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E-Business Adoption in Marketing and its Relationship with Factors in SWOT Analysis: an Empirical Investigation of Small Software Businesses

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ABSTRACT

This research gives empirically grounded insights into e-business adoption in conjunction with factors usually considered in SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis in Austrian micro and small to medium sized software enterprises. The study evaluates the degree in which the Internet is used in supporting the firm's primary activities in marketing and sales based on primary data collected from 141 Austrian software firms. The results show that internet usage in this area is dependent on the size of the company. While almost all small to medium sized enterprises apply e-business to some degree, many micro enterprises do not seek to utilise possible potentials. The study reveals that firms perceiving their relative strengths on branding, pricing, product diversity, internationalisation, and access to new technologies have adopted more advanced e-business support. From the external perspective, organisations more intensively relying on e-business tend to experience less competitive pressure, have lower capital resources, and consider international markets more often as business opportunities than their competitors.

Keywords: software industry, e-business, e-marketing, SMEs, success factors

1. INTRODUCTION

Small businesses worldwide occupy an important economic position since they constitute key drivers of innovation, economic stabilisation, and employment [1-4]. This also seems to be the case for the Austrian computer software industry [5]. The software business itself is highly competitive, complex, knowledge-intensive, and characterised by a highly globalised as well as dynamic business environment. Software enterprises are therefore increasingly reliant on utilising new strategies to remain competitive. The Internet provides managers with opportunities to fortify and strengthen their competitive advantages [6, 7]. Recently published academic findings show a wide spectrum of possible effects of e-business on organisational performance [8]. The potential of e-business is believed to be a precondition for the success of future business organisations [6]. E-business is seen as a means to strengthen the competitiveness of firms [9]. Small software businesses tend to offer selective products and services connected with limited buying mobility of potential customers, instead of mass products where infinite multiplication of choices exist. It is believed that selective brands drive e-business as an strategic opportunity [10].

Empirical research that uncovers the impacts of e-business and relationships between utilisation rates and strengths, weaknesses, opportunities and threats (SWOTs) is underdeveloped. This paper answers the call for more exploratory, empirically grounded work [11] by focusing on: (i) e-business utilization, (ii) and interdependencies between SWOTs and e-business utilization. In all steps of analysis the focus lies on

micro as well as small to medium sized enterprises in the Austrian software sector. This article is restricted to Business to Consumer (B2C) e-business covering all offline and online marketing transactions using Internet based information and communication technologies. Marketing/sales is seen as the most frequently area impacted by e-business, i.e. it affects first ways in which the firm operates with the market [4]. The work assesses the impact of the Internet's growing influence on marketing strategy and possible relationships with perceived SWOTs. It does not elaborate on e-business models, frameworks, and adoption as well as operation practices.

The article is organised as follows. The chosen methodology and details concerning the acquisition of data are given in the next section. Thereafter, the frameworks for analysing the endogenous and exogenous situation are presented. This is followed by the analysis of the empirical data, which comprises the firm size distribution and e-business adoption in the industry as well as endogenous and exogenous perspectives. The last section concludes the article.

2. METHODOLOGY

The methodology employed is an empirical study of the Austrian computer software industry undertaken in the year 2000. The supplied address material for the study contained not only all Austrian software companies but also many hardware manufacturers and other IT firms. Therefore the empirical work undertaken had to consist of two steps. The first step allowed the screening of the provided address material in order to filter out the relevant software companies for the second main step of

analysis. In order to be included in the main sample, firms had to belong to the software industry, which was divided in three segments: Packaged software (SIC 7372, respectively NAICS 51121, 334611), custom software and software related services (SIC 7371, 7373 respectively NAICS 541511, 541512) [12]. Although custom software, i.e. software that is produced only once, is viewed as service output [13] this segment was considered separately. For both, the pre-liminary and the main analysis, the design of a questionnaire which was validated in several pre-tests was necessary. For the pre-liminary phase random sampling was employed and the 600 chosen companies were contacted by telephone. The achieved response rate was 70.4%. Some companies could not be contacted, because they had ceased to exist, the address was wrong or could not be found, etc. These neutral dropouts were considered in the calculation of the response rate and therefore did not decrease the return quota. On completion of the preliminary analysis structured face-to-face interviews followed in the main step of analysis, which based on a stratified and disproportional sample with subgroups according to company size. The rate of return for this second and main step of the study was 55.6%. After completing both, the pre-liminary and main step of analysis, non-response effects were examined. The analysis (regarding known distributions of variables of the Austrian computer software market such as the type of the organisation) revealed no significantly different characteristics between non-respondents and respondents.

