

Electronic Business in Germany: Current Challenges and Future Perspectives - Results of an Explorative Survey -

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ABSTRACT

The objective of the present contribution is to present the results of an explorative survey in the field of E-Business conducted with German enterprises at the end of the year 2003. The survey aimed to convey a picture of the present stage as well the future trends of E-Business in the German entrepreneurial world. An analysis of the present and future developments of E-Business as well as of the related organisational, technical and human implications for enterprises will be presented. Limitations and open challenges of research as well as the planned further work will be eventually discussed.

Keywords: Electronic Business, Explorative Survey, Germany

1. BACKGROUND OF RESEARCH

1.1 Introduction

During the past years, the fast development of new Information and Communication Technologies (ICTs) has been revolutionising the market arena, it extended the horizon of competition, and it caused radical changes in all business branches [3] [12]. The effects of the introduction of E-Business (EB) were an enhanced globalisation process, an even more uncertain and dynamic economic environment, and a technology-driven development of new capabilities, products and services as well as new businesses [12] [13]. This was the case also in the German economy and entrepreneurial structure [3] [13].

In order to analyse the current state as well as the implications of the short but intense history of EB in the German entrepreneurial world, as well as in order to identify key success factors, challenges and future trends, at the FIR it was decided to start a series of empirical works, which the present work belongs to.

1.2 Scope of the explorative study

In this contribution we are going to present the results of an explorative survey, entitled "E-Business in Germany – Success Factors and Obstacles", which was conducted with a sample of German enterprises at the end of the year 2003. The survey aimed to convey a picture of the present stage as well the future trends of EB in the German entrepreneurial world. In particular, the research strived to analyse the current state of EB in German enterprises in order to identify its relation with their economic success, strategy, organisation, processes, ICT infrastructure, and personnel. Furthermore, critical success factors as well as most significant obstacles for companies within the deployment of EB were also sought.

This explorative survey has to be seen as the initial step of a wider research framework; as a matter of fact, its ultimate objective is to enable an initial analysis in order to identify patterns and research areas to be then further and deeply analysed within following empirical works.

2. RESEARCH METHODOLOGY

2.1 Phases of research work

The research work was structured in the following phases:

1. *Selection of an appropriate approach of empirical research*, in which after an analysis of different methodologies of market research [6] [7] [8] [9] [10] [11] [14] [15], the approach of explorative survey with partial census and proportional selection of participants was found to be the most appropriate within the several approaches of primary research. In particular, the survey was planned to internet-based [1]; all participants were to be approached only via email and were asked to fill in the questionnaire online. An option to fill in the questionnaire offline and to send it back by fax or snail mail was also to be offered.

2. *Survey design and technical implementation*, in which the core elements of analysis were identified, the different hypotheses were listed and structured, and the questionnaire was hence designed taking into consideration the requirements of empirical research [1] [6] [7] [8] [9] [10] [11] [14] [15]; furthermore, the execution of a pretest with selected companies helped to gain precious feedback that was integrated into questionnaire, which was hence implemented in a web interface and eventually tested.

3. *Sample selection*. Within this phase, the first step was to define the indices according to which the entrepreneurial quota were going defined: industrial sector as well as size of the enterprises [8] [9] [10] [14]. Such indices were obtained from the Classification of

Economic Activities in the European Community (NACE). The quota related to such indices for the proportional selection process of the survey participants were hence identified with the help of the data from the German Federal Statistical Office¹. Hence, the list of enterprises to be invited to take part to the survey was prepared with data from the database of the market research firm Hoppenstedt² and the own FIR database.

4. *Realisation of the survey.* In this 3 month phase the selected enterprises were sent an email with an invitation to take part to the survey as well as some following reminders, also via email. It is interesting to note that 72,6% of the participants filled in the questionnaire online, while 27,4% preferred to fill in the printed questionnaire and send it back with the support of more traditional means (23,4% via fax and 4% via snail mail). This shows that, although all the participants had an internet access, about one third felt more comfortable with the offline and manual processing of the questionnaire.

