for personalization. Most CRM systems are built upon existing software for Enterprise Resource Planning (ERP).

ERP systems comprise a whole class of software products that are geared at the automatization and control of business process throughout the whole company. They supply software modules which support almost all critical business processes and departments (e.g., accounting, procurement, human resources, sales, production, logistics). ERP systems can be found as core systems for Supply Chain Management, Customer Relationship Management and e-business applications. These more specialized information systems often source their data from the ERP databases which contain the critical company information, namely product catalogs, customer database, sales figures, accounting and the like. In recent years, ERP systems have been further developed to meet the requirements of the Internet. In the last three years, traditional ERP functionality has been extended into the Internet environment. Customers can directly access data in the ERP system using specially developed e-business interfaces. ERP systems which have been equipped with these new e-business interfaces (for e-shops) have been labeled "ERP II" by Gartner Group. Within the scope of our SME project we are striving to further develop SME-suitable ERP systems into ERP II systems.

An *Information Warehouse* as a result of a data mining process is an additional—extended, improved and optimized—representation of sales and customer data. Warehouses are usually used to store raw data for later use in executive information or decision support systems (EIS or DSS). In the context of our study of e-commerce applications, these databases are an important source for personalization and digital marketing.

Where is Personalization Used?

After having looked at different information systems, with their respective databases serving as "enablers of personalization" we will now look at different concepts for the "application of personalization".

In electronic business media *mass customization* can be implemented by a pre-defined rule system which combines

the advantages of mass production (the same e-shop and the same product catalog for all clients) with the strength of made-to-order production (personalized web pages and customized products). *One-to-One Marketing* is the embodiment of personalization in marketing. The underlying idea is to serve and address every customer according to his or her specific needs. *Customer Relationship Management* has already been implicitly described in the section about CRM systems. It aims at supplying every employee (or even the client himself, e.g., in an e-shop) with the relevant information about a customer at the right time to be able to offer him an individualized service. *Permission Marketing* is the idea of giving the customer the chance to select the kind of marketing message he or she wants to receive (Godin, 1999). The customer grants a company "the right to supply him with marketing information" in a preferred category. Regarding electronic communication, it is a means to prevent spamming.

Viral Marketing uses the customer's network of (social and business) relationships. A marketing message is sent to one customer with an incentive to forward this message to his friends and/or business contacts. Every time the message is forwarded to more than one person it is multiplied—a process which reminds of the outbreak of a disease (thus the word "viral"). The idea is similar to what we know as "chain letters". *Data mining* is the process of storing and interpreting data recorded in business processes, e.g., POS transactions. Companies are interested in generating information warehouses which are sources for executive information systems. Whereas data mining addresses all kind of real-world business processes, *Web mining* focuses especially on data accrued from the Web. Data mining is the extraction of interesting and potentially useful information from user activity on the Internet (Kimball & Merz, 1996; Spiliopoulou, 2000; Adomavicius & Tuzhilin, 2001).

RESEARCH INSTRUMENT & DESIGN OF THE STUDY

The survey was driven by the future objectives of the research project. In several interviews with our SME project partners, we identified possible problems which were likely to be encountered in our quest of developing personalization functions for e-business applications. Based on these assumptions, a set of questions was developed and sent to companies.

The interests of SMEs are in the forefront of the survey, which was carried out in the summer of 2001. On the one hand, the study was meant to give information about whether there is a demand on the part of SMEs for personalized e-commerce solutions and how their exploitation can be evaluated. On the other hand, the study was intended to show which technical and organizational preconditions are already met by the companies surveyed. For the recording of the primary data, a standardized questionnaire was developed and repeatedly tested in pretest interviews. The regional chamber of commerce sent the printed questionnaires to 1,250 randomly chosen SMEs in the region. Excluded from the survey were several freelance professions such as doc-

Collection period	August/September 2001
Collection area	Basel-City and Basel-Country
Collection method	Written survey with standardized questionnaire
Size of companies	SMEs with from 1 to 250 employees
Target group	Mainly managers and those responsible for IT in SMEs in addition to independent IT service providers and management
Returns	271 questionnaires, 216 from SMEs and 55 from experts; rate: 16%

tors and other companies whose main function is construction and utilities. The questionnaire was directed to members of management and those responsible for IT in SMEs.