The main questionnaire assessed general company information, the endogenous situation, exogenous data, and questions on co-operations. This endogenous section also covered the level of support of marketing objectives through use of Internet technology. The question was stated so that all organisations regardless of their software sub sector or their different e-business tactics were able to respond on their Internet utilisation rate. This included mentioning examples for online and offline e-business tools such as e-newsletters, web banners, web sites or portals. It is important to mention, that this article does not consider the area of e-procurement or e-sourcing. The assessed variable only refers to primary activities in marketing products and services.

3. SWOT ANALYSIS

Although there is an extensive amount of literature covering the strategic planning process, most approaches include a cyclic iteration of the following five elements. The strategic planning process begins with a statement of the corporate mission and goals (step 1). This is followed by the analysis of the organisation's external competitive environment (step 2) and the analysis of the organisation's internal operating environment (step 3). The internal analysis is followed by the selection (step 4) and the implementation of

strategies (step 5). The last step also involves the design of the organisational structure and control systems necessary to implement the chosen strategy [14, 15]. The focus of this article lies upon step 2 (external analysis) and 3 (internal analysis). The purpose of the external analysis is to identify opportunities and threats in the organisation's operating environment, while the internal analysis seeks to pinpoint the organisation's strengths and weaknesses. Many companies are conducting a SWOT analysis as part of the strategic planning process to identify the strengths, weaknesses, opportunities and threats before proceeding to the formulation of a strategy [16, 17]. SWOT analysis, respectively the analysis of "key" or "critical" success factors, belongs to the highest ranked set of techniques of strategic analysis used by firms in empirical surveys [18].

3.1 Internal Analysis

This work seeks to analyse if the endogenous situation faced by the firm is interrelated with the applied level of e-business initiatives. For the development of the framework this research builds on the generic building blocks of competitive advantage together with a resources and capability based view: Efficiency, quality, customer responsiveness and innovation are the generic building blocks of competitive advantage that every software company can adopt. Achieving superiority requires an organisation to develop appropriate competence, which in turn is a product of the kind of resources and capabilities that a company possesses [15]. The variables that influence the long-term business success were therefore categorised into six areas:

- Resources
- Capabilities
- Efficiency
- Quality
- Customer responsiveness
- Innovation

The distinctive competence of a software company arises from two complementary sources: its resources and capabilities. The distinction between resources and capabilities is important in understanding what generates specific competence. Without the appropriate resources, the company may not be able to create a distinctive competency [15]. The inquired variables contributing to the resource-based view were "acquisition of venture capital", "equity capital situation", "trademark/label" and "image". Variables used to assess the capabilities of the organisation were "internationalisation capabilities", "order/project procurement", "organisational structure", "adherence to costs and schedules", "employee motivation" and "employee qualification". While only efficiency was not divided into sub-areas, quality was analysed by the factors "product quality" and "business process quality", customer responsiveness was represented by the variables "product diversity", "price levels", "customer

satisfaction", "level of specialisation" and "customer orientation", and to innovation the variables "know-how embedded in company" and "access to new technologies" were attributed. Although the inquired variables were allocated into different groups, they are highly interrelated. For example, factors contributing to innovation such as "know-how embedded in the company" or "access to new technologies" can also enhance quality, efficiency and customer responsiveness.

3.2 External Analysis

The independent variables of the external perspective were subdivided into potential exogenous growth barriers (threats) and potential exogenous growth drivers (opportunities). The selection of variables for both groups was influenced by the Porter's five forces model [19] and a wider macro-environmental view. Industries are embedded in a wider macro-environment, which comprises the technological, social and demographic, ecological, political and legal, and broader macro-economic environment [15, 20]. Changes in the macro-environment can have a direct impact on the five forces in Porter's model.