5. *Follow up telephone interviews.* Since in the paper-based questionnaires some inconsistencies were found, some follow up telephone interviews were needed in order to clear few open issues with some of the participants [11] [14] [15]. This action enabled the clarification of the open issues and enabled the further use of the whole data set within the analysis phase.

6. *Collection and coding of data.* The automatic saving of the data of the online questionnaire in a previously programmed database enabled an efficient and error-free coding of such data; the paper-based questionnaires were manually coded and accurately doublechecked.

7. *Data analysis and documentation of the results.* The collected data were analysed with the help of univariate, bivariate, and multivariate statistical methods [2] [5] [11] [14]. Appropriate statistical testing methods were used to test the results of the analysis: Significance-test with $\alpha < 0,05$ for the tested hypotheses, Chi²-test for bivariate and contingency analysis, F-test within the multivariate analysis. Furthermore, in order to avoid distortions caused by different scales (especially in the multivariate analysis), all different units and scales were standardised with the help of the Z-transformation. Cluster analysis that were conducted with different standardisation methods lead always to the same results. Eventually, all analysis and results were documented.

2.2 The sample

During the sample selection 8.150 enterprises (gross sample) that fulfilled the criteria were selected. Decision-makers of such enterprises were sent an email with the invitation to take part to the survey. During the mailing action 1.258 emails did not reach the targeted group, this meaning that 6.892 potential participants received the invitation email (net sample). By an analysis of the net sample it came out that the striven quota of

population, with an acceptable deviation, were still fulfilled by the net sample.

On the whole, 278 enterprises took part to the survey and sent back the filled questionnaire, with the result of rate of return of 4,03%. The distribution of the participants vs. the values of the population are given as follows: 48,6% vs. 21,4% in the industrial sector, 42,1% vs. 40,1% in the field of services (without commerce); 9,3% vs. 24,7% in the commerce sector, and 0,0% vs. 2,3% in the agricultural sector. As far as the entrepreneurial size is concerned, the distribution of the participants vs. the values of the population are: 62,2% vs. 89,4% small sized enterprises, 17,3% vs. 10,3 medium sized enterprises, 20,3% vs. 0,3 large sized enterprises. Some branches and some enterprise sizes are overrepresented, while other are underrepresented.

Because of the high unit non-response, a non-response analysis was conducted. The major reasons of non-response are lack of reachability, technical limitations, and noncompliance [4]; while the lack of reachability is the most appropriate explanation for the difference between gross and net sample, the technical limitations could be to a certain extent excluded because of the way in which the web questionnaire was implemented; as a result, the unit non-response of the net sample is likely to have its origin in the noncompliance of the invited persons [4]. An analysis of the reasons of non compliance would have required a new survey of a sample of the persons that did not fill the questionnaire in: this new survey would have gone beyond the scope of the present work.

As a matter of fact, since the objective of the empirical work was to conduct an explorative survey, and not necessary a representative survey (planned for a further research phase), the data was considered sufficient for the explorative scope of the research.

2.3 The questionnaire

The questionnaire of the survey had 39 questions divided in seven sections with a total of 556 items. It covered the following areas:

1. *E-Business in the considered company and in the economy*, in which along with the different items about the present state of EB in the own firm (e.g. involved areas, duration, strategic objectives as well as achievements of EB), also a qualitative evaluation of the state of EB in the considered firm, industrial sector and German economy in the present and in the coming one to two years was gathered. Furthermore, the issue of EB related innovation in the considered firm, its competitors and in the related industrial sector were dealt with.

2. *Strategy in E-Business*, in which data about strategic aspects of the EB deployment were collected, such as e.g. the existence of a EB strategy and its relation to the entrepreneurial strategy, experiences in the strategy

¹ see also http://www.destatis.de/e_home.htm

² see also <http://www.hoppenstedt.de/>

finding process as well as experiences with approaches and methods used within such a process.

