Personalization of E-Commerce Applications: an Empirical Study of Potentials and Readiness of SMEs in Switzerland

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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. Besides the theoretical fundamentals of personalization this paper will present 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) sceptical towards E-Commerce applications which include personalization. It furthermore becomes clear that the heterogeneity of organizational and technical conditions hinders the development of standardized tools.

1   Introduction

The quality of E-Commerce applications has been constantly improved over the last few years. Especially the major suppliers run websites which are of noticeable usefulness and which are reliable enough to assure the customer's trust [Schubert/Dettling 2001]. This is confirmed by continuously positive growth figures in online business [BCG 2001, pp. 11].

Many consumers already take it for granted that they will be addressed personally when they pay repeat visits to the major E-shops such as amazon.de, buch.ch or ebay.com, and will not have to key in their address and banking details with every new purchase. Apart from this basic aspect of personalization, the concept hides a wealth of

possibilities. They allow the shop operators to offer their customers additional tailor-made benefits [Schubert/Ginsburg 2000].

According to a new study by Mummert + Partner [2001] personalization will play *the* decisive role in E-Commerce in the coming years. A question which arises in this context is the competitive ability of small and medium enterprises (SMEs) which cannot invest large sums in costly personalization tools. Hence in this paper we want to concern ourselves with the issue of personalization from the particular angle of SMEs.

The following findings derive from an E-Commerce survey carried out in Switzerland. The acceptance of the Internet is comparatively high in Switzerland; in the year 2000 more than 90% of Swiss SMEs already had Internet access. Penetration depended heavily on the field and the number of employees [Sieber 2000, p. 74]. In larger companies with more than 20 employees penetration was over 90% whereas in smaller companies with fewer than 6 employees the rate of use was only 45%. In the meantime the tendency has been for the smaller companies to catch up on Internet use [Netzwoche 2001, p. 34].

The E-Commerce survey was carried out as part of a project which investigates personalization tools for E-Commerce applications. The aim of the project lies in the development of a concept for a standardized, inexpensive personalization tool for SMEs. In the light of the Internet situation in Switzerland outlined above, the general starting position for the introduction of personalized E-Commerce applications in SMEs in Switzerland appears comparatively favorable.

The paper is constructed as follows; we will first provide an overview of the opportunities offered by the personalization of E-Commerce applications. In the main part of the paper we will present the most significant statements of the companies and experts questioned. Finally we will draw conclusions for the currently emerging potential for the implementation of personalization tools in SMEs in Switzerland.

2 Personalization of E-Commerce applications

With *personalization* of E-Commerce applications the information presented on the screen is specifically directed at a user (customer). A specific form of personalization is individualization, in which the display is unique for an individual user (figure 1). Personalization is based on information available about the customer. This is known as user or customer profile [Schubert 2000a]. These profiles can arise in E-Commerce applications in different ways: through the recording of transactions and surfing behavior (historical), through asking about preferences (questioning) or also determined by the current context in which users find themselves (situative).

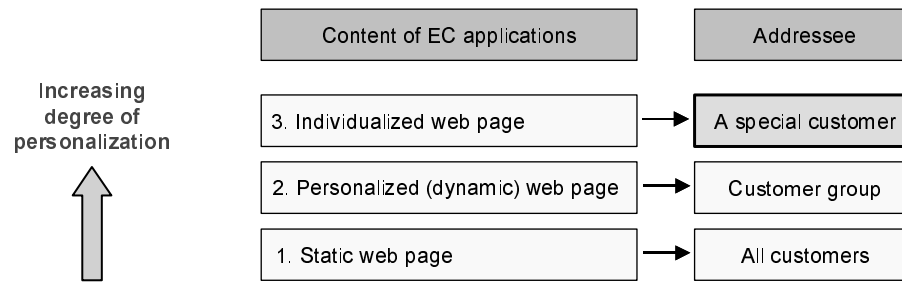| Content of EC applications		Addressee
3. Individualized web page	→	A special customer
2. Personalized (dynamic) web page	→	Customer group
1. Static web page	→	All customers

Increasing degree of personalization

Figure 1:   Degrees of personalization

In marketing, personalization supports one-to-one marketing [Peppers/Rogers 1997] which should increase the customer share over a lifetime. A related concept is that of mass customization [Pine 1993; Piller 2001]. What used to be possible in the corner shop, since the shopkeeper knew her customers personally, will be extensively possible in the electronic medium by the storage of profiles and the automatic evaluation on the basis of predefined rules. With mass customization the advantages of mass production (the same E-shop and the same product database for all customers) are harnessed to the strengths of individual production (personalized website) [Schubert 2000b]. As a rule these mass customization tools do not have the quality of the local shopkeeper; however, they assist in building up a personal dialogue with customers and thereby in binding them more strongly to the offer, with the proviso that customers desire this type of individual address.

Customer-specific quality and price differentiation, personalized cross-selling as well as tailor-made advertising methods count as further steps towards personalization. In order to tailor the offerings to individual customers you first have to get to know them. For this purpose, data already known to the company about customers and further data generated by users during interaction are recorded. From this data customer profiles are drawn up which allow a systemization of the related marketing measures (figure 3).

For the personalization of E-shops (online-shops), there are currently available integrated total packages, 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 which are generally destined for use in large companies. The standardized online-shops partially used in SMEs only contain rudimentary tools for the personalization of transactions.

