Romanian Banks – Romanian SMEs: A Mutual Business Relationship

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Abstract

This paper analyzes the bank-SMEs partnership in terms of ICT collaboration. The data about ICT projects developed in the Romanian banks having SMEs as a technology provider is collected by web content mining. Then, the paper addresses two main perspectives. At first, we identify the features that characterize the successful SMEs that managed to develop business relationships with the Romanian Banks and we build an econometric model to express this dependency. On the other hand, the paper analyzes the problem from the Romanian banks' perspective, identifying patterns in their IT investment decisions.

Keywords: *SMEs, banking industry, IT investments, clustering, decision patterns*

JEL classification: G21, L26

Introduction

The paper aims to provide an analysis of the relationship between Romanian SMEs and the Romanian banking **industry** in terms of ICT cooperation. This article aims to answer the following questions:

- What features identify the SMEs that provide ICT solutions to the Romanian banking industry?
- What are the ICT areas in which banks and financial institutions request SMEs' products and services?

Literature review

The current issues in the recent literature concerning ICT specialized SMEs focus especially on their ability to take advantage of the new market opportunities.

Saarenketo et al (2004) identify the firm's ability to innovate as the main driver for economic growth and higher revenues, underlining the need for new SMEs to develop business networks among them in order to improve the R&D processes through knowledge sharing.

Harindranath et al (2008) carry out a research in the UK and discover the state-of-art of ICT adoption among SMEs and discovers 23.20% of them develop activities in Internet field and most of the IT investments aim to improve operational efficiency.

The European Commission (2008) underlines the fact that ICT-producing SMEs must face the rough competition of big companies and therefore adopt new types of product delivery (software-as-a-service) and build networks of firms with shared R&D divisions.

The idea of collaboration between SMEs is discussed by Dobrea et al (2009), that emphasize the role of IT as a driver of change for the traditional business practices among Romanan SMEs.

Most of the recent studies in the Romanian literature, as in the European one, are focused on the adoption of ICT within SMEs and the benefits of aligning the small businesses to the electronic commerce and digital economy practices.

Grama and Fotache (2007) identify the year 2001 to be the moment of SMEs' transition to e-business and discuss the implications of ERP systems adoption within firms. Baltac (2006) analyzes the Romanian SMEs' readiness to the new technology paradigm on the point of Romania's integration in the European Union and discusses the opportunity of IT and Business Incubators for new SMEs in the information technology field.

Nicolescu et al (2009) analyze the competitive advantage of SMEs based on a set of economic criteria and identify that "the proportion in which companies are more competitive as a result of the innovation capacity decreases together with the companies' size and the weight of SMEs that have as a competitive advantage the quality of provided products/ services, quality management and firm's reputation increases together with the companies' size"[4].

Research Method

Data collection

The data collection is based on the following framework (presented in figure 1). In the first stage, we use the online version of White Pages and various online directories of firms in order to get an accurate and more complete list of Romanian ICT firms (consisting of name, geographical region and web address). The first stage finished, the database table contains 1040 records of different Romanian ICT companies.

In the second stage, we browse the previous table and, for each row where the web address is available, we enter the official website of the company. The web mining process continues with the identification of the following sections of its website: "References", "Clients", "Projects", "About us". The aim of this phase is to identify possible collaborations between that company and the banking industry in terms of ICT projects.

In the case where the company does not provide in its website references from the banking industry, that company is omitted from further analysis. Therefore, after this phase, the list of companies of interest for our research is composed of 48 companies.

For the resulted list, we verify its financial status on the Romanian Minister of Finance's contributors section of the website [5]. The information obtained in this phase comprises: the financial status of the company (erased/still active), the year of establishment and the financial reports for the maximum period 1999-2008. We get the last financial report and extract the average number of employees.

In order to obtain the final list of ICT SMEs that provided the banking industry with technology, we use the definition of a SME [1]: "an organization involved in the economic activity, with less than 250 employees and no more than 43 millions of euros income, autonomous". We filter the previous list from this perspective based on the data retrieved from the Minister of Finance. The final list used in the research contains 45 SMEs.