3. *Organisation and processes in E-Business*, in which organisational and process-related issues (such as the positioning of EB within the organisational hierarchy or the extent of the reorganisation of the entrepreneurial processes) as well as operational objectives of EB were focused on. The extent of reorganisation of processes was also inquired.

4. *Information and Communication Technology in E-Business*, in which EB budget and its temporal development, typology and evaluation of the involved solutions as well as of the involved ICT service providers, the information sources used for within the selection of the ICT service providers and the software criteria that ex-post were found to be critical.

5. *Personnel and E-Business*, in which data about EB trainings (such as type and targeted employees), a qualitative employees' evaluation of the EB deployment within the firm as well as of the employees' productivity variations caused by EB were collected.

6. *Further comments* about Electronic Business, could be then added within a section for free text remarks.

7. *Data about the interviewee and demographic data of the enterprise*, such as NACE-Sector, number of employees, turnover in the previous year as well as age of the firm.

3. RESULTS

3.1 Selected results

In this chapter some of the results of the monivariate analysis of data are going to be presented and discussed.

1. *State-of-the-Art and E-Business in the future*. On average, the enterprises have been dealing with EB for 3 to 4 years and mainly see it as a strategic approach to conquer new market segments and new customers (27,4%), to increase their turnover (17,8%) and to improve their relationships with their customers (17,6%). While currently the degree of EB maturity of nearly half of the enterprises is considerably low (e.g. 48,4% of the firms concentrates their activities on a web presence and web marketing), in the coming future the trend is clearly towards a more complex and manifold understanding of EB deployment (e.g. 19,6% plan a holistic EB concept or even 25,7% an EB supported inter-organisational integration), see also Figure 1. This confirms the hypothesis of a trend towards an increasingly networked economy [12]. As far as the entrepreneurial functions are concerned, the ones which are currently mostly involved within EB are sales/ marketing (76,4%), procurement (61,6%) and after sales service (45%).

In the future, while de facto all firms will operate sales/ marketing over the Internet, almost 80% will be practicing e-procurement and web-based after sales services, about 70 % will be practicing web-based Customer Relationship Management (CRM). As far as

approaches of inter-organisational integration are concerned, within the coming years 60% of enterprises will implement e-logistics solutions, while about 40% solutions for Supplier Relationship Management (SRM) and Supply Chain Management (SCM). This result is consistent with the trend highlighted in Figure 1.

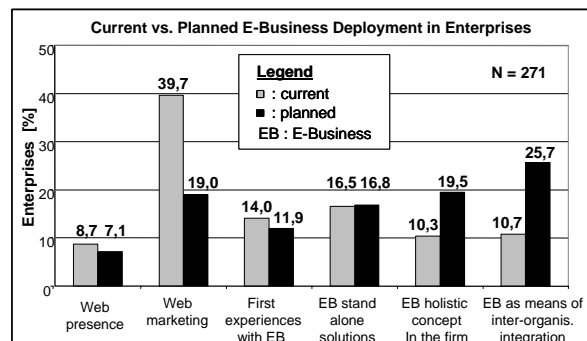


Figure 1: Current and planned EB deployment

While only a part of enterprises could achieve an increased turnover (33, %) or lower procurement cost up to 10% (29,3% of the firms) through EB, the majority of them estimates EB as important or very important for their enterprise (63,6%), while moreover 84,2% declare to plan to increase their EB deployment in the next one or two years. Comparable positive estimations were given regarding the EB growth in the own industrial sector and overall in the German economy in the coming future by 84% to 92% of participants.

2. *E-Business Strategy*. Within the analysis of data about strategic aspects of the EB deployment, it was noted that, even if only 37,8% of the firms formulated an explicit EB strategy, it was almost always adjusted and aligned to the entrepreneurial strategy (91,6% of them). This process is clearly important, especially if we consider the previous experiences related to the E-Business hype and to the hastily embedding of EB-solutions into organisations [12]: firms that have an EB strategy, are developing it with a structured and methodical approach and furthermore in alignment with the entrepreneurial strategy.

