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ASSESSING THE ADOPTION OF E-BUSINESS IN THE REGION: A QUANTITATIVE STUDY

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Abstract

The development of e-business in SMEs in the European regions needs effective e-adoption models. This paper verifies e-business adoption models for SMEs by collecting and analyzing data in the Pomeranian Region of Poland. The paper consists of five sections. The Introduction discusses the theoretical foundations and purpose of the survey. Section 2 characterizes e-business adoption models. The methodological background to the main items of the survey is outlined in the next section. The main results of the survey are presented, illustrated graphically, discussed and explained in Section 4. The Summary contains synthetic conclusions derived from the research.

Keywords: e-Business, SMEs, adoption model, questionnaire, survey.

1 INTRODUCTION

The development of the knowledge economy is dependent on the speed and effectiveness of the implementation of Internet- based solutions in businesses. While large companies have been quick to adopt current ICT solutions and technologies, small and medium-sized enterprises (SMEs) have had more serious problems with the requirements and challenges of e-business (Parker 2006). These result from such basic barriers as restricted financial resources, limited personal technical skills, insufficient support by governmental agencies and a high level of business risk. On the other hand, because of their flexibility and adaptability, SMEs are important drivers of innovation in any economy. Analysis of statistical sources shows similar statistical indicators at the European, Polish and Pomeranian levels, with SMEs making up almost 99% of enterprises and employing around 70% of the workforce. The task of drawing up and putting forward effective e-business adoption models, therefore, poses a crucial challenge at the regional level for:

- policy-makers, in order to allocate the available financial resources properly
- SME managers, in order to further their innovative development

In the Pomeranian Region of Poland the Regional Government and the Agency for Regional Development identified the adoption and promotion of the digital economy as one of the highest priorities in the Pomeranian Regional Innovation Strategy (2004). These issues have recently been taken up, surveyed and analyzed in Pomerania (Wrycza 2004).

On the basis of this extensive European business experience the “E-business Observatory in Pomerania” project was initiated last year¹ with the aim of increasing the economic competitiveness and modernisation of the Pomeranian economy. Its main task has been to monitor the impact of regional economic policies on the results of e-business development by using effective e-adoption models, in particular in SMEs.

The background for the research is the structure of companies in the Pomeranian Region assessed on the basis of the number of employees and the various branches of business covered. The relevant data are included in Table 1 and Figure 1 respectively.

Enterprises	Number of firms	Percent
Micro (1-9)	206 665	95.36%
Small (10-49)	8 308	3.83%
Medium (50-249)	1 501	0.69%
Large (250 +)	247	0.11%
Total	216 721	100.00%

Table 1. Number of enterprises in the Pomeranian Region by size category in 2005, Source: The Office of Statistics, Gdańsk, 2005.

¹ “E-business Observatory” is part of the research project “The Pomeranian digital economy system for SMEs,” financed jointly by the European Social Fund and funds allocated by the Republic of Poland.