Besides SMEs, the survey was also meant to reach providers of IT services and management consultants with the aim of including additional expert opinions. For the group of experts, the questionnaire was slightly modified and provided online. The experts were asked to answer the questions from the point of view of a company well-known to them (one of their customers). The table above summarizes the most important details about the design of the survey.

The explanations that follow are an excerpt from the study—primarily presenting the answers given by the representatives from SMEs. The 'expert' opinions will only be listed explicitly if they differ significantly from those of the SMEs.

FINDINGS OF THE STUDY

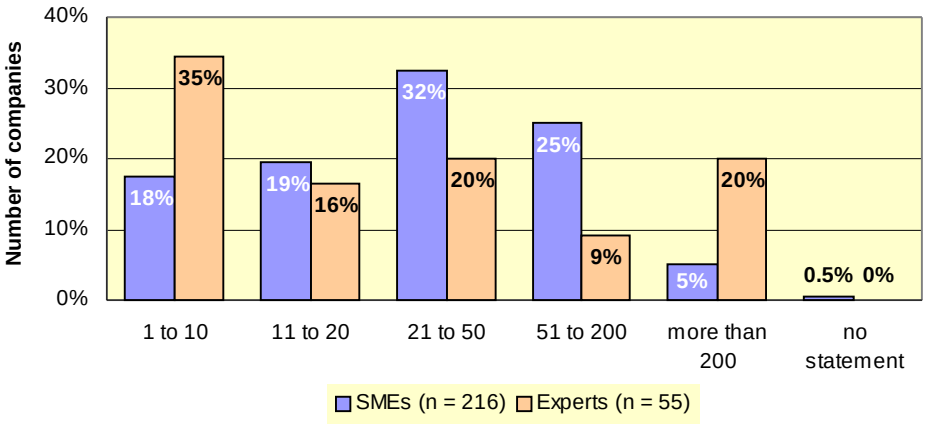
We start by describing the characteristics of the companies surveyed. This is followed by an analysis of the significance of marketing and sales processes for SMEs. The third paragraph discusses Internet use and the exploitation of personalized e-commerce applications. Finally, the technical and financial prerequisites for the development and operation of e-shops will be discussed.

Characteristics of the Companies Surveyed

The survey reached primarily *owners or managing directors* (53%) and *people responsible for IT* (25%) in SMEs. The remaining questionnaires were completed by people who fulfilled *both functions* (6%) and from people who had *other leadership functions*. In the group of experts, *providers of IT services* or *management consultants* (45%) were addressed. Other experts were *owners or managing directors* of the company (29%).

In the sample, almost all sectors are represented, the majority being from the industrial (22%) and services (20%) sector. Trading companies account for 12% and IT/telecommunications firms for 8% of the sample. Grouping the companies according to size categories illustrates that these SMEs are mainly represented by

Figure 3: Number of Employees (full-time equivalent)



companies employing between 21 and 200 employees (Figure 3). They account for 57% of all SMEs surveyed. A further 37% are small firms with between 1 and 20 employees. Only very few larger firms with more than 200 employees are represented.

In the expert group the size distribution looks different; here there are a lot of small firms with between one and 10 employees. They account for 35% of the companies evaluated by the experts. The share of firms with more than 200 employees (20%) is noticeably high. The high proportion of small as well as large companies in the sample of experts can be explained by the fact that the IT and telecommunications field is strongly represented in this sample. Firms in this sector are often very small (e.g., IT service providers) or very large (e.g., telecommunications corporations). This relationship is also expressed in the number of customers. The SME group shows a far more balanced distribution of customer numbers.