3. *Organisation and processes in E-Business*. Within the analysis of the positioning of EB within the organisational hierarchy, no dominant approach could be found. EB is either in the competence field of the management board through a dedicated staff unit (21,6%) or it is given an own organisational unit (only 6% of firms) or it is assigned a third level position in the organisational hierarchy, as subunit of an organisational unit (31,3%), mainly sales/ marketing or ICT. Interesting is that in 28,7% of firms uncoordinated EB competencies are to be found.

The extent of the reorganisation of the entrepreneurial processes following the introduction of EB was also inquired: only 22,8% of the firms carried out a (even partial) reorganisation of processes related to the EB

introduction. This fact seems to be a surprising result and it will be further discussed in section 3.5.

Furthermore, operational EB-objectives were also analysed, with the following top-three-ranking: better customer retention (23,6%), lower process costs (16,3%), and better communication with customers and suppliers (15,6%).

4. Information and Communication Technology in E-Business. Within the analysis of ICT solutions for EB, it came out that only 17% of the firms make use of Application Service Providers (ASP), while 83% implemented the solutions in the own enterprise; furthermore, the vast majority of such solutions are either standard solutions, with (51,0%) or without customisation (19,0%), or fully new solutions developed only for the own enterprise (21,9%). As far as the involved ICT service providers are concerned, they were selected mainly based upon information gained through personal contacts or recommendations, hardly ever after a systematical and structured analysis of capabilities and performances of the specific solution. Nonetheless, both the implemented ICT solutions and the collaboration with ICT service providers were evaluated as good. Furthermore, the software criteria that ex-post were found to be critical were the user friendliness, the capability of system integration, and flexibility of software.

5. Personnel and E-Business. It must be highlighted that enterprises are aware of the fact that the employees play an important role within the successful EB deployment. As a matter of fact, the majority of enterprises gives the own employees a generic training about Internet and EB (89,9% of the firms) and more specific training for the use of EB solutions (77,7%). Still, some differences arise while analysing the profile of the targeted employees.

On the whole, the employees of the participant firms welcomed EB in their daily work; in fact, in 61,1% of the firms, the employees' perception and consequent evaluation of EB is positive to very positive, in 25,7% neutral and only really seldom negative (1,8%). Last but not least, a significant amount of enterprises (40%) underlined that the productivity of the own employees increased because of EB.

3.2 Differences among small, medium and large enterprises

With bivariate and multivariate analysis of the data, differences among enterprises of different enterprise sizes were analysed. On the whole it can be stated that there is a remarkable gap between large enterprises (LEs) on the one side and small enterprises (SEs) on the other side. Medium enterprises (MEs) are, depending on the issue, either leading with LEs or following together with SEs.

As a matter of fact, LEs are, within the degree of deployment of EB, pioneers with a holistic EB-concept (22,9%) or even inter-organisational integration (25%) and are in clear advantage to SEs and MEs, which are by far beyond LEs with e.g. initial EB-experiences (16% and 16,4%) or even simpler web marketing (44,8% and 38,8%) approaches.

As far as strategic issues are concerned, 52,8% of LEs and 45,7% of MEs have defined an EB-strategy, while only 30,8% of SEs defined it. The differences become smaller in the case of a planned EB-strategy in the future (69,7% LEs, 66,7% MEs, 66,7% SEs), this meaning that, even if coming from different experiences, enterprises are increasingly aware of the importance of the definition of an EB-strategy.

As far as strategic EB-objectives are concerned, LEs strive mainly to EB-driven cost reductions, while SMEs strive more to acquiring new customers. This aspect is confirmed by the operational EB-objectives, according to which LEs strive first of all to lower process costs (a), and then to a better customer retention (b), and hence to a better communication with customers (c). Even if the operational EB-objectives are basically the same, priorities are different (b-c-a for SEs and b-a-c for MEs).

