The connection between innovation and business growth in the Hungarian SME sector

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Abstract
Researchers have been interested in innovation and growth for a long time. While macroeconomic models regarding the innovation and growth nexus are relatively well developed, our knowledge is still limited about the nature of connection in the firm level. Most business level examinations focus on the analysis of high growth high innovative firms in the high or medium tech sector. At the same time, much less is written about the majority of small and micro size firms that constitute the core of the economy. By relying on a representative sample of 500 Hungarian SMEs, I investigate the connection between growth and different types of innovation activities. It is presented that the connection between business growth and innovation is not linear but quadratic that raises the problem of causality. It means that stagnating business have the lowest level of innovation activity, and both negatively and positively growing businesses innovate more. This phenomenon is the most prevailed in the 10-19 and the 20-49 employee business size categories. A potential implication of this finding is the lack of future strategic focus: Some mall business owners do not innovate until they can maintain their level of sales. They do start innovating when growth begins to decline. The interrelation between growth and different innovation activities were further examined by cluster analysis that provided a very contradictory picture regarding growth and innovation. Only two cluster businesses, about 20% of the whole sample can be considered as innovative, however the business attitudes toward growth is ambiguous. There are some businesses aiming to grow without innovation and investment, and there was a cluster of firms where innovation served only to maintain competitive position. Whether these findings are only the specialties of the Hungarian SMEs or more general phenomena requires further examination.

1. Introduction[1]

Since Schumpeter's seminal work (Schumpeter 1934) there have been an enormous number of publications regarding innovation. Out of the several potential extensions, the connection between innovation and growth has proved to be one of the most popular topics. Classical growth model of Solow (1956, 2000) and of endogenous growth theory of Lucas (1988) handle innovation as an exogenous

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factor. Following Kaldor and Mirrlees (1962) and Arrow (1962) growth theories that included technological change, Romer (1990) was the first who incorporated innovation as an integral part of his growth model (Romer 1990).

Another extension of the innovation theories to economic growth can be referred as the National System of Innovation (NSI) that views innovation as a complex process of the participating firms, research organizations and government institution (Freeman 1988, 1994, Edquist 1997, Nelson 1993, Lundwall 1992). Knowledge creation, knowledge transfer, learning and the interaction amongst the different stakeholders of innovation play the crucial role in the success of innovation (Lankhuizen, and Woolthuis 2003) and ultimately of economic growth. Instead of firms, universities are considered to be the most important players in the Etzkowitz and Leydesdorff (2000) triple-helix model. A recent marriage of the Romer and the NSI model aim to explain the paradox of high knowledge (measured by R&D and patents) and low growth rates by the existence of the knowledge spillover. According to the knowledge spillover theory, knowledge does not commercialize automatically: The existence of a filter can prevent the created knowledge to spill over to other firms and other sectors to the economy thus hindering economic growth (Acs and Plummer 2005, Carlsson et al 2007).

While macro and meso-level growth models are relatively well developed the connection between micro (firm) level innovation and growth is still unclear mainly. According to the classical approach, the whole process of innovation starts with basic research, then it is followed by applied research and development, and finally ends with production and diffusion (Godin 2006, Dodgson and Rothwell 1995). This set-up has been heavily criticized because of the unicasual and deterministic view. Over years, five generation of innovation models have been developed from the technology push and demand pull innovations via the coupling feedback approach toward the integrated and networking models (Rothwell 1992). This conceptual setup is widely applied in the empirical literature of innovation. A popular direction of this research is to identify the determining factors of innovation. A large number of factors, such as basic firm characteristics (age, size, sector, location), strategic variables (R&D, absorption, finance investment, human resource development, organizational structure, collaboration, networking, ICT strategy etc.) and environmental factors (diffusion, spillover, spatial proximity, competition, government and regional policy, education, financial system etc) are found to explain more or less the innovation activity.[2]