Personalization can be an important component of the success of an E-Commerce application because it is beneficial to all interested parties [Buxel 2001]. From the E-Commerce supplier's point of view it represents a supplementary service which sets the switching costs at a high level and helps to bind customers to the offer on a long term basis. One fundamental reason for customer loyalty is often that customers have to invest a certain amount of time initially to feed into the system the most important information about themselves (preferences). If, subsequently, this information is actually used, there is little incentive for them to go through this process all over again with a rival. The main value for customers lies in the time saved and in the offer of information and products tailor-made to their needs.

There are various types of customer information which can be differentiated with regard to its extraction (recording of the dialogue or input from the customer) as well as its exploitation. Knowledge about a customer arises when the E-Commerce application operator gathers information about their clientele. This can either be through explicit asking of personal information or preferences in a data-input form (e.g. when making a necessary registration) or through the recording of interactions and transactions.

The process of personalization can be illustrated thus (figure 2):

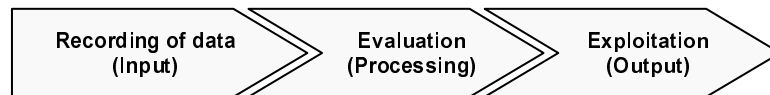| Recording of data (Input) | Evaluation (Processing) | Exploitation (Output) |

Figure 2:   Personalization process

The prerequisite for a successful personalization is meaningful customer profiles. Figure 3 shows the mechanism of personalization measures on the basis of various selected customer profiles.

Input

Profile / Place of storage	Identification profile	Preference profile	Interaction profile	Transaction profile	Ratings
Local client	(X)	(X)	X		
EC-server	X	X	X	X	X

Processing

Identification	Categories of choice	Assigned categories	Assigned categories	Collaborative filtering

Output

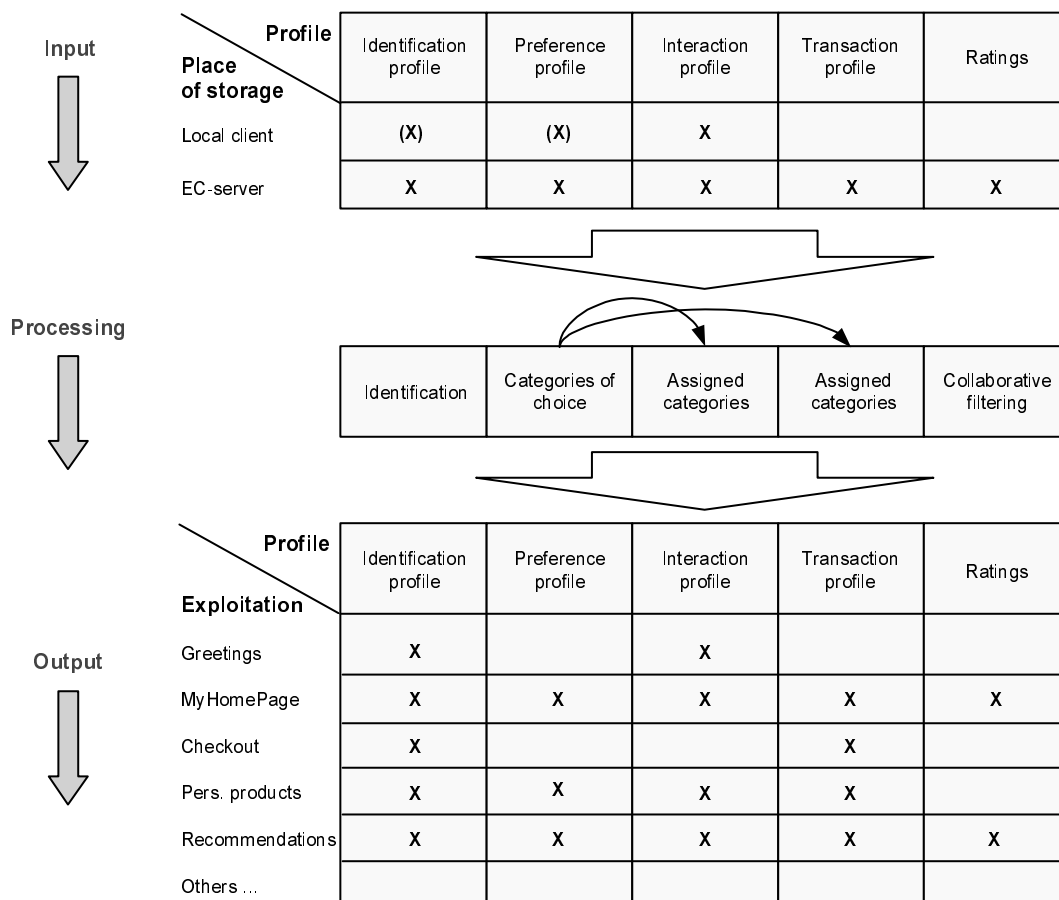| Profile / Exploitation	Identification profile	Preference profile	Interaction profile	Transaction profile	Ratings
Greetings	X		X		
My HomePage	X	X	X	X	X
Checkout	X			X	
Pers. products	X	X	X	X	
Recommendations	X	X	X	X	X
Others …					

Figure 3:   Mechanism of a personalization tool

Customer profiles can provide personalization functions without a specific customer having an extensive history of transactions. Through self-categorization and the assignment to categories with the help of templates a system which has already 'learnt' from the behavior of like-minded customers can provide even a new customer with its experiences. The process falls within the scope of collaborative filtering [Goldberg et al. 1992; Resnick/Varian 1997].