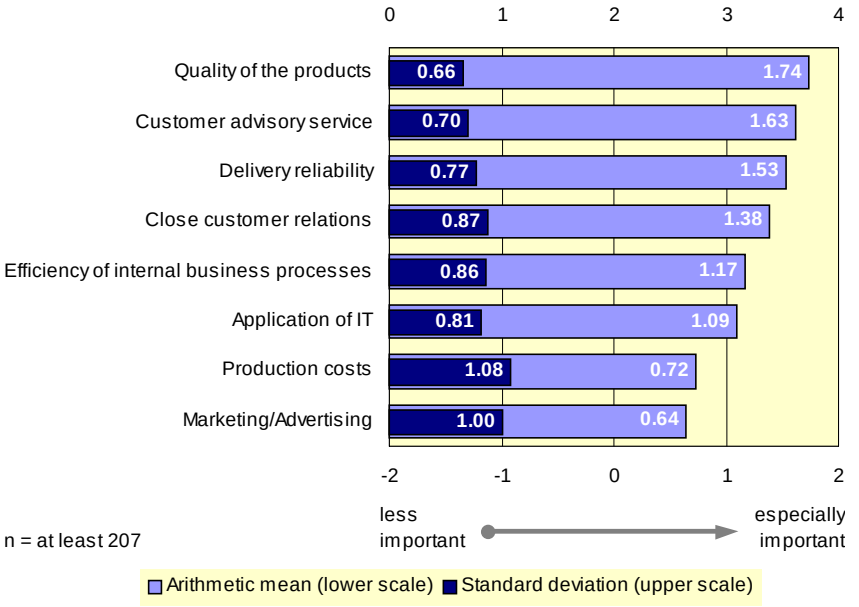
The sample cannot be seen as representative regarding distribution of company size. We can also assume that there is a dominance of those companies which are already tackling the e-commerce issue, or at least intend to in the near future.

Significance of Marketing & Sales Processes for SMEs

The e-commerce activities of SMEs are the focus topic of the survey. In order to evaluate the future role of e-commerce in the companies, we first tried to clarify the general significance attached to sales activities. Figure 4 shows a few selected factors which were evaluated in view of their significance for the companies' future competitiveness.

The companies are in agreement that the *quality of the products* will play an important role in the future. The sales-related factors, which are of special interest here—*customer advisory service*, *delivery reliability*, and *close customer relations*—follow in places two to four. They are evaluated higher than the *efficiency of internal business processes*, the *application of IT* in general and *production*

Figure 4: Success Factors of SMEs Based on the Statements of SMEs



costs. It is somehow surprising that *marketing and advertising* rank at the bottom (Figure 4).

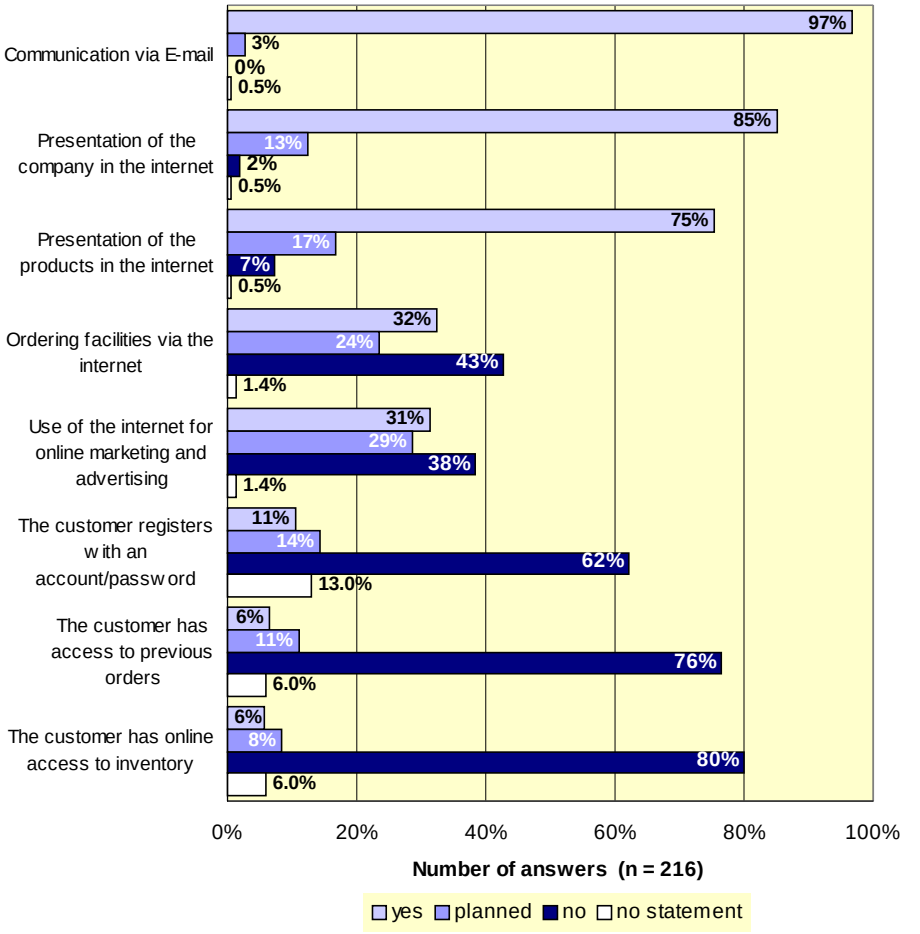
There are only slight differences between the appraisal of the SME representatives and the opinion of the experts. The importance of *marketing and advertising* (1.07) for example ranks higher. On the other hand, in the eyes of the experts, *efficiency of internal business processes* and *production costs* were least important (last two places).