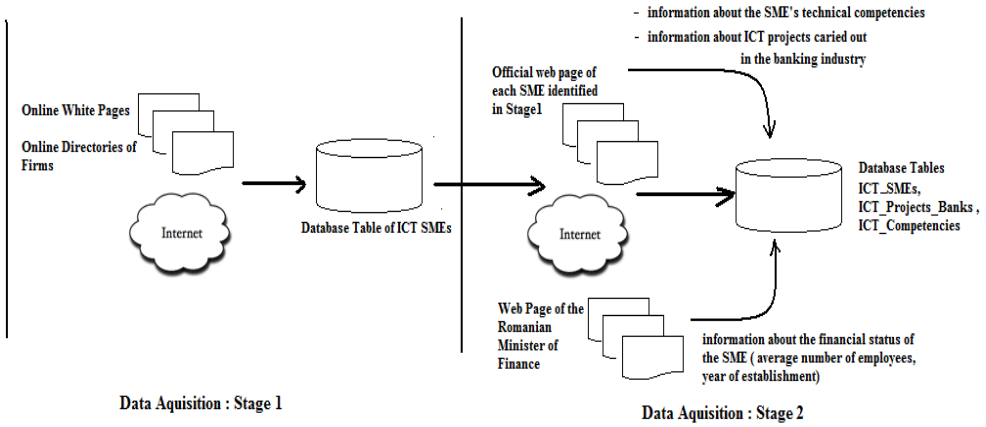

Figure 1 The data acquisition process

Data analysis

We shall analyze the data from a double perspective.

First, we shall analyze the factors that determine an ICT SME's success as a provider of technology for the financial industry.

The second analysis treats the problem of ICT investments from the bank's perspective, aiming to identify certain decision patterns at this level.

1. Analysis from the SMEs' perspective

For the model we build, we consider the number of ICT projects carried out by a SME in the banking industry (NPB) as the dependant variable of the model.

The independent variables of the model are:

a) the average number of employees hired by the SME in the last financial year: ANE

b) the age of the SME – considering its year of establishment (YoE): AG

c) the technical competencies of the SME: TC

In terms of technical competencies, the following aspects are considered:

- we identified the following list of competencies that can characterize adequately the technological profile of a SME acting on the ICT market: LC={SOFTWARE, ASSEMBLING, CONSULTING, INTERNET, NETWORKING, OUTSOURCING, WEB DESIGN, COPY-MACHINES, SERVICE, CARDS, ADMINISTRATION}
- we code the previous list LC, as bitmaps. This means, that each SME is characterized by a mask of bits that take the 1/0 (true/false) values whether they own or not that technical competency.

For example, a company A, which builds software solutions and offers consulting services, has the following bitmap: 10100000000

- The bitmap is then conversed to decimal representation. The order of elements in LC is preserved and the reason behind this order relays in the complexity of that competency as resulted from interviews with IT experts.

For the previous example, the decimal representation will be $2^{10}+2^{8}= 1280$.

The first step in our analysis consists of clustering the 45 SMEs in clusters according to the number of projects they have developed in the banking industry. We employ the K-means clustering algorithm with N=3 clusters and obtain the following results, represented in table 1 (Annex).

The clusters resulted are characterized by the following mean values presented in table 2:

Clusters characteristics

Table 2

	Mean	**Std Deviation**	**Variance**
Cluster 1	4.307693	1.031554	1.064103
Cluster 2	8.666667	1.861899	3.466667
Cluster 3	1.269231	0.4523443	0.2046154

It is interesting to discover how the technical capabilities influenced the clustering, as shown in figure 2. The different clustering of similar capabilities is due to different numbers of employees (although the relationship is not directly proportional as shown in Table1 Annex) and to the age of the company (once again, there is apparently no direct implication of the age of SME on the cluster the SME belongs to). One possible explanation for this phenomenon might be the establishment of new companies specialized in new technologies, thus that carry a competitive advantage over the elder ones.