This study focuses on SMEs. We believe a separate consideration of these companies is meaningful because SMEs differ from 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 compared with corporations show the benefits and drawbacks of scale [Leimstoll 2001, pp. 132, pp. 155]. With regard to using E-Commerce applications above all limited financial resources, poor conceptional 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. In a small market segment SMEs offer specialized, qualitative high value products which are tailor-made to customers' needs (product differentiation). It is precisely for this reason that elements of personalization should also be applied in E-Commerce.

Bearing in mind the established opportunities offered by personalization we must examine which essential technical preconditions are fulfilled in SMEs and how much demand there is for personalization. The potential of personalized E-Commerce applications in SMEs as well as the requirements for the development of a personalization tool result from these three aspects.

3   Question Formulation and Design of the Study

The interests of SMEs are in the forefront of the survey, which was carried out in summer 2001. On the one hand the study is 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 the study is meant to show which technical and organizational preconditions are already met in 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 1250 randomly chosen SMEs in the region. Excluded from the survey were several freelance professions such as doctors 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, so as to record additional expert opinion. To that end the questionnaire was slightly modified and provided online. The experts were to answer it from the point of view of a company well known to them. The following table summarizes the most important details about the design of the survey.

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%

The explanations that follow are an excerpt from the whole study, primarily setting out the results of the SME survey. The 'expert' opinions will only be listed explicitly if they deviate significantly from those of the SME representatives.

4   Findings of the Study

Firstly some of the features of the firms surveyed are described, so as to present a picture of the underlying sample. This is followed by an analysis of the significance of marketing and sales processes for SMEs, and then comments will be made about Internet use and about evaluating the exploitation of personalized E-Commerce applications. Finally the technical and financial prerequisites for the development and operation of E-shops will be analyzed.

4.1   Features of the firms surveyed

In the SMEs the survey reached primarily *owners or managing directors* (53%) and *people responsible for IT* (25%). The remaining questionnaires came from people who fulfilled *both functions* (6%) and from people who had *other leadership functions*.

Amongst the experts chiefly *providers of IT services* or *management consultants* (45%) were addressed. A further number of the experts are *owners or managing directors* of the company (29%) from whose point of view they answered the questionnaire. The others hold *several* or *other functions*.

In the sample almost all areas are represented, mainly 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 clearly that the SMEs are chiefly represented by companies employing between 21 and 200 employees (figure 4). They account for 57% of the SMEs. A further 37% are made up of small firms with between one and 20 employees. Larger firms with more than 200 employees are barely represented.
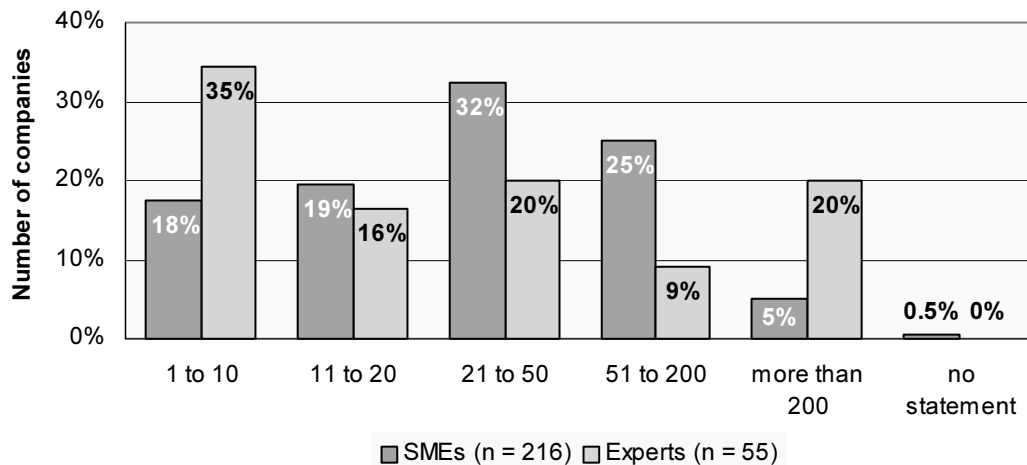
Figure 4:   Number of employees, calculated as full-time jobs (full-time equivalent)

In the expert group the size distribution looks different (figure 4); here there are a lot of small firms with between one and ten employees. They account for 35% of the companies evaluated by the experts. Noticeably high is the share of firms with more of 200 employees (20%).

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. telecommunication corporations). This relationship is also expressed in the number of customers. The SME group shows a far more balanced distribution of customer numbers.

Especially on the basis of the distribution of company size the sample cannot be seen as representative. It should also be assumed that there is a preponderance of participation in the survey by those companies which are already tackling the E-Commerce issue, or at least intend to in the near future.