The potential exogenous growth barriers deemed as relevant for the analysis in conjunction with e-business were:

- Marketing/distribution in foreign countries
- Culture, varieties in language
- Trade/commerce law issues
- Governmental regulations
- Lack of ITC standards
- Acquisition of capital
- Labour legislation issues
- E-business maturity in Austria
- Austrian market size
- TC costs and infrastructure in Austria
- Software piracy
- Rivalry

As potential exogenous growth drivers the following criteria were selected:

- EU Software patent protection initiative
- Break-up of the former eastern bloc
- EU east expansion
- EU domestic market
- Liberalisation of telecommunications

4. EMPIRICAL RESULTS

4.1 Distribution of company size

The empirical data showed a strong overbalance of smaller software enterprises in Austria: Micro-enterprises (ME) account for 55.7% of the Austrian software organisations, 32.2% can be attributed to small-to-medium sized enterprises (SME), and 12.1% to large enterprises (LE). Classification was performed

using data on number of employees, turnover and independency following the definition proposed by the Commission of the European Community (EC, 1996). The applied criteria and the approximated overall number of software enterprises in Austria are presented in Table 1. In Austria the average firm size has declined in line with smaller firms entering the industry. Especially at the end of the 1980's and the early 1990's annual growth rates of over 20% (measured by number of enterprises in Austria) caused the decline of average firm size.

Table 1. Company size distribution

Size	Empl yees	Turn over Mio.€	Indep end. ¹	No. of comp. (rel.)	No. of comp. (abs.)
ME	1-9	< 7	< 25%	55,7%	1.082
SME	10-249	< 40	< 25%	32,2%	625
LE	> 250	> 40		12,1%	235
Total				100%	1.941

¹ Capital share in external ownership

In the following sections analysis was performed only for the MEs and SMEs which constitute the research focus of this article. Consequently, from the 174 datasets 91 MEs (weighted N=97) and 50 SMEs (weighted N = 56) were included in the analysis, whereas two SMEs did not respond on e-Business utilisation.

4.2 E-Business Adoption

This study assessed the degree in which the Internet is used in supporting the firm's primary activities in the marketing area on an interval-scale from 1 (never) to 5 (very intensively). To test whether MEs and SMEs have identical distributions the Mann-Whitney U Test was applied, which is a nonparametric alternative to the independent-sample Student t test. It revealed that significant differences ($p < 0.05$) exist. The data showed that in the mean SMEs are more intensively engaged in e-business compared with MEs. The following exploratory analysis was undertaken for each group of companies classified by their size separately.

The data set comprising only MEs exhibits a clear kurtosis and low skewness, i.e. indicating a very symmetric distribution. The variability of the data set is high. A great part of the organisations ignore e-business while approximately the same proportion of respondents already embraces e-business based transactions. Traditional marketing and communication channels are still predominant in the case of MEs. Many companies do not even build on the simplest e-based methods. Among SMEs, the distribution changes significantly. In SMEs, the utilisation rate of e-business is concentrated around a high level of utilisation. Only a small minority of SMEs have not implemented any e-business initiatives.

4.3 Internal Analysis

The endogenous success factors given in a previous section had to be rated by managers of Austrian software companies on an interval scale based on our local school grading system from 1 (very positive) to 5 (very negative) as perceived in their own organisation. The first step of analysis was to test if there is a relationship between e-business utilisation and endogenous success factors. As a non-parametric test of statistical significance for bivariate analysis, the Chi square test was applied followed by an analysis of cross tabs with a special focus on standardised residuals to identify influential observations [21]. The strength of a possible relationship between success factors and the size of the company was analysed by calculating the Spearman rank correlation coefficient. Again, a non-parametric measure was used, which does not make any assumptions about the underlying frequency distributions.

The following analysis was applied in multiple steps. The first step comprised MEs and SMEs grouped together, followed by separate steps of analysis for each group of companies. Viewing both MEs and SMEs together, the study identified seven out of the twenty success factors analysed that showed differences in how they were rated by managers dependent on the rate of e-business adoption. Among MEs, six variables remained. Considering SMEs, four factors showed a significant relationship (see Table 2). It can be noted, that due to the impact of sample size on statistical power, less statistical significance is achieved with SMEs, where the number of observations is lower (50) compared to MEs (91). The endogenous situation improves with e-business utilisation for almost all identified relationships. The analysis of residuals for non-correlated factors has shown the same tendency.