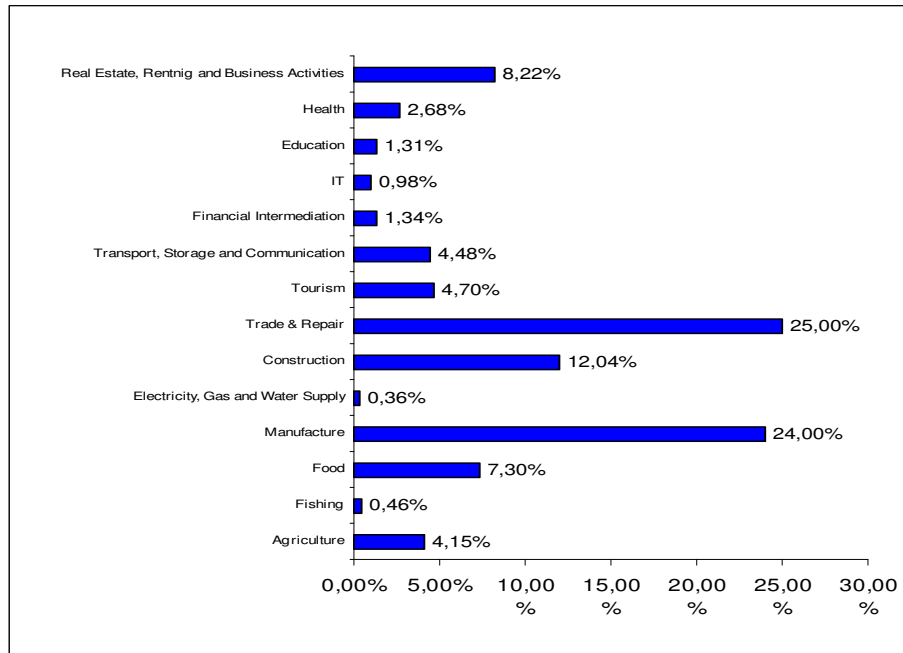


Figure 1. The branches of business represented by Pomeranian SMEs, Source: the Office of Statistics, Gdańsk, 2005.

2 THE PROPOSED RESEARCH MODEL

At present two models for e-business adoption by SMEs dominate (Levy & Powell 2005):

- the stage or “ladder” model and
- the contingent or “transporter” model.

Chronologically, the first model assumes a gradual adoption of ICT by SMEs, including e-business. Authors such as Costello and Tuchen (1998), Ihlström and Nilsson (2003), Taylor and Murphy (2003), Teo and Pian (2003) and Rao, Metts and Monge (2005) have proposed stages or levels of e-business growth ranging in number from three to six. The e-business adoption ladder for SMEs usually consists of the following consecutive steps:

- Internet access (e-mail and browser),
- Creating a company portal (Liu 2005),
- E-commerce – the purchasing and selling of goods and services,
- E-business - $EB = EC + BI + CRM + SCM + ERP$ (Lindgren 2001),
- Network organizations, virtual enterprises and digital ecosystems (Nachira 2002).

Following the second "contingent" model, ICT adoption by SMEs does not develop along the linear “ladder” approach (Levy & Powell 2005), but depends on two crucial factors:

- plans of business growth,
- evaluation of the usefulness of Internet technology.

A company's management takes decisions regarding the modification of the company's business or e-business model, taking into account expected benefits, organizational readiness and external stimuli (Mehrtens et al. 2001). The adoption or non-acceptance of network technologies or e-business models depends on the assessment and absorption of the above-mentioned solutions and technologies (Moreau 2005).

The article presents an analysis of the stage model generally adopted by the SMEs in the survey. Instances of use of a contingent adoption model were very rare and practically non-existent until the appearance last year of, for example, online tourist and financial services. It is now clear that as a result of innovative activities such as the establishment of technology parks in the region more firms will adopt the contingent model. This issue requires specific qualitative studies.

3 METHODOLOGICAL BACKGROUND OF THE SURVEY

The survey of models of e-business adoption among Pomeranian SMEs was conducted in stages in the following sequence:

- identification of survey goals,
- definition of sample,
- setting the sampling framework,
- selection of sampling techniques, quantity of samples and the sampling process,
- conducting the survey,
- processing and analyzing the data collected and drawing conclusions.



The survey was the representative one, which allowed the results to be generalized for the whole population. The sample was chosen from units employing 10–249 persons. A random sample was taken of SMEs located in the Pomeranian Region. The basic objective of the survey was to collect information according to the kind of activity and sector of e-business. This meant that the population surveyed was characterized by two variables:

- kind of activity, i.e. NACE division or group according to section,
- number of employees (*10-49, 50-249*).

Taking into account the standards of the representative method, it was assumed that the survey should cover about 350 respondents.

The numbers of employees given in the Statistical Unit Register was used as a stratification and sample allocation variable. The survey sample was delineated separately for each sub-population. The main reason for the choice of this sampling method was the difference in the number of enterprises by size and branch according to the NACE classification (Figure 1). The results of the survey presented are in relative and not in absolute figures because of the sampling method.

The questionnaire (Figure 2) included 43 questions and consisted of five parts: identification of the organizational and business characteristics of the interviewee, followed by analysis and assessment of four domains, these being the technological, economic, social and political.