4.2   The significance of marketing and sales processes for SMEs

The E-Commerce activities of SMEs are at the center of the present survey. In order to evaluate the future role to be played by E-Commerce for the companies, we first have to clarify the general significance attached to sales activities. Figure 5 shows a few selected factors which have been evaluated in view of their significance for the companies' future competitiveness.
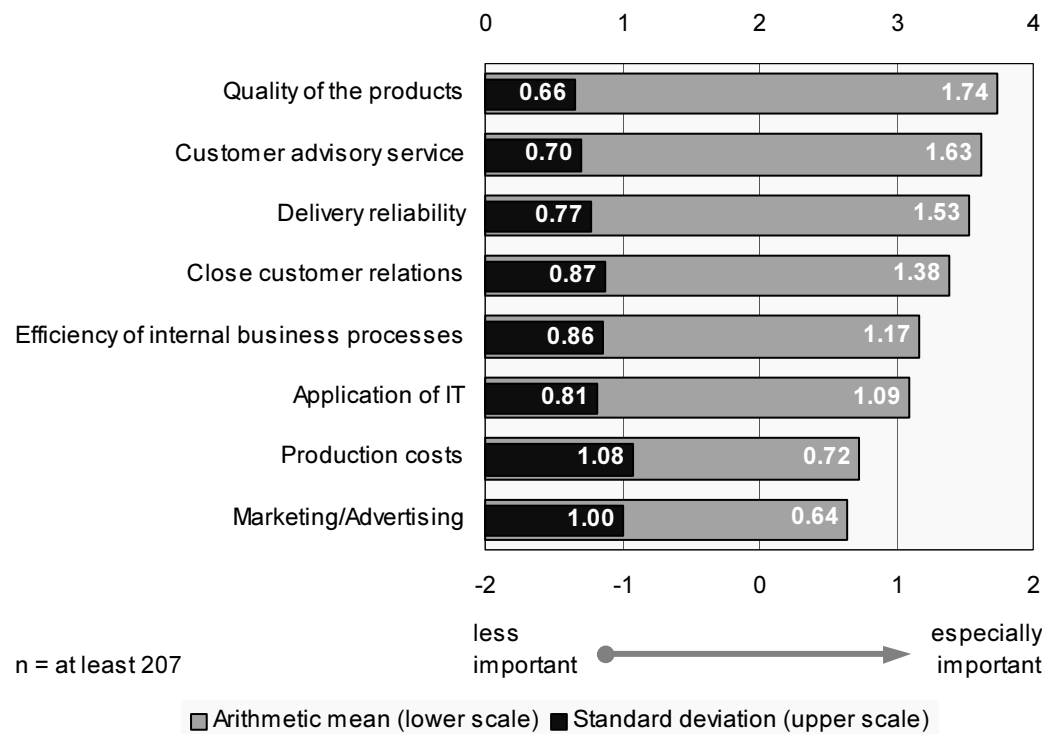
Figure 5: Success factors of SMEs based on the statements of SMEs

The companies are in fairly close agreement that the *quality of the products* will play an especially important role in the future. The sales-related factors, which are of especial interest here, *customer advisory service, delivery reliability*, and *close customer relations* follow immediately after in the order of their importance in places two to four. Thus they are evaluated higher than the *efficiency of internal business processes*, the *application of IT* in general and *production costs*. It is certainly somewhat surprising that *marketing and advertising* rank at the bottom (figure 5).

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, is placed higher. On the other hand, in the eyes of the experts, *efficiency of internal business processes* and *production costs* land in the last two places.

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

4.3 Current E-Commerce activities of Swiss SMEs

As mentioned in the introduction, empirical studies indicate that Internet use in Switzerland is steadily increasing. However, the concept of Internet use is seldom considered in a differentiated way. The manner in which the Internet is used will therefore now be clarified. The method of use gives information to some extent about the stage of development of the E-business applications implemented.