From this result it follows that sales-related activities are of high significance for the competitiveness of the companies. The support granted by information technology also plays an increasingly important role.

Current E-Commerce Activities of Swiss SMEs

Empirical studies show that the intensity of Internet use in Switzerland is steadily increasing. However, the concept of Internet use is seldom considered in a differentiated way. The following graphic shows the ways in which the Internet is used by the responding companies. The kind of use indicates to some extent the stage of maturity of the e-business applications implemented in the companies. Figure 5 shows the results of the question on Internet use. Whereas the degree of extensiveness ('yes' answers) declines from top to bottom, the degree of planning ('planned' answers) first increases, and then declines again in the area of more

Figure 5: Different Uses of the Internet, Based on Statements of SMEs



sophisticated applications ('no' answers).

The results regarding e-mail use show higher figures than presented by similar studies; e-mail is used by almost all of the companies surveyed, and there is no company that does not at least plan to use e-mail for communication. *Company and product presentation* is also widely realized. If we include the figures on planned use, then soon 98% of the companies will present information about the company on their Web site and 92% will present information about their products on the Internet. The evaluation of the experts hardly deviates from this.

Internet applications that go beyond the functions of e-mail and homepage are rarely encountered (Figure 5). *Ordering facilities via the Internet* (offered by 32% of companies surveyed) as well as *use of the Internet for online marketing and advertising* are also included among the functions carried out to a considerable extent. Taking into account planned use, these two forms of use will, in the future, reach a degree of 56 and 60%. They are considerably more widespread in the companies of the experts;

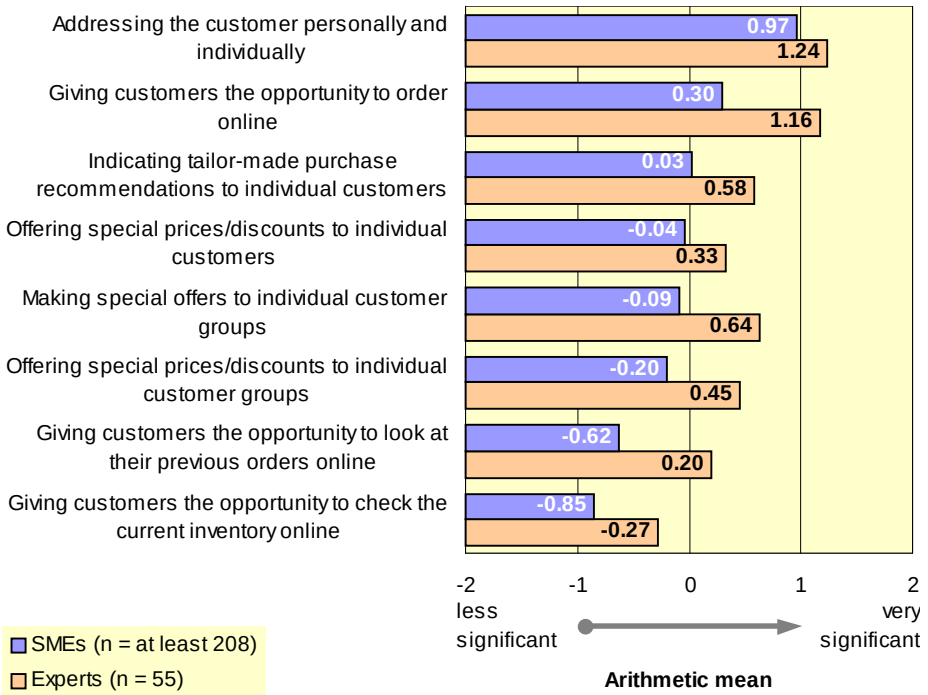
there, *ordering via the Internet* is possible in 44% of the companies, and 53% use the Internet for *online marketing and advertising*. Together with companies planning to apply these uses, the degree of use reaches 77%.