The internationalisation capabilities improve, especially in SMEs, with higher e-business adoption levels. This reflects that the use of information and communication technologies in general, decreases the costs of distance, especially for more product rather than service oriented firms. The Internet is an enabling technology to reach new customers and suppliers in an affordable, more efficient and effective way [9] without the necessity to set up and maintain local branches in foreign markets. For MEs, the data shows that firms that see their relative strengths in the areas of trademarks/labels, product diversity, and price levels are more intensively engaged in e-business. These factors seem to be key strengths that motivate software firms to market their products and services in the Internet, consequently not fearing the associated global transparency. The ability to access new technologies is positively related with higher e-business adoption levels. Another study reported that the highest barrier for SMEs to doing business on the internet is the lack of technical skills [22]. This research adds empirical evidence to this statement applicable to

the software industry. The empirical evidence supporting this relationship is limited to the sample comprising all companies. The significance was lost when analysing both groups defined by company size separately. Efficiency was expected to be better in organisations with more e-business supported operations. A significant relationship was detected for all companies analysed together, but no sensible pattern underlying the relationship was identified. The same situation applies to product quality. A surprising indication is that MEs with lower customer orientation levels have more widely adopted e-business. The link between firms and their customers is believed to be strengthened by enabling e-business. Finally, the ability to acquire venture capital improves with the level of e-business diffusion. In general, MEs and SMEs with venture capital background passed a sales and marketing due diligence, which gives an explanation for their above average inclusion of state-of-the-art information and communication technology in their marketing models.

Table 2. Identified endogenous success factors showing dependencies by Chi²-Test and/or Spearman Rank Correlation Coefficients

No.	Variable	Classification
1	Internationalisation	Capabilities
2	Product diversity	Customer responsiveness
3	Price levels	Customer responsiveness
4	Customer orientation	Customer responsiveness
5	Efficiency	Efficiency
6	Access to new technologies	Innovation
7	Product quality	Quality
8	Trademark/label	Resources
9	Acquisition of venture capital	Resources

To identify how and if the significant endogenous criteria relate as sets to the e-business utilisation variable, two stepwise regression analyses were performed for each group defined by company size. It was therefore implicitly hypothesised that a multivariate model can be found, that significantly predicts e-business utilisation as the dependent criterion. The results of the stepwise analyses are reported in Table 3. For MEs, five steps were calculated, i.e. while five of six factors retain in the regression equation, the trademark/label factor was omitted. Due to the stepwise approach, all remaining factors significantly contribute to the model and therefore explain e-business utilisation. The extent of change in e-business utilisation for each 1-unit change of predictors seems to be similar. The direction of the change is different for product quality and customer orientation compared with the other factors significantly contributing to the final model. Product diversity was the first measure to be included in the stepwise calculation. Specifically, 31% of the

variance in e-business utilisation is explained by the five success factors in the final model ($p < 0.01$).

Table 3. Results of stepwise regression analysis of e-business utilisation on significant endogenous factors in MEs

Step	Variable	B	R ²	corr. R ²	Δr^2
1	Product diversity**	-0.50	0.11	0.10	-
2	Product diversity**	-0.58	0.18	0.16	0.06
	Customer orientation**	0.56			
3	Product diversity**	-0.50	0.25	0.22	0.06
	Customer orientation**	0.65			
	Price levels**	-0.56			
4	Product diversity**	-0.46	0.31	0.28	0.06
	Customer orientation**	0.73			
	Price levels**	-0.55			
	Acquisition of venture capital**	-0.30			
5	Product diversity**	-0.50	0.35	0.31	0.03
	Customer orientation**	0.67			
	Price levels**	-0.57			
	Acquisition of venture capital**	-0.34			
	Product quality*	0.46			

* $p < 0.05$, ** $p < 0.01$

The regression constant was excluded from the table for every step.