Figure 6 shows the results of an overview of Internet use. Represented are the various forms of use. Whereas the degree of extensiveness ('yes' answers) declines from top to bottom, the degree of planning ('planned' answers) first of all increases, and then declines again in the area of hitherto hardly-extensive applications ('no' answers).
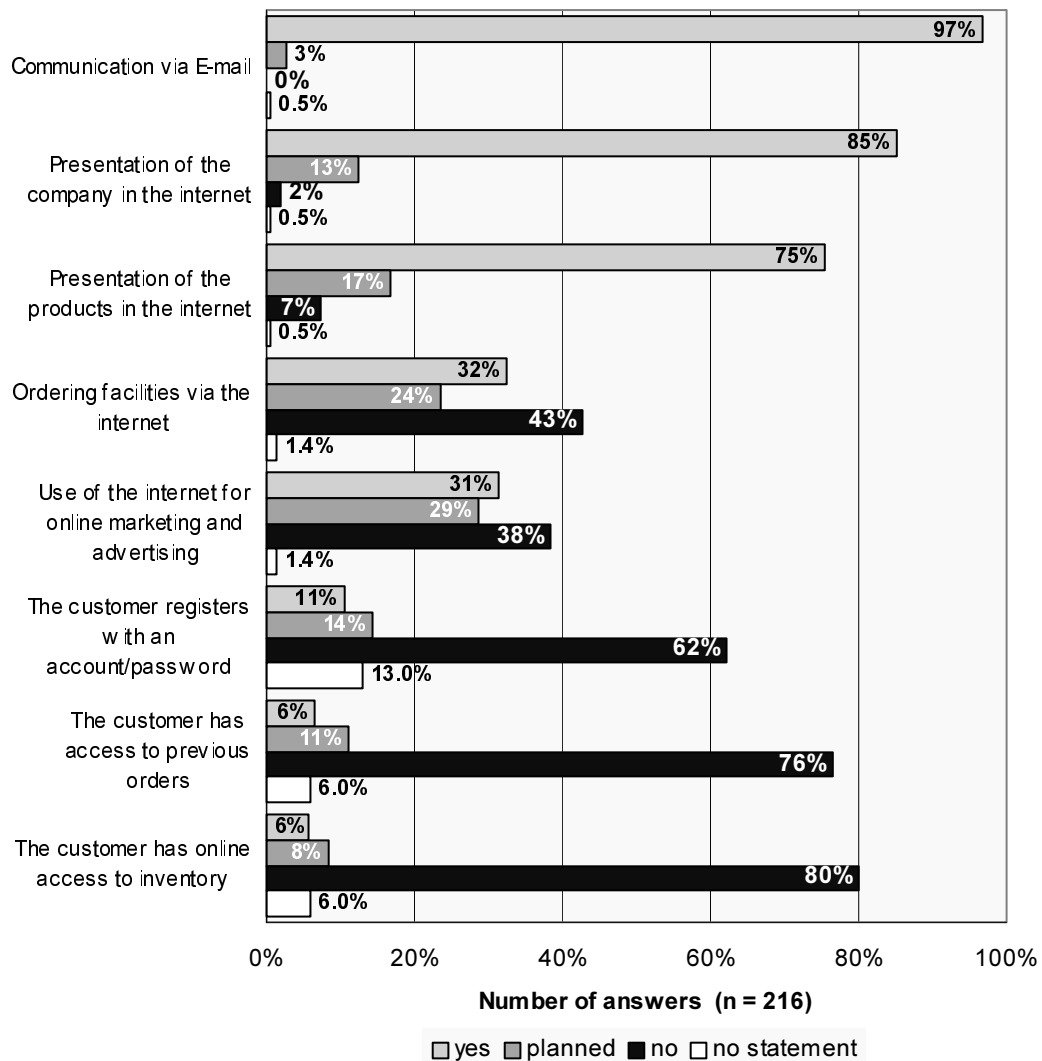

Figure 6:   Different uses of the Internet, based on statements of SMEs

The findings concerning E-mail use go slightly further than the findings of other studies; E-mail is used by nearly all of the companies surveyed and there is no firm that does not want to use E-mail for communicating. *Company and product presentation* is also widespread. If we include planned use, then soon 98% of companies will present information about the company and 92% will present information about their products in the Internet. The evaluation of the experts hardly deviates from this.

Internet applications which go beyond the functions of E-mail and Homepage are clearly encountered more seldom (figure 6). *Ordering facilities via the Internet* (practiced by 32% of companies surveyed) as well as *use of the Internet for online market-*

ing 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 extensiveness of 56 and 60%. These are considerably more widespread in the companies of the experts; there, *ordering via the Internet* is possible in 44% of companies, and 53% use the Internet for *online marketing and advertising*. Together with companies planning to apply these uses, within experts' companies the degree of extensiveness reaches 77 and 78%.

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 brackets: carried out/planned): *personal registration of the customer on the website* (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 here than with the SMEs; in the future about a quarter to almost a half of the expert-companies will offer these otherwise little widespread functions.

4.4   Basic functions in personalized E-Commerce

After the current situation regarding Internet use was identified, a further block of questions about the functions of personalized E-Commerce applications was in the foreground. Out of the many possibilities which these applications offer, some were singled out to see how they were evaluated by the companies surveyed (figure 7).
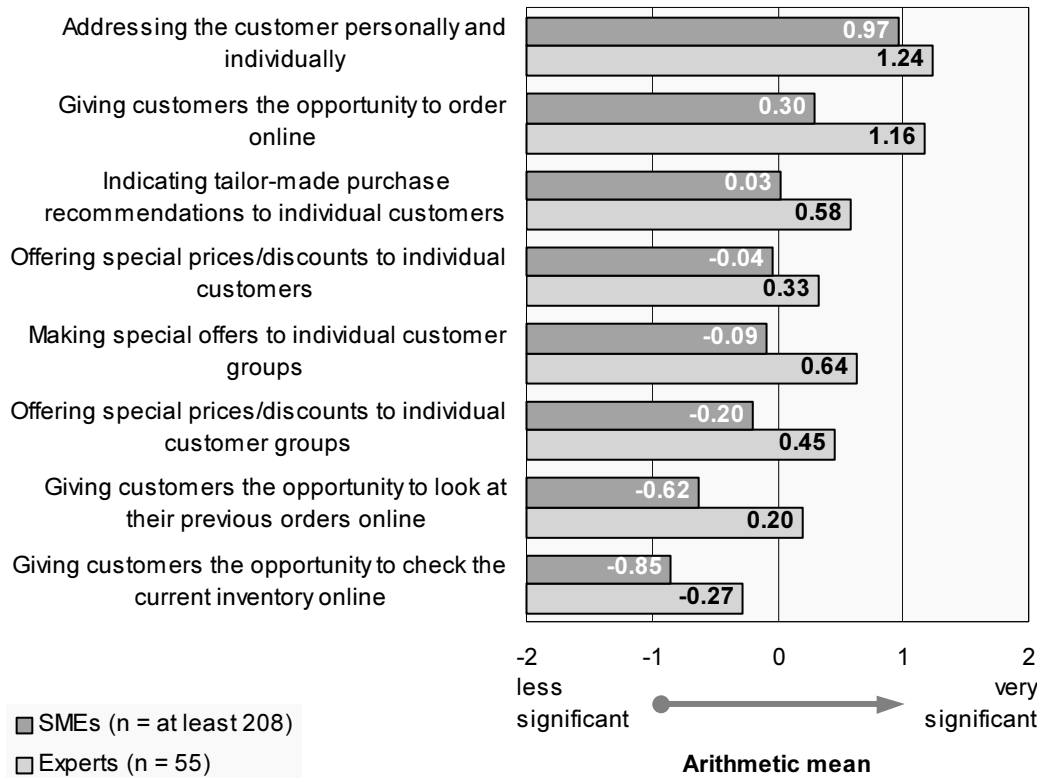
Figure 7: Significance of the functions of a personalized E-Commerce application; SMEs and experts in comparison