In addition, there is a group of Internet functions which have hitherto been put into practice in very few SMEs. These are functions which take up a special position with particular relevance to the personalization of e-commerce applications (in parentheses: carried out/planned): *personal registration of the customer on the Web site* (11/14%), *customer access to previous orders* (6/11%) and *customer access to inventory* of the supplier (6/8%). Among the expert companies, 22% already offer *personal registration*. Planned use is significantly higher than reported by the SMEs; in the future, about a quarter to almost a half of the expert companies will offer these otherwise rarely implemented functions.

Basic Functions in Personalized E-Commerce

After the first block of more general questions about marketing and e-commerce activities, the questionnaire presented a block of questions targeted at specific functions of personalized e-commerce applications. When developing the questionnaire, we were aware that there is an abundance of functions related to personalization, but we had to limit the questionnaire to the ones that seemed most

Figure 6: Significance of the Functions of a Personalized E-Commerce Application (SMEs and experts in comparison)



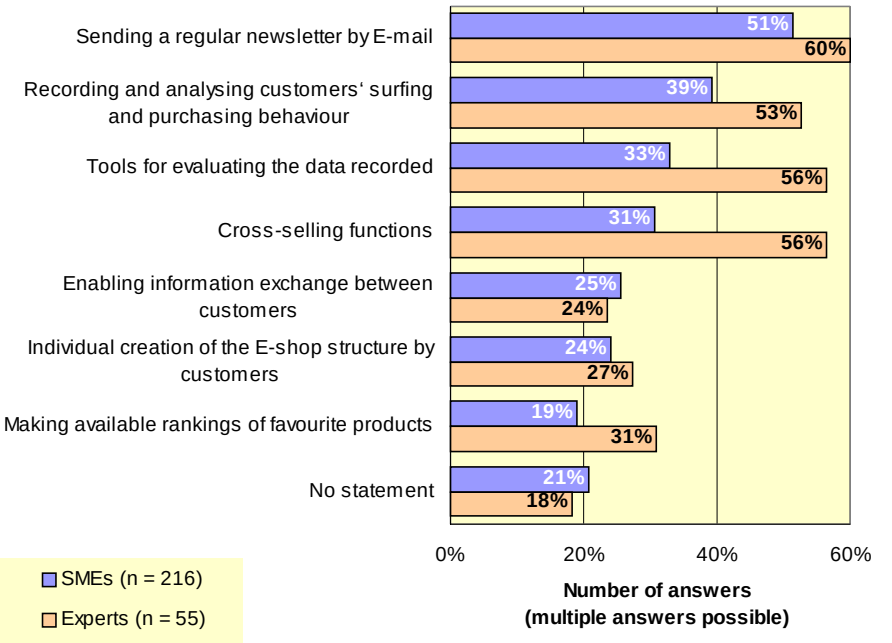
relevant to our project (Figure 6).

Out of the functions presented in Figure 6, only a few are considered truly significant. On the five-point scale (from -2 = less significant to + 2 = very significant) , only three functions score over zero, starting with *addressing the customer personally and individually*. In this case almost three-quarters of the SMEs responded to the answer with '1' or '2'. The significance of *online ordering facilities* is 0.30, which means that *online ordering facilities* are in the group of functions which are considered 'significant'. The same is true for *purchase recommendations tailor-made to the customer* (0.03), for the *opportunity to offer special prices/discounts to individual customers* (-0.04), and for the *opportunity to make special offers to individual customer groups* (-0.09).

Ranked among the functions evaluated rather 'less significant' we find *prices and discounts for individual customer groups* (-0.20), *access to previous orders* (-0.62) and *online access to inventory* (-0.85). Note that the last function, *access to inventory*, is not applicable in certain sectors (e.g., services, which comprised 14.4% of the sample).

In contrast to the SMEs, the experts attributed higher scores to the functions of personalized e-commerce applications (Figure 6). We could measure the highest difference in the evaluations for *online ordering* (D = 0.86), *previous orders* (D = 0.82) and for the *opportunity to make special offers to individual customer groups* (D = 0.73). These findings illustrate that SMEs are cautious in the assessment of personalization efforts — more cautious than the group of experts.

Figure 7: Additional Functions of E-Commerce Applications to Support Marketing and Sales Processes (SMEs and experts in comparison)



Additional Functions of Personalized E-Commerce

E-commerce solutions support and offer a number of further functions related to personalization. Figure 7 compares the opinions of SMEs and experts regarding the usefulness of the application of these additional functions. The questions were phrased abstractly (not in the language of information systems) in order to analyze which additional functions future e-commerce solutions should offer. This was evaluated indirectly with the help of questions regarding marketing and sales processes.