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E-business Observatory In Pomerania


1. Does your enterprise have an Internet connection?-----

no, why?:

- too high cost
- employees not trained
- no need for Internet
- other:

yes, what type of internet connection does your enterprise use:

- analog modem (standard telephone line PSTN)
- digital modem ISDN
- broadband DSL or ADSL
- other broadband (id. through cable TV)
- wireless connection (ie. through satellite, wireless network, mobile phone)

Figure 2. Excerpt from the CAWI questionnaire.

The interviews were conducted with the use of CATI (computer-assisted telephone interviewing), and occasionally with CAWI (computer-assisted web interview) techniques. The rate of response was 45.04%, which was satisfactory for the method applied (Table 2).

	Number of enterprises	Rate
Successful interviews	341	45.04%
Enterprises sampled but not surveyed owing to refusals and for other reasons	416	54.96%
Total	757	100.00%

Table 2. Interview response.

4 SURVEY AND ASSESSMENT OF E-BUSINESS PROGRESS IN THE REGION

The results of the investigations confirmed that Pomeranian SMEs follow the stage model of business adoption. There was no evidence for the contingent model in the research outcomes, excluding a few isolated technical cases. At present, they plan to carry out more in-depth studies on the basis of quality research methods.

As stated in Section 2 above, the first phase in the stage model of e-business adoption involves SMEs gaining access to the Internet. The survey revealed that the use of computers and the Internet are ubiquitous among Pomeranian SMEs, as shown at Figure 3. Computer applications were rated as “important” and “very important” for 97% of the enterprises interviewed (Figure 4) with e-mail and browser services widely used by respondents.

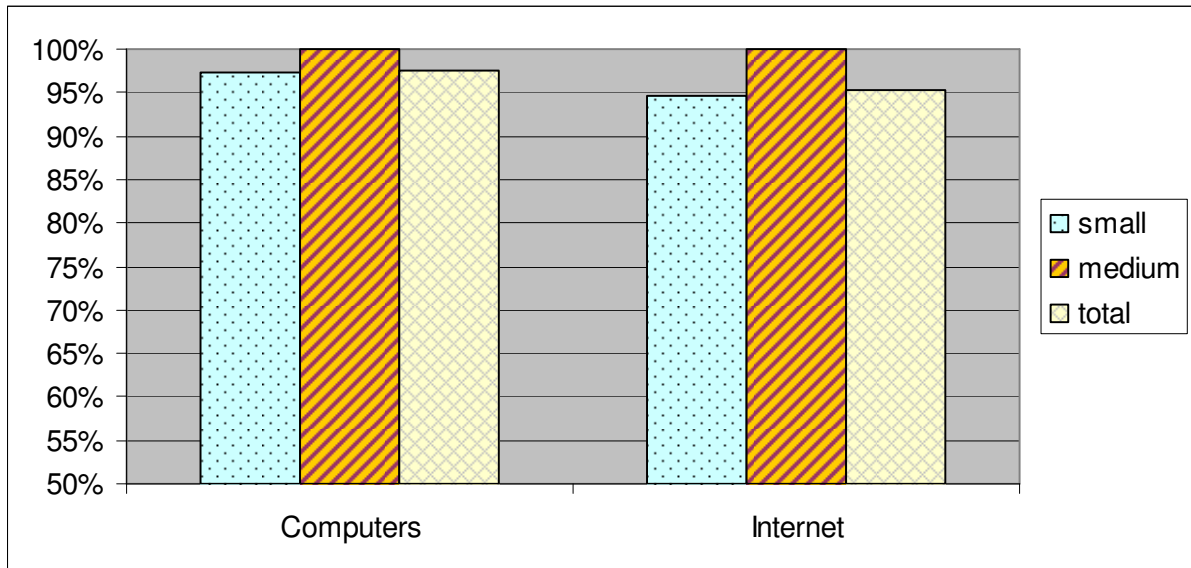


Figure 3. Computers and Internet access among Pomeranian SMEs.