Another field of research aiming to explain the connection between innovation and growth is entrepreneurship with a focus on small businesses. In the Schumpeterian sense, innovation can be viewed as a heart of entrepreneurship (Schumpeter 1934). There are empirical researches presenting evidences about the importance of small entrepreneurial businesses in innovation (Acs and Auretsch 1988, 1990, 2005). Since Birch (1987) seminal study, the examination there has been several studies focusing on a the small number of high growth, young firms, the so-called gazelles that believed to be responsible for the bulk of new job creation, technology progress, and economic growth is a (Auito

[2] For summary literatures see e.g. Faberger et al (2005), Trott (2005), Malerba and Brusoni 2007

2005, Birch 1987, Parker et al 2005). At the same time, most small businesses that constitute the core of the economy do not innovate. Only some of them engage in R&D, and very few introduce novel innovations. Most SME innovations are marginal improvements of already existing products, and instead of new technology creation, they rely on the adoption of the available technologies (Brown 2002, Damanpour and Wischnevsky 2006, Lankhuizen and Woolthuis 2003, Rothwell 1986, 1994). While the investigation of small business innovation is a popular topic in the literature, our knowledge is still limited about the nature, the types, the factors, and aims of innovation in the smallest sized firms. Standard innovation statistics such as Oslo Manual based surveys, and several empirical studies examine only those businesses that employ at least 10 or 20 employees (Inzelt and Szerb 2006).

The success of innovation and its potential positive effect on growth in these micro-sized businesses mostly depends not on the R&D effort and budget but on the collaboration and networking potential, and also on the absorption and adoption ability of the business. Another distinctive feature of small business innovation is its dependence on a few key personnel's creativity, risk taking propensity, strategic and managerial capabilities. Moreover, these business owner-managers can have different aims then large profit oriented firms, focusing on surviving and maintaining the position of the business rather than growing. Their planning horizon reflects to a short term view where innovation is costly and risky activity better to be avoided. What is the connection between innovation and business growth in the small business setup? That is the main research question of this paper.

In the following, I would like to examine the nature, the type, and the connection between innovation and growth in the small business sector by relying on a 2006 representative survey in the Hungarian SME sector. Part 2 describes the Hungarian SME sector, its innovation potential in the framework of international comparison. Part 3 contains the basic characteristics of the data set regarding innovation and growth. The analysis between the connection of innovation and growth is the topic of Part 4. Finally the paper concludes.

2. Innovation and growth in the Hungarian SME sector

In order to evaluate the connection between innovation and growth in the SME sector correctly, the specialties of the examined country, that is Hungary should be noted. Hungary, similar to other Central Eastern European transitional countries has a relatively short history in SME development that goes back to 1990 when the transformation from the planned to a market economy started (Szerb and Ulbert 2002). By the mid 2000s, the Hungarian SME sector consisted of a relatively large number of registered businesses that exceeded the 120/1000 capita. Other available comparative statistics reinforce that the importance of the Hungarian SME sector was very similar to the EU average. In 2003 Hungarian (European Union 15 + 4 NAFTA country average) SMEs provided 71,4% (69,7%) of the jobs, 51,4% (57,3%) of the value added, 59.3% (57.6) of the turnover, and 16,4% (20%), %) of the export (Román 2006). However, this relative comparison hides the fact that an average EU business in the

SME sector is 5-10 times larger than a Hungarian SME in term of economic performance causing a low level of competitiveness.