In the comparison both groups named the following functions most frequently: *newsletter via e-mail*, *analysis of customers' surfing and purchasing behavior*, *evaluation tools* and *cross-selling functions*. However, the frequency of these answers is far lower among the SMEs than among the experts.

The group of functions which were not mentioned frequently by neither of the two groups includes: *information exchange between customers* (a community function), *customer creation of e-shop structure* and *rankings of favorite products*. Clearly, only a few companies envision the positive effects of personalization on marketing and sales processes. However, *rankings of favorite products* was at least mentioned by 31% of the expert companies.

The comparison between SMEs and experts indicates that the SMEs are more skeptical towards the opportunities of personalized e-commerce solutions. Possibly they cannot yet imagine how a personalization tool could look like in practice. The purpose of a newsletter is certainly the easiest concept, and most of the respondents are familiar with this marketing tool. The experts' statements show that this group estimates that the personalization of e-commerce will have a thoroughly positive effect on the marketing and sales processes of SMEs.

Development & Operation of E-Shops

Sixty-four percent of the SMEs and 69% of expert companies responded that

Figure 8: Outsourcing of Web Server Operations (Based on statements of SMEs)

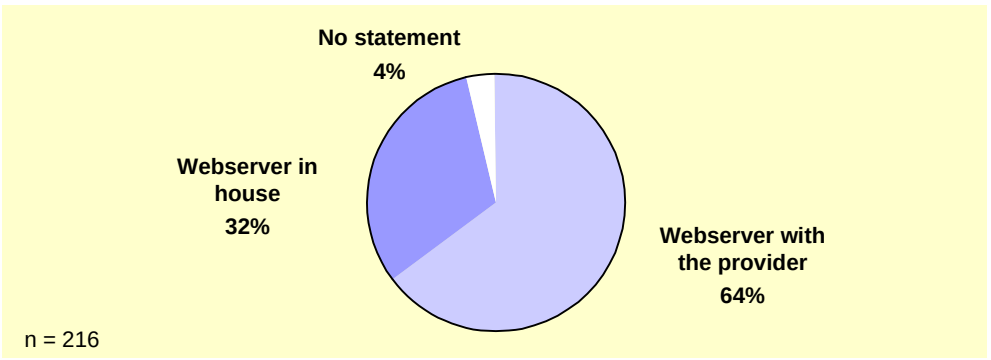


Figure 9: Standard Software vs. Individual Software in the E-Shop Field

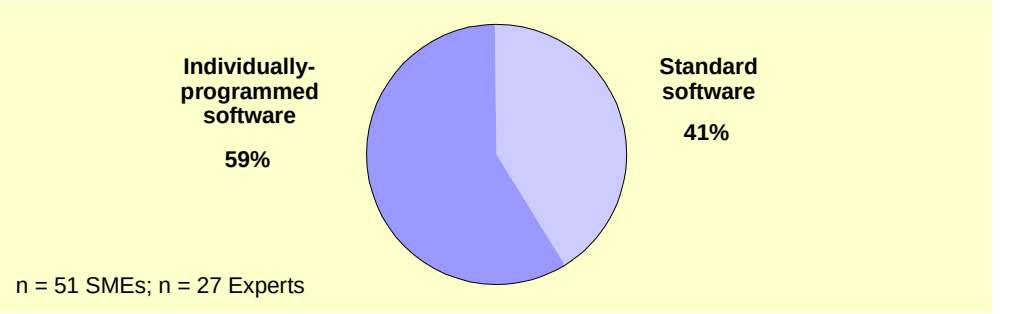
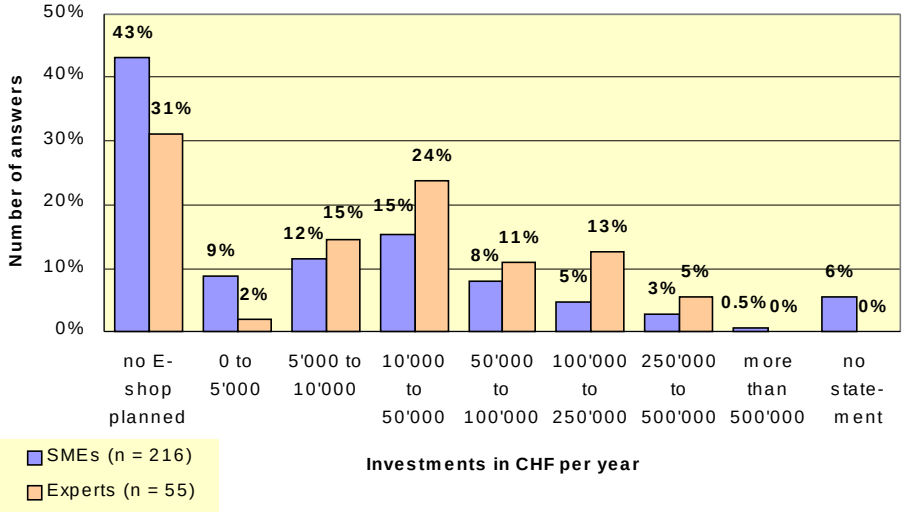