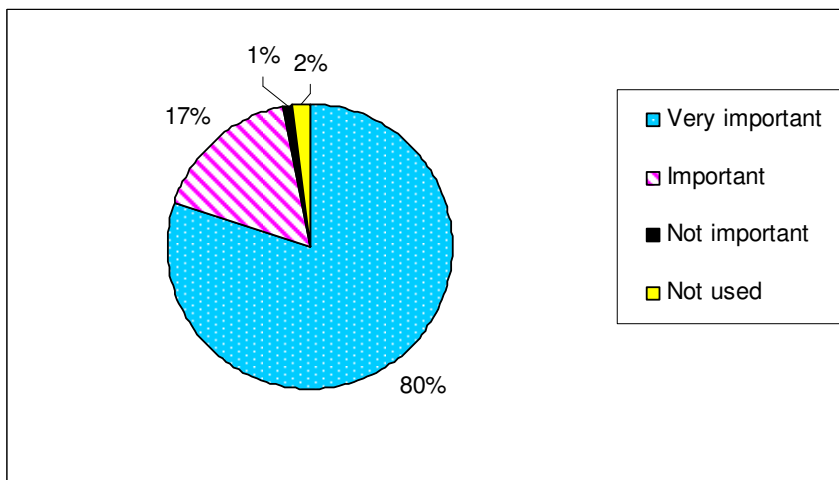


Figure 4. Assessment of computer importance for firms.

Surprisingly, the percentage of firms which have moved to the second phase of the stage model and developed their own websites is not still as high as for those at the first stage of adoption; nevertheless the evidence is that 63% of Pomeranian SMEs have developed websites. Nearly all medium-sized firms have an Internet presence (86%). The total result for Pomeranian SMEs taken as a whole, weighted according to the proportion of small and medium-sized firms, is 63% (Figure 5).

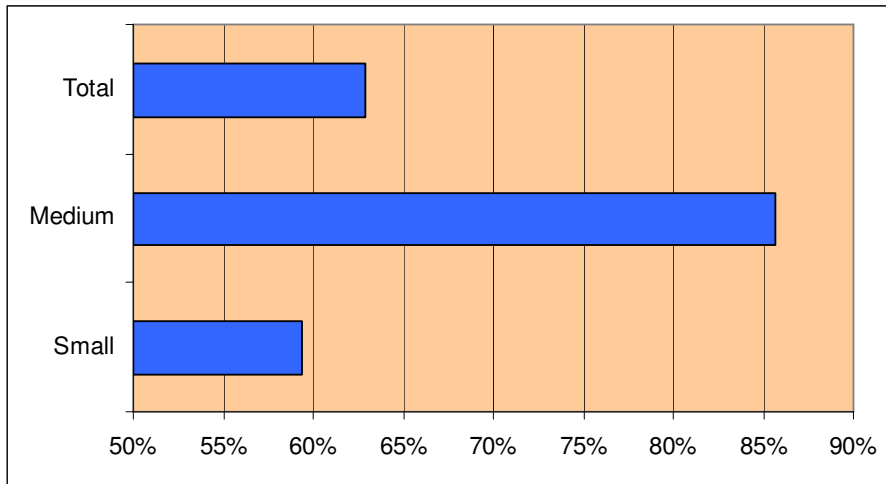


Figure 5. Percentage of websites in Pomeranian SMEs.

The company portals mainly contain information about the company (99%), maintain contact with clients (95%), present the firm’s product catalogue (90%), supply information about a firm’s products and services (27%) and display the price list of products and services (25%). A marginal role is played by the website for after-sales service (Figure 6), a function performed by the IT firm which updates the software.