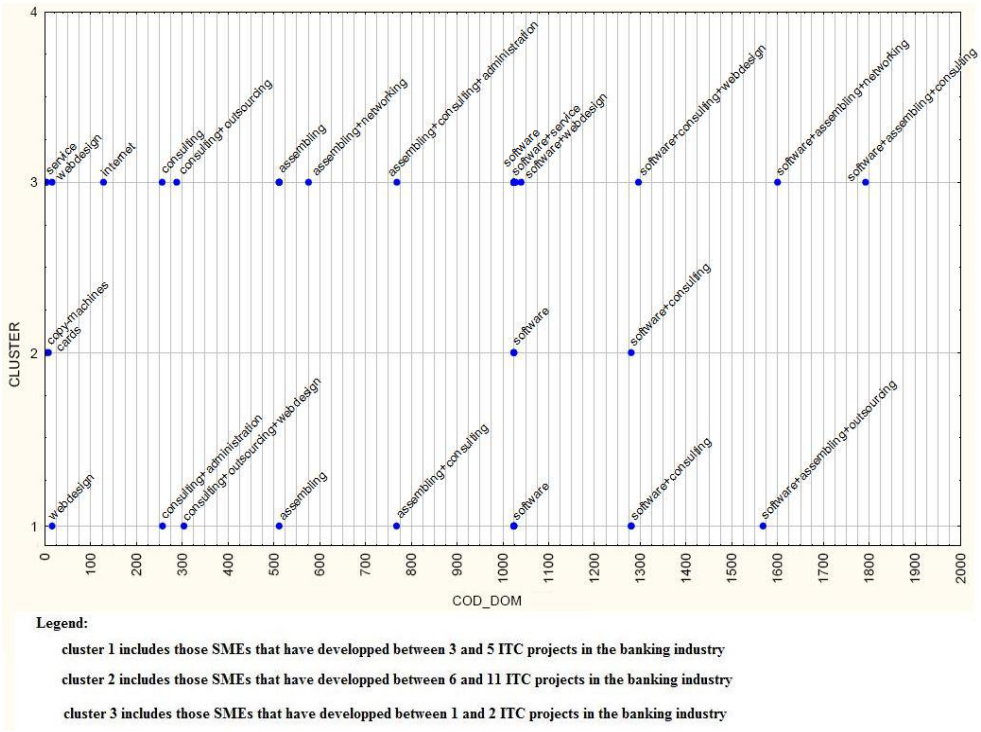

Figure 2 The impact of SME's technical capabilities on the clustering

In order to obtain a quantitative approach in our research, we employ the following multivariate regression model:

$$NPB = a0 + a1 * AG + a2 * ANE + a3 * TC \quad (1)$$

The results, for a 95% confidence level are shown in the following table 3.

Therefore we obtain the following regression formula:

$$NPB = 2.23682 + 0.02693 * AG + 0.02293 * ANE - 0.00012 * TC \quad (2)$$

The SME's age affects positively but in a small proportion the number of projects developed in the banking industry. Therefore, we can state that new firms have the same potential as older firms in terms of developing projects for the financial institutions.

Another finding is that the technical competencies affect in a negative manner the number of projects, but we must underline the fact that we concentrate on SMEs. Therefore, in our data we can observe small companies with an average of 1-to-5 employees that provide many competencies, being over-qualified but still in lack of human resources to carry on a large project.

Table 3

Regression Statistics								
Multiple R	0.33561973							
R Square	0.1126406							
Adjusted R Square	0.04771186							
Standard Error	2.66112023							
Observations	45							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	36.85600461	12.28533	1.734834	0.174878			
Residual	41	290.3439954	7.081561					
Total	44	327.2						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2.23682063	1.227622047	1.822076	0.075743	-0.24241375	4.716055	-0.24241375	4.716055012
AG	0.02693168	0.077787484	0.346221	0.730946	-0.13016342	0.184027	-0.13016342	0.184026775
ANE	0.02293283	0.010110866	2.268137	0.028654	0.00251351	0.043352	0.00251351	0.04335215
TC	-0.0001238	0.000838502	-0.14763	0.883357	-0.00181718	0.00157	-0.00181718	0.001569601

Therefore, SMEs are more likely to be involved in large projects for the financial industry if they are specialized in a certain ICT field or if they have a large multi-disciplinary team of employees.

Still, by examining the t Stats and the overall quality of the model (F , Significance F) we can identify that TC and AG are independent variables that do explain in smaller proportions the variation of NPB.