Out of the functions presented in figure 7 only a few are considered truly significant. On the five-part 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 questioned answer with '1' or '2'. Concerning the significance of *online ordering facilities* the score is 0.30, so that *online ordering facilities* can be classified under functions considered 'significant'. The same goes 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 judged 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). In the last case we have to note that *access to inventory* is not of importance in certain fields (e.g. services, which comprised 14.4% of the sample).

In contrast to the SMEs, the experts award overall markedly higher scores for the functions of personalized E-Commerce applications (figure 7). The differences are most marked with *online ordering* (Δ = 0.86), with *previous orders* (Δ = 0.82) and with the *opportunity to make special offers to individual customer groups* (Δ = 0.73). This finding illustrates clearly that the potential of personalization is evaluated cautiously by SMEs – more cautiously than by the experts.

4.5 Additional functions of personalized E-Commerce

E-Commerce solutions support and offer a number of further functions. Figure 8 compares the opinions of SMEs and experts regarding the useful application of these additional functions. The questions were formulated abstractly to find out which additional functions future E-Commerce solutions should offer in order to provide effective back-up to marketing and sales processes.

Both groups in the comparison mentioned the following functions most frequently: *Newsletter via E-mail*, *analysis of customers' surfing and purchasing behaviour*, *evaluation tools* and *cross-selling functions*. However, the frequency of these answers is far lower among the SMEs than among the experts.
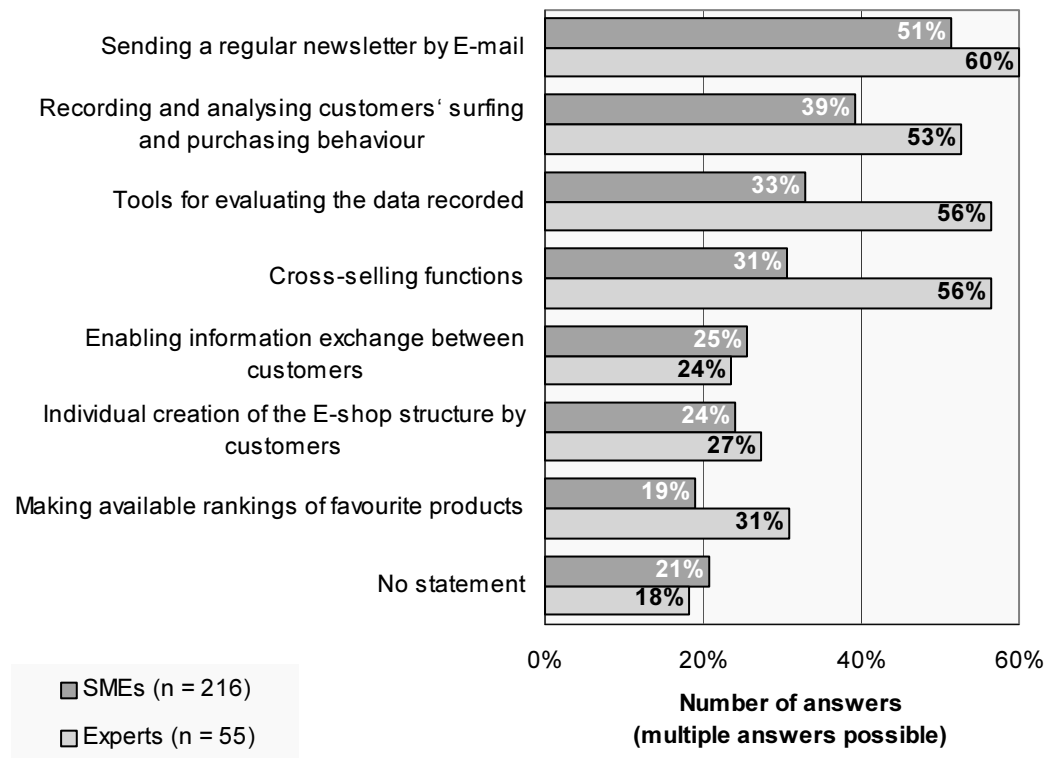

Figure 8:   Additional functions of E-Commerce applications to support marketing and sales processes; SMEs and experts in comparison

Classified among the not-so-frequently mentioned answers in both groups we find *information exchange between customers* (a community function), *customer creation of E-shop structure* and *rankings of favorite products*. Clearly only a few companies can imagine the positive effects on the marketing and sales process. However, *rankings of favorite products* is mentioned by 31% of the expert-companies.