Figure 10: Investments in Own Online Shop in the Next Two Years



the Web server is run by a provider *(Web server with the provider)* (Figure 8). This means that the majority of companies has outsourced this service. It was surprising for us to see that however almost a third of SMEs operate their *own server*.

For the support of certain functions of an e-shop, such as online access to inventory or direct order processing, the seamless integration with an existing ERP system is necessary. For this reason we included a question on the current use of ERP systems. The findings show a very heterogeneous distribution of ERP systems. The high rate of responses in the category '*other provider*' (64%) reflects this situation. ERP systems are often specialized for certain sectors. *ABACUS*, *SAP (R/2 or R/3)* and *NAVISON* are the only systems which showed a certain dominance in use by SMEs. In the expert companies *SAP* and *ABACUS* dominated, resulting in 15 and 13% of responses. The heterogeneity of the systems show that the development of a personalization tool for SMEs (an original objective of our

project) had to be independent from a *specific* ERP vendor.

The study confirmed that online shops have not been broadly introduced by Swiss SMEs. 64% of SMEs and 47% of the experts state that they do NOT use any e-commerce software for the communication with their customers (on the sell side). The results show that there is no market leader for e-shop software. From the companies that already have an e-shop, 59% use *individual software* and 41% *standard software* (Figure 9).

We assume that some of the respondents did not distinguish between "individually programmed software" and "individually customized standard shop solutions," so the figure of 59% might be a bit misleading. Since around the time of our survey most ERP vendors were developing their e-business solutions with selected pilot customers and then adding the e-business module to their standard product suite, we estimate that the actual number of individually programmed e-shops is a bit lower.

In the future, only 43% of the SMEs and only 31% of the expert companies intend to remain without an e-shop (Figure 10). All other companies plan to invest substantially in their e-shop in the next two years; most of these companies (15% of SMEs and 24% of experts) have opted for an investment sum ranging between US$7,800 and 39,000 per year (6,400 to 32,000 EUR).

At first sight, the study design may appear as if very little of the survey actually dealt with personalization. This has the following reason: most SMEs in Switzerland are not yet sophisticated Internet users, so we decided to phrase most of the questions indirectly, rather hinting at personalization potentials than explicitly naming them. Without using the actual word "personalization," the answers to the questions nevertheless help us in deciding the future steps of the project.

INTERPRETATION OF FINDINGS & FUTURE RESEARCH

Some interesting statements about the need for personalization tools in SMEs can be deduced from the findings of the survey. SMEs value very highly—independently of e-commerce—marketing and sales-related success factors: customer advisory service, delivery reliability and close customer relationships are, according to their statements, of high importance for the success of the company. In the marketing and sales area, the strengthening of customer relationships and the quality of customer information are crucial. Altogether the results show that for SMEs, addressing the customer personally is a pivotal aspect for their company's success. Wherever e-commerce applications can be used at the interface to the customer, personalization can play an important role.

The findings of the study have encouraged us to proceed with our project to develop personalization tools for SMEs. An overwhelming number of SMEs are planning to invest considerable sums in their e-commerce solutions in the next few years. Many small companies have already established their own Web sites.