Running a univariate regression of the number of ICT projects carried out by a SME in the banking industry (NPB) over the average number of employees hired by the SME in the last financial year (ANE) we obtain a model with higher significance and quality:

$$NPB = 2.4378 + 0.02245 * ANE \quad (3)$$

Having R squared = 0.109157, Std Error = 2.60359, F= 5.268889 and the following results for the variables:

	Coefficients	**Standard Error**	**t Stat**	**P-value**
Intercept	2.43782	0.49239	4.950995	1.1883E-05
ANE	0.022549	0.009824	2.295406	0.026649912

2. Analysis from the banking industry's perspective

The 45 SMEs that undergo our analysis were involved in a total of 141 ICT projects in the banking industry. In order to preserve banks' reputation, we shall code the banks' names involved in the study.

We continue by exploring the decision patterns for each category of financial institutions: banks (central or local branch), credit institutions, leasing divisions and financial-investment organizations.

2.1. Leasing divisions

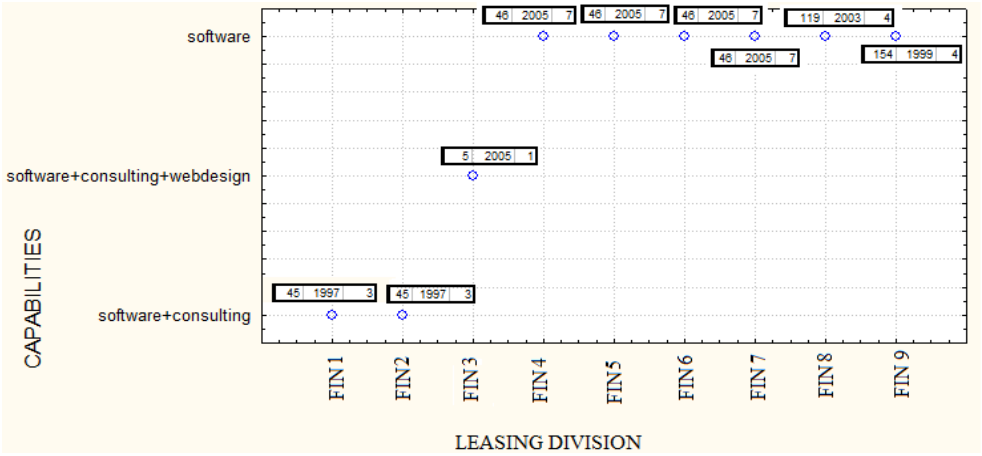

Figure 4 Leasing divisions' collaboration with ICT SMEs

As resulting from the figure 4, the leasing divisions generally request SMEs' expertise in terms of software products. Leasing divisions generally collaborate with medium-size SMEs with ANE ranging between 45-154 employees and that carried out a significant number of projects in their field (NPB ranges between 3 and 7). The exception is made by one leasing division who collaborated with a SME specialized in software, web design and consulting and that consisted of only 5 employees and carried out only 1 project in the financial industry.

2.2. Financial institutions

In terms of ICT projects among financial institutions focused on investments, two patterns can be observed:

- -collaboration with small SMEs (ANE between 1-4 employees, with few projects in the financial industry NPB of 1 or 2) in areas such as service, web design, consulting or specific software packages
- -collaboration with medium sized SMEs (ANE between 26 – 154 employees) and with a significant number of projects in the financial industry (NPB ranging between 4-8 projects) specialized in software development.