After the introduction of EB in the own company, about the half of the LEs conducted a reorganisation of entrepreneurial processes (44,9%), while only 22,2% of MEs and 17,1% of SEs underwent such an important process to embed properly new technologies into the organisational structure and processes.

As far as Information Technology is concerned, ICT Budgets are somewhat in proportion to the entrepreneurial size: while 85,8% of SEs invest up to 25.000€ in the previous year, 81,9% of MEs invested up to 50.000€, LEs have a wider budget range, with a peak of 29% with values over 1 million € investment for EB-solutions. As far as EB-solutions are concerned, ASPs were chosen more frequently by SEs and MEs (respectively 20,1% and 18,5%), while more seldom by LEs (only 7,4%); as a matter of fact, 92,6% of LEs implemented EB-solutions, which are in 86,9% of the cases standard solutions with entrepreneurial adaptation or even complete individual solutions. In this respect, both SEs and MEs are opting preferably for simpler standard solutions without or with entrepreneurial customisation (79,3% and 68,9%). Furthermore, 93,3% of LEs and 81,1% of ME trained their employees to use specific EB-solutions, while only 65,9% of SEs did it; this fact means that 34,1% of SEs did not consider relevant to skill the personnel to make use of the adopted solutions.

3.3 Differences among economic sectors

Differences between different sectors of the economy (namely industry, services without commerce, and

commerce) were also sought with the help of bivariate and multivariate data analysis. Even if enterprises from the services sector do show to be slightly further within the EB life cycle, on the whole, the data do not underline any remarkable and significant differences in the pattern of use and deployment of EB among the considered sectors. As a result, it can be concluded that the importance and the degree of deployment of EB industry, services without commerce, and commerce can be considered as comparable.

3.4 Cluster analysis

On the base of a factor analysis, 15 factors were identified and hence used as variables for a hierarchical cluster analysis. The objective of the cluster analysis was to search for patterns to characterise different enterprise profiles.

Three clusters of enterprises have been identified: E-Business Experts, E-Business Followers, and E-Business Conservatives. The distribution of enterprises between the three clusters was, respectively, the following: 60 enterprises in the first, 165 in the second, 53 enterprises in the third cluster. The clusters are going to be discussed with the help of some selected data.

1. E-Business Experts (19,1% of all survey participants) are quickly moving towards the most mature phases of the EB life cycle. Among them, 24,5% have already deployed an embedded a holistic EB concept in the own organisation, while even 41,5% are using EB as a means for inter-organisational ICT-based integration. A considerable amount of enterprises (more than 50%) embedded EB thoroughly in their whole organisation – both in direct entrepreneurial functions (procurement, manufacturing, logistics, sales/ marketing, after-sales service) and in indirect entrepreneurial functions (research and development, personnel/ human resources) – and used EB also as an approach to integrate with their suppliers, partners and customers (SRM, SCM, and CRM).

Enterprises from this cluster have a remarkable EB-driven success: respectively 62,3% and 56,5% of the cluster enterprises could achieve either higher sales volumes or lower procurement costs through EB. Only 11,3, % and 17% did not have any positive effects in sales volume or procurement cost. Furthermore, at least 50% of the firms fulfilled or even exceeded their objectives. These results are on the whole clearly positive.

Members of this cluster have started with EB for four to five years, are innovative to highly innovative, and consider EB as important or even very important for the own business. For all above-mentioned reasons, the members of this cluster can be hence considered as the successful pioneers in the field of EB.

2. E-Business Followers (59,3% of all survey participants), the largest of the three clusters. In this group, a lot of the enterprises concentrates their activities on a web presence and web marketing (49,1%), while only 26,1% deployed or used basic EB-solutions, such as e-shops or e-marketplaces, and only a minority implemented a holistic EB concept or even approaches of inter-organisational integration (9,1%). Enterprises from this cluster have started with EB in average for three to four years and currently do concentrate their EB activates in about three entrepreneurial functions (mainly procurement, sales/ marketing, and after-sales service).