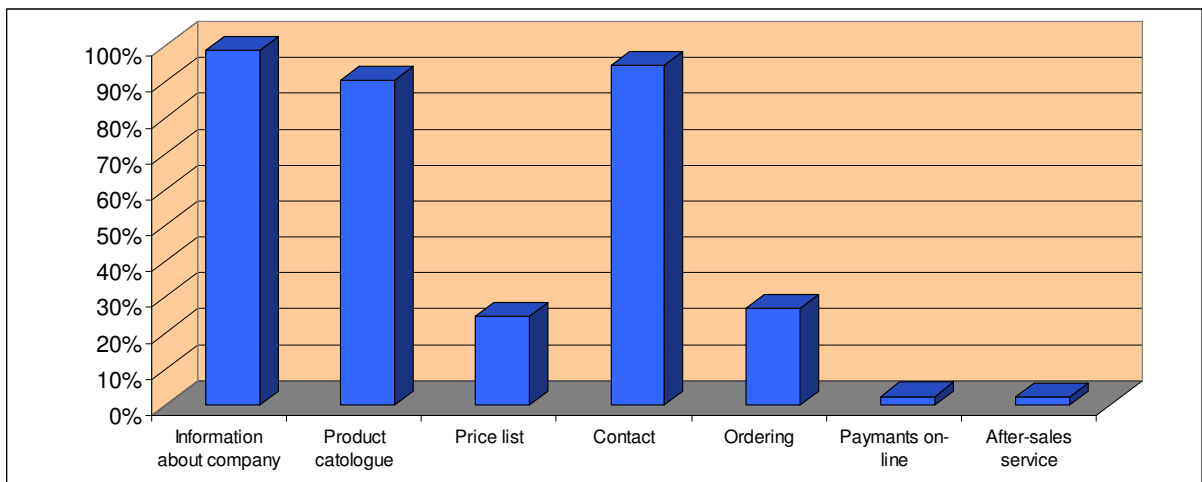


Figure 6. Services performed by the websites of SMEs.

Unfortunately, it seems that quite a number of websites are “dusted” (Mendo 2005). Only 2% update and modify their websites every day, while 48% do so once a quarter and 23% do so once a year or even less frequently (Figure 7).

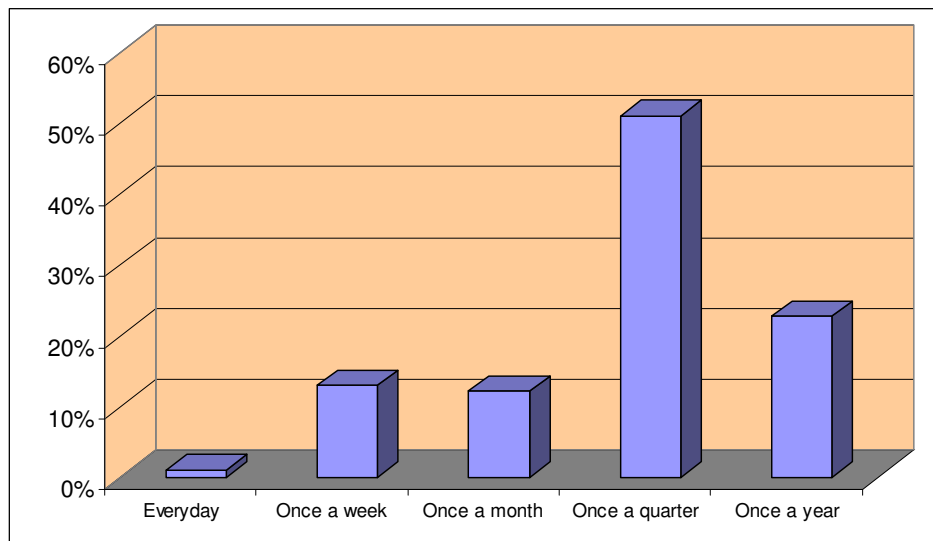


Figure 7. Updating frequency of the websites of SMEs.

In 1999 over 5% of the firms had already created their own portal. In seven years the percentage of SMEs with their own websites grew to 63%. The number of firms developing websites has increased steadily by about 8% by year.

The essence of e-commerce, the third phase of the stage e-business adoption model, is the selling and purchasing of goods and services. This phase has been reached by a considerably lower number of the firms surveyed. As shown in Figure 8, purchasing is much more popular than selling (purchasing: 33%, selling: 7%). The distribution of e-commerce functions varies between branches of business. Tourism firms have almost completely accepted e-commerce as a way of doing business. The tendency to growth is shown by the IT firms in this context. Other branches of business are in the preliminary phase of e-commerce implementation. These have seen greater progress in buying than in selling their goods and services. An important element in the third phase of the stage model is the use of e-banking. This has become a significant element in the day-to-day business of Pomeranian SMEs (Figure 9). In total over 80% of firms have made use of this form of financial service and some use it exclusively. This is true not only of the financial intermediation branch but also of such branches of the “old economy” as trade and repair (97%), transport (87%) and construction (76%). Only fishing shows a low (30%) level of acceptance of e-banking.