The results of the comparison between SMEs and experts clearly indicate that the SMEs are more skeptical towards the opportunities of personalized E-Commerce solutions. Possibly they cannot imagine how the application of a personalization tool can be concretely implemented. The purpose of a newsletter is certainly the easiest to understand. Nevertheless, the experts' statements plainly show that the personalization of E-

Commerce will have a thoroughly positive effect on the marketing and sales processes of SMEs.

4.6 Development and operation of E-shops

As far as the operation of a webserver is concerned, 64% of the SMEs and 69% of expert-companies replying prefer *operation with the provider* (figure 9). Consequently the majority of companies have hitherto opted for the outsourcing of this service. It is certainly surprising that almost a third of SMEs already use their *own server*.
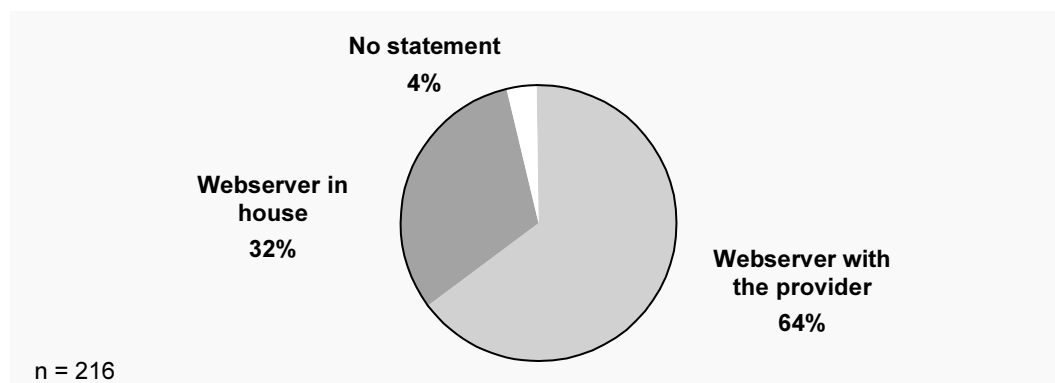

Figure 9:   Outsourcing of webserver operations; based on statements of SMEs

For certain functions of an E-shop, such as online access to inventory or the direct start to processing the order immediately after receipt, integration into an existing ERP system is necessary. For this reason the companies were also asked which system they use for the planning and control of internal processes (so-called ERP system).

The findings make it obvious that there are very many different ERP systems on the market. The high proportion of the rubric 'other provider' (64%) makes this abundantly clear. Mostly in use are applications specific to the particular field. *ABACUS*, *SAP (R/2 or R/3* and *NAVISON* are the only systems which are widely used in SMEs. In the expert-companies *SAP* and *ABACUS* dominate, with 15 and 13 percent of mentions. The heterogeneity of the systems applied suggests the development of the functions of a standardized personalization tool for SMEs independent of the ERP-software used.

Online shops have not been very extensive in SMEs up to the present. 64% of SMEs and 47% of the experts state that they are not using any E-Commerce software. It is not possible to find any one E-shop system which could be considered a market leader.

Systems developed in-house make up the greatest share of E-shop systems carried out to date. Amongst companies which already have an E-shop and have supplied information on it, 59% use *individual software* and 41% *standard software* (figure 10). This applies equally to both groups in the comparison. With these findings it has to be taken into account, however, that the description 'individually-programmed software' may also include individually-parameterized shops which are based on a standard application.
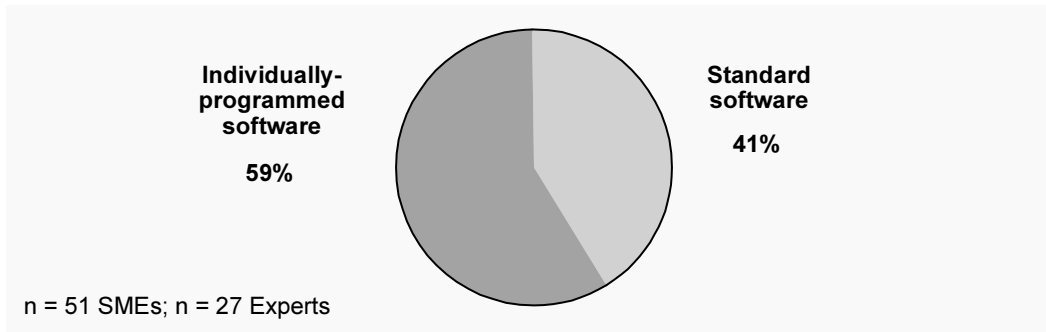
Figure 10:   Standard software versus individual software in the E-shop field