For SMEs, four factors were included in the calculation, whereas two retained in the regression equation and together significantly explain e-business utilisation (see Table 4). With the final regression function, 16% of the variance in e-business utilisation is explained by the two variables ($p < 0.01$).

Table 4. Results of stepwise regression analysis of e-business utilisation on significant endogenous factors in SMEs

Step	Variable	B	R ²	corr. R ²	Δr^2
1	Internationalisation*	-0.24	0.10	0.09	-
2	Internationalisation**	-0.28	0.19	0.16	0.07
	Trademark/label*	0.45			

* $p < 0.05$, ** $p < 0.01$

The regression constant was excluded from the table for every step.

4.4 External Analysis

During the interview, the companies assessed the given exogenous variables according to their perceived influence on business growth on two different interval scales for each of the following groups: potential exogenous growth barriers and potential exogenous growth drivers. With these variables the same analysis as presented above was conducted. The analysis showed that observed e-business utilisation had a significantly

different distribution depending on a number of external factors more specifically in SMEs. An interesting indication is that managers in SMEs who are more intensively relying on e-business are experiencing less rivalry than their competitors. The marketing opportunity in the European Union is considered as a more important growth driver by software managers employed in firms with higher e-business utilisation. Finally, firms with lower capital resources more intensively exploit e-business. For the remaining factors, no clear direction of the dependencies was identified.

Table 5. Identified exogenous factors showing dependencies by Chi²-Test and Spearman Rank Correlation Coefficients

No.	Variable
1	EU domestic market
2	Labour legislation issues
3	Marketing/distribution in foreign countries
4	Acquisition of capital
5	Austrian Telecommunication costs and infrastructure
6	Rivalry
7	EU Software patent protection initiative

In analogy to the previous section, stepwise regression analyses were performed to complement the analysis with a multivariate method considering all detected significant variables together. Since no multivariate dependency profile was detected for MEs, the analysis was undertaken for SMEs only. The calculation process based on the identified exogenous factors as predictors was not able to conclude with a sensible and statistically significant model.

5. CONCLUSIONS

The paper provides empirically grounded insights into e-business utilisation in conjunction with related endogenous as well exogenous factors for MEs and SMEs in the Austrian software industry. In MEs, the usage of e-business tools in marketing their products and services is diverse with many organisations ignoring e-potentials. Among SMEs, e-business is variability is much less, i.e. most companies already seek to complement and enhance their marketing skills with e-business tools. They exploit e-business as an additional marketing channel, allowing for a global reach. They therefore follow Porter's argument that organisations should use the Internet in conjunction with their traditional business models and activities [7].

The analysis of the internal situation faced by the firm showed that a number of success factors were perceived as relative strengths in companies with better e-business support. E-business can be advantageous or disadvantageous to the business strategy of small firms [22]. Behind this background it does not seem surprising, that branding and pricing together with an attractive product portfolio were identified as key

strengths connected with the decision to engage the global market via the Internet. The ability to access new technologies seems to improve with higher levels of e-business adoption. If e-business is considered as a technology based innovation meant to redesign or complement primary activities in marketing and sales, it seems reasonable to expect that technology innovators among SMEs and MEs should show a higher e-business adoption rate. A surprising result was that customer orientation decreases with the level of e-business support in MEs. The external perspective embracing a number of factors regarded as threats and opportunities showed a less number of factors with significant relationships. Companies more intensively relying on e-business tend to experience less competitive pressure, have lower capital resources, and consider the international markets in the European Union as a more valuable business opportunity than their competitors.

In addition to correlation and dependency tests, multivariate regression analysis was applied to see if the variation of e-business utilisation can be explained by a multivariate consisting of the endogenous, respectively exogenous criteria for MEs and SMEs separately. The results showed that the multivariate relationships were found in the endogenous framework. Although exploratory regression models were calculated, this study can not help to distinguish between causes and consequences of e-business adoption.

Due to the highly globalised nature of the software industry, the findings should also be applicable for other countries, especially in the European Union. Future e-business research at our department will focus on in-depth case-based analysis to create an Austrian taxonomy of e-business strategies for small software business which can be compared with the wide selection of approaches, typologies as well as other taxonomies brought forward in academic literature.

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