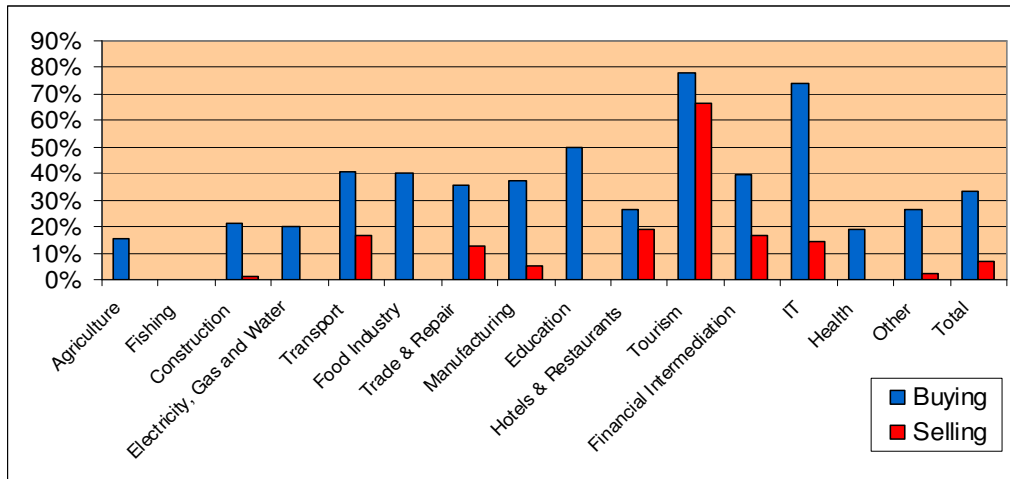


Figure 8. E-commerce distribution according to branch of business.

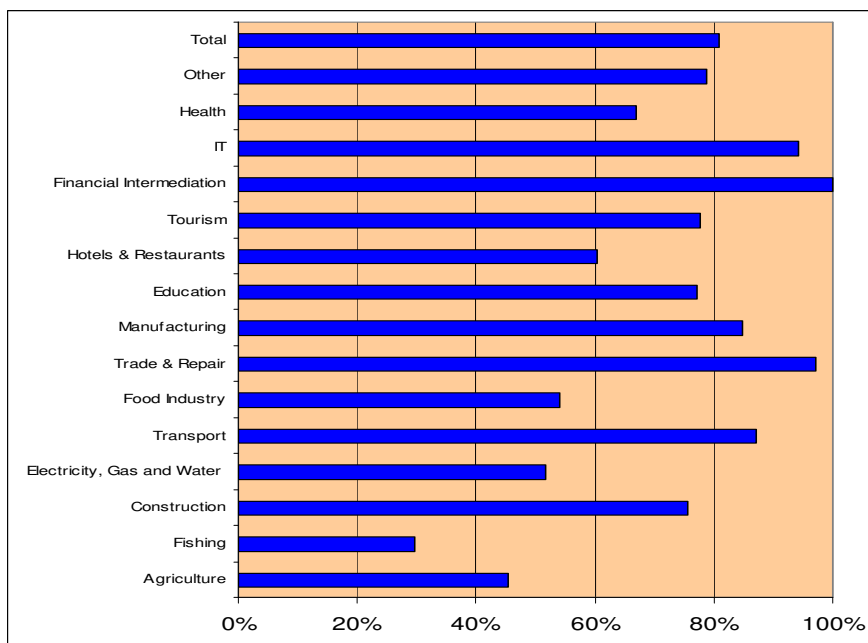


Figure 9. E-banking popularity.

The transition of Pomeranian SMEs to the fourth phase of the stage e-business adoption model is still a matter for the future. The basic formula of e-business includes, besides e-commerce (EC), business intelligence (BI), customer relationship management (CRM), supply chain management (SCM) and enterprise resource planning (ERP). While in medium-sized enterprises there are some signs of the fourth stage, for most small firms e-business still presents a serious challenge. In total only 2% of the firms surveyed may be assessed as being at this stage. However, there is a very important indicator of a move by Pomeranian SMEs towards the fourth phase of the adoption model and that is the importance of drawing up a strategy for e-commerce for Pomeranian SMEs. On a scale from 1 (the lowest) to 5 (the highest) this requirement is assessed as 2.7 (Figure 10). The IT and tourism branches have already developed their e-business strategies.