Even if these enterprises are not innovators in the field of EB, they tend to give EB a relative importance and seem to be aware of the potentials that can be reached with its embedding into their organisations. Even if less than the previous cluster, respectively 31,5% and 34,5% of the cluster enterprises could achieve either higher sales volumes or lower procurement costs through EB. Still, 30,9% and 32,7% did not reach any positive effects in sales volume or procurement cost.

In the future, members of this cluster plan to extend their EB activities: 37,6% plan to implement stand-alone EB solutions, while 29,1 plan to deploy a holistic EB concept in the own enterprise or more advanced inter-organisational integration; this is reflected by the fact that such enterprises plan to extend EB to entrepreneurial functions such as logistics, and CRM, but also personnel/ human resources. To conclude, for all above-mentioned reasons, members of this cluster can be also defined as second-movers.

3. E-Business Conservatives (21,6% of all survey participants), a smaller group than the previous one. Also in this cluster, the majority of enterprises (53,4%) concentrates their EB activities on web presence and web marketing, while 35% gained initial experiences with EB-solutions. Enterprises from this cluster have started with EB in average for less than 3 years and currently concentrate their EB activities only in one or two entrepreneurial functions (mainly procurement and sales/ marketing). Many of the members of this cluster can be considered as late followers, since they started to deploy EB only when the related solutions reached a considerable degree of maturity. It is striking that about 40% of the members of this cluster did not define any objectives of their own EB activities. This could be interpreted with the fact that many of such enterprises were pushed from the market (competitors and customers) to adopt initial EB solutions, and hence just reacted to the new boundary conditions without defining any further objectives. For the same reasons, enterprises of this cluster are also not particularly innovative, but follow the mature solutions offered in the market; furthermore, they do give EB only a neutral importance. As far as economic success is concerned, only 18,3% had a higher sales volume, and also only 18,3% could achieve lower procurement costs through EB. About

40% of the members of this cluster did not reach either higher sales volumes nor lower procurement costs at all. In the future, EB Conservatives plan to implement some EB solutions (25%) or to deploy and implement a holistic EB concept or even approaches of inter-organisational integration (26,6%); this fact is being reflected by the fact that they plan to extend EB to entrepreneurial functions such as logistics, after-sales service and CRM. All in all, members of this cluster can be also defined as cautious followers or third-movers.

3.5 Critical success factors for E-Business

Last but not least, several hypotheses were tested, in order to identify critical success factors for EB on the basis of the available data. The success factors that were identified are: 1) the existence of an EB strategy, 2) the existence of an organisational form to coordinate EB activities, 3) the execution of reorganisational measures, 4) the choice to implement individual or customised solutions, and 5) the decision to train employees. By the analysis of such factors within the three clusters, it could be observed the majority of the EB Experts were fulfilling all criteria.

7. CONCLUSIONS, LIMITATIONS AND FURTHER NEED FOR ACTION

In this paper the results of a survey with German enterprises in the field of E-Business were presented and discussed. Among others, three entrepreneurial profiles in the field of E-Business could be identified and characterised: successful pioneers, second movers, and cautious followers.

The survey was of an explorative kind and it is not necessary representative. Anyhow, interesting results and some trends could be highlighted. Hence, the survey can be seen as the initial step of a wider research framework. As a matter of fact, its ultimate objective was to enable an initial analysis of the research field, in order to enable the identification of patterns, trends and research areas to be then further and deeply analysed within following works of empirical research. The results support the fulfilment of this objective.

With the help of the gained data, a basis for further analysis was identified. The next step will be a set of semi-structured interviews to be conducted with targeted German enterprises from the first cluster (EB Experts) from selected industrial sectors. The objective is to better understand the reasons that lead to the described results, to deepen the analysis of critical success factors, and to highlight differences between industrial sectors.

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