The study shows that the development of personalization software is no easy undertaking. Reality shows, however, that a world of widely differing systems is being used in internal systems (ERP) on the one hand, and in e-commerce applications (e-shop software) already in use on the other hand. The operating systems used also differ greatly. Furthermore, the majority of SMEs do not operate their own Web servers, but have outsourced this task to an Internet service provider. The only possible approach is that we involve ERP solution providers who develop standard modules to extend their existing systems. In an initial project we are developing a project method for the definition of requirements for personalization of ERP-based e-commerce solutions. The project method combines a set of useful creativity tools, elements of classical project management together with a method for rapid screen design. The most important issue is to make sure that people in SMEs and ERP vendors understand each other and manage to jointly develop a new generation of SME-suitable ERP II systems which include customizable, easy-to-use personalization features. Continuing with our research, we have initiated further projects with SMEs and their respective ERP vendors where we constantly apply and refine the method.

The difficulty in the development of a software lies in the fact that SMEs are today cautious about the use of such systems, and the technical preconditions are far from optimal due to the wide difference in the systems employed. Nevertheless, many companies are planning substantial investments in this field over the next few years. All in all, the study findings have confirmed our assumption that a need for standardized, inexpensive personalization software for SMEs exists, based on existing ERP systems, or will arise within the next few years.

REFERENCES

Adomavicius, G. and Tuzhilin, A. (2001). Using Data Mining Methods to Build Customer Profiles. In *IEEE Computer*, 34(2), 74-82.

Belz, C., Bircher, B., Büsser, M., Hillen, H., Schlegel, H.J., and Willée, C. (1991). *Successful performance systems*, (orginal title: "Erfolgreiche Leistungssysteme"), Stuttgart: Schäffer Verlag für Wirtschaft und Steuern GmbH.

Buxel, H. (2001). Customer Profiling in E-Commerce: Basic Methodology, Application Problems and Management Implications (Original title: Customer Profiling im Electronic Commerce: Methodische Grundlagen, Anwendungsprobleme und Managementimplikationen), Aachen: Shaker.

Ginsburg, M. and Weisband, S. (2002). Social Capital and Volunteerism in Virtual Communities: The Case of the Internet Chess Club. In *Proceedings of the 35th HICSS Conference*, Hawaii.

Godin, S. (1999). *Permission Marketing: Turning Strangers into Friends and Friends into Customers*, New York: Simon & Schuster.

Kimball, R. and Merz, R. (1996). *The Data Webhouse Toolkit: Building the Web-Enabled Data Warehouse*, New York: Wiley & Sons, 1996.

Pennar, K.(1997). The ties that lead to prosperity, *Business Week*, December 15.

Peppers, D. and Rogers, M. (1997). *Enterprise One to One: Tools for Competing in the Interactive Age*, New York: Ban-tam Doubleday Dell, 1997.

Schonfeld, E. (2002). eBay's Secret Ingredient, *Business 2.0*, Accessed February 17, 2002, at http://business2.com/articles/mag/0,1640,37743,FF.html.

Schubert, P. and Dettling, W. (2002). Extended Web Assessment Method (EWAM) - Evaluation Of E-Commerce Applications From The Customer's Viewpoint. In *Proceedings of the 35th HICSS Conference*, Hawaii.

Schubert, P. and Leimstoll, U. (2002). *Handbook Personalization of Electronic Commerce Applications* (Original title: Handbuch zur Personalisierung von Electronic-Commerce-Applikationen), Basel: Arbeitsbericht Nr. 7 des IAB, Fachhochschule beider Basel (FHBB), 2002.

Spiliopoulou, M. (2000). Web Usage Mining for Web Site Evaluation, in: *Communications of the ACM* (CACM), 43(8), 127-134.

Petra Schubert *is professor for E-Business at the University of Applied Sciences in Basel (FHBB). She received her doctorate in Information Systems from the University of St. Gallen. Her research interests include the study of management of e-commerce applications, specifically personalization and virtual communities. She co-edited four books containing business cases on successful e-business implementation strategies, e-fulfillment, e-procurement and e-business integration. She is a board member of Ecademy, the Swiss Competence Network for E-Business and E-Government of the Swiss Universities of Applied Sciences.*

Uwe Leimstoll *is a research associate in e-business at the Institute for Business Economics (IAB), University of Applied Sciences, Basel (FHBB). He studied Industrial Engineering and Management at the University of Applied Sciences Offenburg and Economics at the University of Freiburg im Breisgau (Germany). After working several years as consultant and lecturer, he received his doctorate in the Faculty of Economics at the University of Freiburg im Breisgau (July 2001). He is managing different research projects in the fields of personalization, Web analysis, group support systems (GSS) and e-business in SMEs.*