According to the survey results, no signs have yet emerged of moving on to the fifth phase of the adoption model. Digital ecosystems are a challenge still to be faced by Pomeranian SMEs.

A synthesis of the results obtained through the survey is presented in Figure 11. This shows the advancement of the Pomeranian SMEs up the rungs of the ladder in the stage e-business adoption model. The following indicators were taken into account for the specific stages:

- stage 1 - the percentage of firms with Internet access,
- stage 2 - the percentage of firms with portals,
- stage 3 - the percentage of firms using e-commerce,
- stage 4 – the percentage of firms with e-business,
- stage 5 – digital ecosystems.

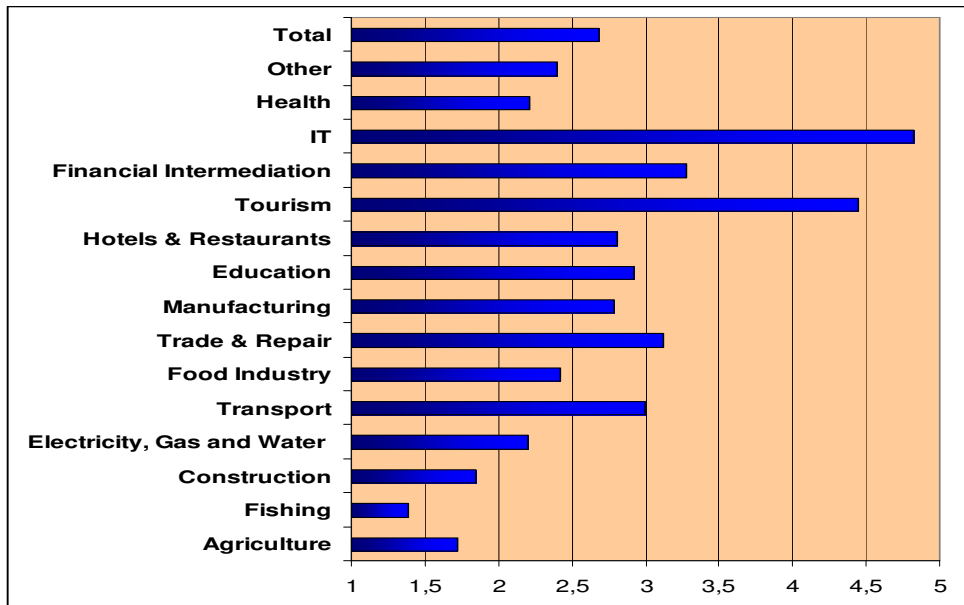


Figure 10. E-business in the strategy of firms.

While most of the firms have signalled that they are motivated to progress on the e-adoption ladder, many of them declared that they have reached a stage, for example the second or third, which is satisfactory for their current business requirements.

To sum up, the results of the survey confirmed the existence among Pomeranian SMEs of the e-business stage model synthesized in Figure 11. While the first stage of the adoption model is widespread, the ecosystems are very rare, being restricted to two or three cases. This demonstrates for regional policy-makers and company management the way in which e-business is adopted in SMEs. They should also, however, be aware that the contingent model is advancing rapidly and that this means that the innovative e-business models and concepts emerging from business incubators and technology parks will be directly transferred to businesses. The stage model that has prevailed in the last few years was the result of Internet technology development, its solutions were successful and it was subsequently adopted by the business community.