In the future only 43% of the replying SMEs and only 31% of the expert-companies want to do without an E-shop (figure 11). The 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 10'000 and 50'000 CHF per year (6'600 and 33'000 EUR).
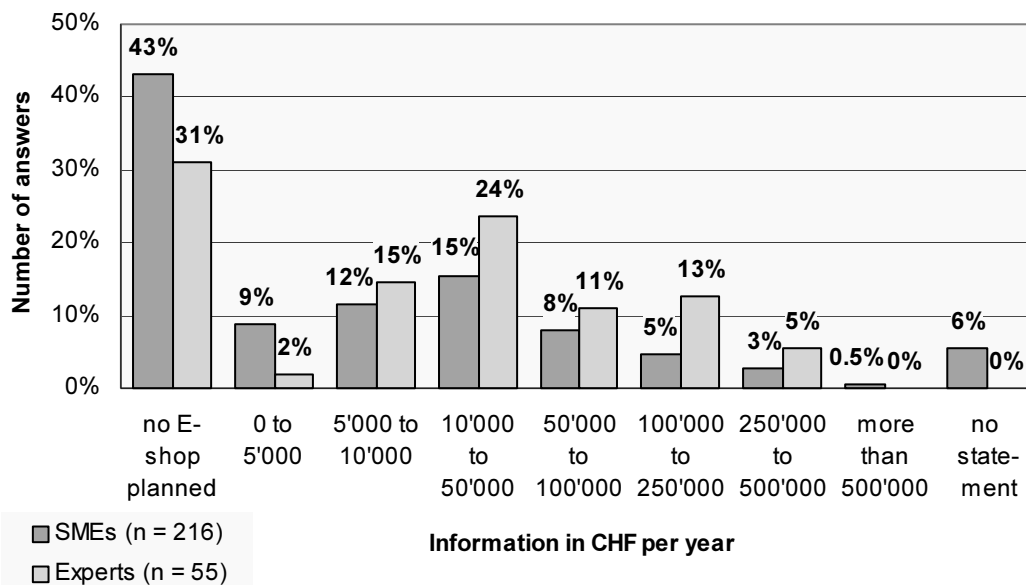

Figure 11:   Investments in own online shop in the next two years

5   Interpretation of the findings

Two types of conclusion can be drawn from the findings of the survey. One includes statements about the need for personalization tools as expressed by SMEs in their answers. The other comments on the consequences for the development of a personal-

ization tool which – based on the results of the survey – would be suited to application in SMEs.

5.1   Need for personalization tools in SMEs

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 relations are, according to their statements, of extreme importance for the success of the company. In the marketing and sales area the strengthening of customer relations and the quality of customer information are crucial.

In the specific area of E-Commerce applications addressing the customer individually and personally are also considered useful. The interviewees were very cautious with regard to the useful implementation of further functions of an E-Commerce application; apart from personal address the other functions were only barely considered 'useful'. The experts awarded positive scores to E-Commerce functions across the board.

These observations can be interpreted thus. For one thing it is conceivable that SMEs see the relationship to their customers as so significant that they do not want to risk any experiments with new technology in this area. They perceive the opportunity of personalization of Internet applications as an unsuitable instrument to address customers personally. It is furthermore conceivable that the SMEs cannot yet estimate the success potential of personalization, and so underestimate the opportunities. The high scores awarded by the experts would indicate that this is the case.

The partially contradictory answers on the part of the SMEs give some indication that the features and technical prerequisites of E-Commerce applications have not yet been fully understood (e.g. the point of an identified login, previous orders, insight into available inventory, server operating systems). The answers also show that several functions have been evaluated as useful, although their implementation is not foreseen. Hence there is a discrepancy between the expected use for the company and the implementation into concrete applications.

5.2   Development of a personalization tool

Basically the findings of the study have encouraged us to proceed with our project to develop a standardized personalization tool for SMEs. An overwhelming number of SMEs are planning to invest considerable sums in their E-Commerce solutions in the next few years. Many already have their offering up and running in the Internet.

The findings of the study show that the development of such a tool is no easy undertaking. Reality shows, however, that a world of widely-differing systems is being used by internal systems (ERP-software) on the one hand, and by E-Commerce applications (E-shop software) already in use on the other. 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.

This has the following consequence. We cannot start with a particular software (e.g. the market leader) and extend this with additional functions. The only possible approach is the programming of easily integratable standard modules which offer open in-

terfaces to the multiplicity of software solutions offered today. In the last few years the Internet field has established standards which are favorable to our project. These include, e.g. standard formats for log files (CLF, ECLF), profiling standards for customer profiles like P3P, data exchange formats like XML, SQL as query language for different databases, LDAP for user administration. The aim of the software to be developed will be to assure an integration in multiple platforms by means of open interfaces and good documentation. The installation must be carried out parametrizably (operating system database and E-shop are chosen on installation). It would appear advisable to include Internet service providers as partners in the development, or to let the resulting product be offered via this partner. In this way personalization could be an additional offer of E-Commerce solutions for providers.

Personalization software is already available on the market. Powerful, expensive products, such as for example that of Broadvision, are increasingly being adopted by larger companies. These tools are too expensive and oversized for SMEs. Here there is the same need for adaptability as in the use of SAP (for large companies) and ABACUS (for small ones). SMEs need 'simple' solutions – preferably standard software products – which can be cheaply adapted for web servers or E-shops.

It is generally established that personalization functions in Internet applications are a must for large corporations. Users quickly get used to the opportunities of interactive applications and personal address will be a standard feature of high quality E-services in the future. In our opinion the SMEs must not miss the boat.

6   Concluding remarks

The conclusions of the study for the development of a personalization tool is encouraging as well as sobering. Altogether the results show that it is precisely personal customer address that SMEs consider to be a key function for company success. Wherever E-Commerce applications can be used at the interface to the customer personalization can play an important role. The difficulty in the development of a tool lies in the fact that SMEs are today cautious about the use of such systems, and the technical preconditions are not optimal due to the wide difference in the systems employed. Nevertheless, over the next few years, substantial investments are planned in this field by many companies. All in all the, study findings have confirmed us in our assumption that a need for standardized, inexpensive personalization tools for SMEs exists, or will arise within the next few years.

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