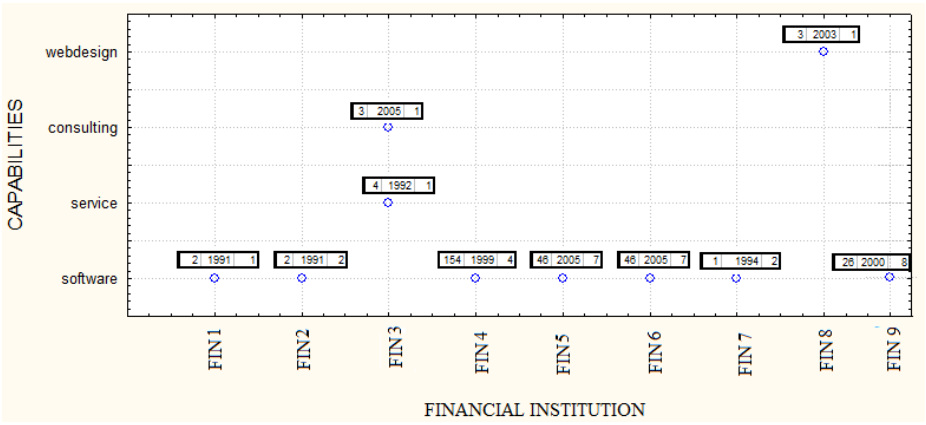

Figure 5 Financial institutions' collaboration with ICT SMEs

2.3. Credit institutions

The credit institutions provide the following decision pattern in terms of ICT investments: for hardware configuration and assembling they can collaborate with small SMEs (ANE ranging of 3-5 employees), while for software products they opt for medium size SMEs (ANE between 26-80 employees) with a significant number of projects in the financial industry (NPB of 7-8). An exception is a credit institution that collaborated with a SME with 80 employees but with only one reference in the financial industry.

Figure 6 presents an overview of these projects.

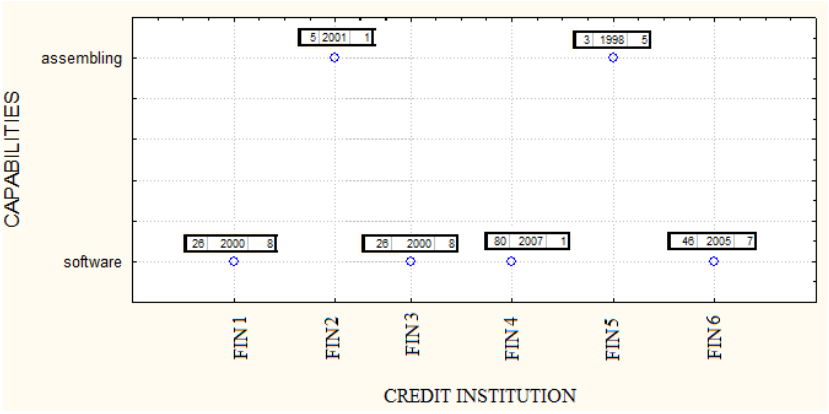

Figure 6 Credit institutions' collaboration with ICT SMEs

2.4. Banks – the local branches

In terms of SMEs collaboration for local ICT projects, the following decision patterns can be observed:

- the banks tend to use the same ICT provider for branches situated in neighbor geographic regions

- the main ICT areas in which banks request SMEs' services for their local branches are hardware assembling and networking. Seldom, they purchase software products from SMEs for use in local branches only

With regard to the characteristics of SMEs involved in this category of projects, they usually are identified by a small number of employees (ANE ranging in 3-36 employees, with one exception of 154 employees) and an age of at least 10 years (AG ranging in 10-17 years).

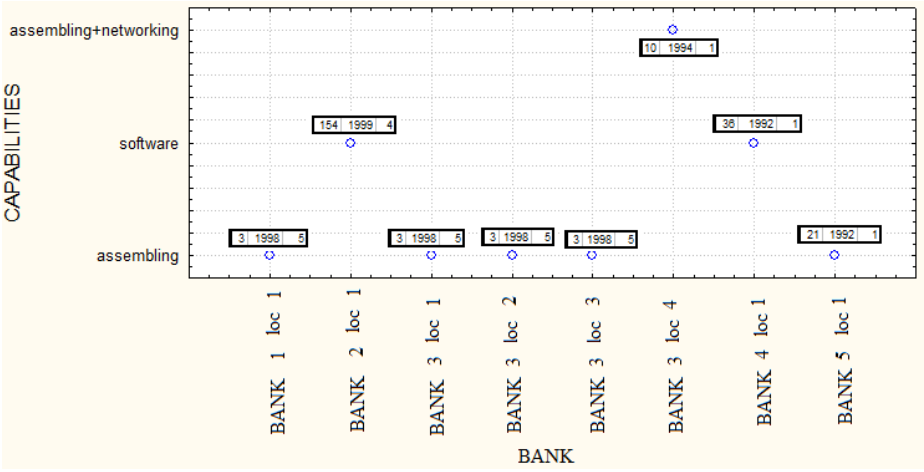

Figure 7 Banks local branches' collaboration with ICT SMEs

2.5. Banks – the central location

The figure 8 presents the collaboration between banks and SMEs for ICT projects and enlightens the strategies adopted by the top 10 Romanian banks. The following conclusions can be drawn:

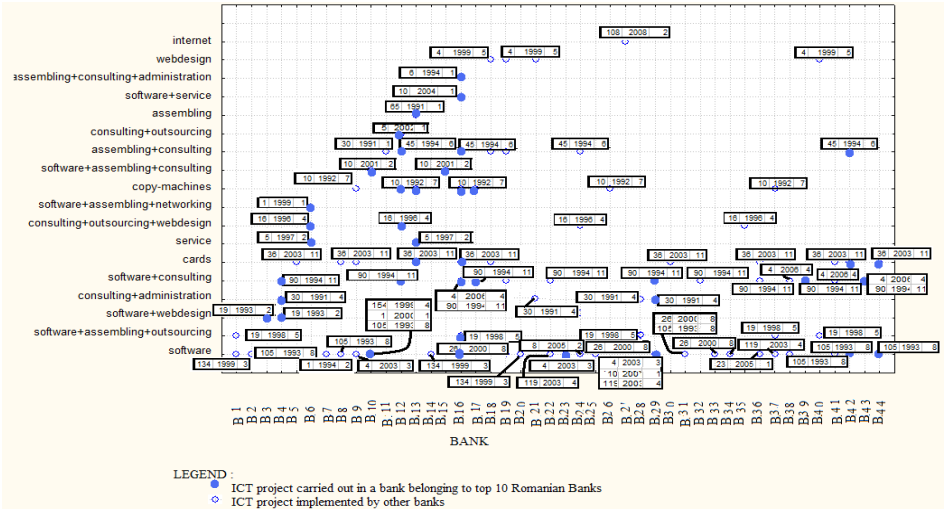

Figure 8 Banks' collaboration with ICT SMEs

From this analysis we can identify the following patterns of ICT collaboration: generally, the top 10 banks are the most likely ones to develop ICT projects involving SMEs. In this case, banks opt for SMEs with a wider expertise, that is having more than one sphere of action (e.g software+ +assembling+outsourcing, software+webdesign, consulting+administration etc).

The results show that software is the main IT field where banks and SMEs collaborate, especially for developing modules that come interfaced with the core-banking system and provide specialized functionalities.

In the field of internet and web-design it is generally the smaller banks that collaborate with SMEs for the development of their web-sites or of certain functionalities of their web portal.

The SMEs that are specialized only in one IT field generally offer niche services such as cards processing, copy-machines, service and that is what makes them attractive to banks.

Conclusions

The present study identifies some patterns in the investment decisions within the Romanian banking industry, emphasizing some of the main factors that affect this collaboration: the SME's previous experience in the financial industry, the SME's size and its age on the ICT market.

The patterns identified differ according to the division of the bank (leasing, credit) and to the level where the decision is taken (branch or central location).

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Annex

K-means clustering results

Table 1

		CLUSTER 1		CLUSTER 2		CLUSTER 3	
COD_DOM	**DOMAIN**	**ANE**	**YoE**	**ANE**	**YoE**	**ANE**	**YoE**
2	cards			36	2003		
4	service					5	1997
8	copy-machines			10	1992		
16	webdesign	4	1999			3	2003
128	internet					108	2008
256	consulting					3	2005
257	consulting +administration	30	1991				
288	consulting +outsourcing					5	2002
304	consulting +outsourcing +webdesign	16	1996				
512	assembling	3	1998			5	2001
512	assembling					21	1992
512	assembling					65	1991
576	assembling +networking					10	1994
768	assembling +consulting	45	1994				
769	assembling +consulting +administration					6	1994
1024	software	4	2003	26	2000	1	1994
1024	software	45	2000	46	2005	1	2000
1024	software	119	2003	105	1993	1	2001
1024	software	134	1999			2	1991
1024	software	154	1999			2	1991
1024	software					8	2005
1024	software					23	2005
1024	software					36	1992
1024	software					80	2007
1028	software +service					10	2004
1040	software +webdesign					19	1993
1280	software +consulting	4	2006	90	1994		
1280	software +consulting	45	1997				
1296	software +consulting +webdesign					5	2005
1568	software +assembling +outsourcing	19	1998				
1600	software +assembling +networking					1	1999
1792	software +assembling +consulting					1	2001