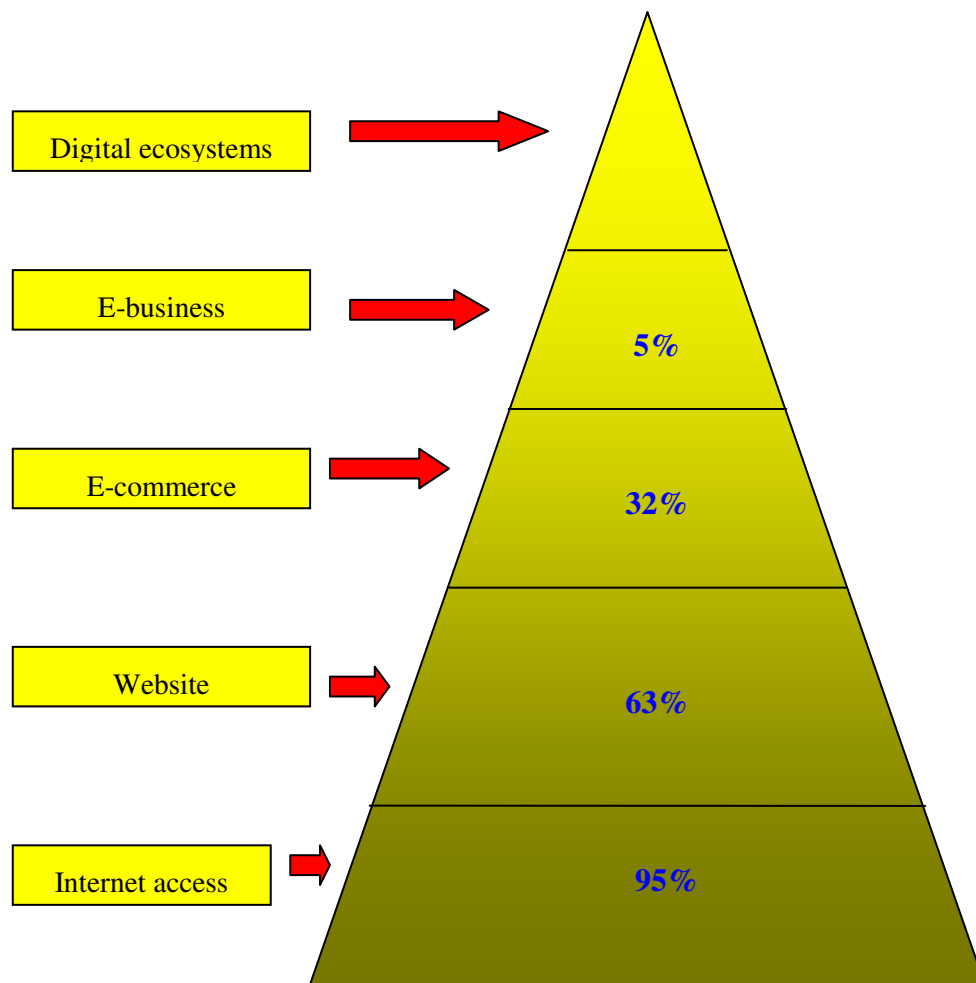


Figure 11. The adoption of a stage model by Pomeranian SMEs.

The results presented in this paper not only have analytical value but also form a basis and serve as indicators for e-business development strategies and policy in region. They may also be used by regional policy makers for the development and improvement of regional innovation strategies. The findings presented may also be viewed as an inspiration to business incubator technology transfer centres and technology parks.

5 SUMMARY

Analysis of the data collected and processed in the extensive questionnaire-based survey presented in this paper leads to a number of the conclusions. E-business adoption models, namely the stage model and the contingent model, were assessed and the survey, carried out according to the methodological principles for sampling, confirmed the dominance of the stage e-business adoption model among the Pomeranian SMEs surveyed. Computers and the Internet are in use in almost all Pomeranian SMEs and e-mail, Internet browsers and other search engines are also used universally. Surprisingly, the development and Internet presence of websites of Pomeranian SMEs is limited to 60-70%. The basic e-commerce functions, namely buying and selling, are still relatively unexploited among Pomeranian SMEs. The exception is tourism, as practically all tourism services are offered, purchased and sold by means of the Internet by SMEs, while traditional transactions are becoming marginal. Buying online is much more popular than selling online among Pomeranian SMEs. E-banking is the e-business

technology currently being adopted most dynamically by SMEs, as anticipated by the financial branch which entirely adopted e-banking. Agriculture and food, however, still use mainly traditional banking. The fourth and the fifth rungs of the e-business adoption ladder, the more advanced ones, are still underdeveloped, while there are some attempts to apply the e-business formula (EB = EC + BI + CRM + SCM + ERP) and the first signs of the introduction of digital ecosystems have been identified.

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