The entrepreneurial characteristics of Hungary are well-known from the Global Entrepreneurship Monitor (GEM) international research (Szerb 2005, Szerb et al 2006). On the basis of the Early Stage Entrepreneurial Activity (TEA) index – which shows the percentage of the 18-64 age bracket wishing to establish a new business or having a business younger than 42 months – both the absolute and the relative position of Hungary have continuously deteriorated in the period 2001-2005. In 2001, the indicator stood at 11.4%, but this declined to 6.6% in 2002, to 4.3% in 2004 and to 3.2% in 2005. Since that there is an improvement in the TEA index but Hungary performs very poorly in other entrepreneurship activity related features (Table 1)

Table 1: Entrepreneurial activity and other entrepreneurship related features of Hungary compared (2004-2005 average, as a percentage of the 18-64 adult population)

Country	TEA (%)	Opportunity entrepreneurship share(%)	Knows entrepreneur (%)	Possesses startup skills (%)	Sees good business opportunity (%)
Hungary	4,02	61,26	28,69	18,03	13,51
USA	11,89	84,06	38,60	53,21	32,97
Europe	5,90	77,74	40,22	43,00	35,93
Latin America	16,47	65,22	44,49	62,48	50,08
Australia/ New-Zealand	14,12	85,21	42,94	59,46	53,30
Asia developed	4,05	79,47	28,83	21,13	18,00
Asia developing	17,23	60,14	49,31	49,87	31,21
Other	12,32	66,47	43,99	56,22	45,56
Average	8,93	75,06	40,84	46,53	38,01

Source: own calculation based on GEM 2004, 2005 executive summaries

While most Hungarian businesses starts because of opportunity reasons, that corresponds to the development of the country, less than 30% of the adult population knows an entrepreneur who started a business in the past two years, just 18% possesses the necessary startup skills, and only 13,5% can see good business opportunities. In all of these measures, Hungary posits well below the average, and of other European countries.

The innovation performance of the Hungarian SME sector can be evaluated with the European Innovation Scoreboard survey, where Hungary ranked 15th out of the 25 EU member countries. The 2002 Community Innovation Survey that consists of enterprises with over 10 employees data are available for Hungary (Table 2).

Table 2 Percentage share of enterprises introducing innovation by size classes in Hungary, 2002

Size classes	Industry	Services	Total	Of which: mainly own company	
				product	process
Small enterprises (11-49 *persons*)	19,1	13,6	16,9	65,8	59,8
Medium-sized enterprises (50-249 f*persons*)	22,6	30,3	24,5	64,0	42,5
Large enterprises (250- *persons*)	44,6	25,0	41,4	71,3	46,2
Total	**21,4**	**15,8**	**19,4**	**66,1**	**53,8**

Source: based on Innovation 2003, 18-19. and 21. oldal.Román 2006: Small and medium-sized enterprises and Entrepreneurship, Hungarian Central Statiscical Office, Budapest 2006, p. 74

According to Table 2, only 19,4% of Hungarian SMEs introduced product or process innovation, 21.4% in the industry and 15.8% in the services. Smaller businesses – except the medium sized service category – have lower innovation activity than larger businesses. The relative backwardness of the Hungarian SME sector to other EU countries in the field of innovation can be seen from the Innobarometer survey conducted amongst managers (Table 3).

Table 3: Percentage share of positive responses of managers introducing innovation, 2004

Interview question	EU-25 enterprises					EU-15	New members	Hungary
	average	extremes	20-49 persons	50-249 persons	250-499 persons			
Introduction of new product, services	74	85-63	73	76	81	74	77	63
Introduction of new process	56	71-31	54	59	65	56	53	51
Market research for innovation	33	22-54	30	40	45	33	36	31
In house research	53	75-19	49	59	67	54	44	52
Contracting on research	20	51-7	17	25	34	20	17	9
Application for patents	12	17-0	9	18	25	13	9	6
Registration for international trademark	14	33-5	13	17	23	15	12	5

Source: Román 2006: Small and medium-sized enterprises and Entrepreneurship, Hungarian Central Statiscical Office, Budapest 2006, p. 75

While there is 11% and 5% difference in the product and process innovation between Hungary and the EU average, respectively, the deviation is the largest in research, patents and trademark applications.

Other innovation surveys report even larger differences in the innovation activity and effort between Hungary and other countries (for a summary see: KKV szektor…2006)

Despite that studies on the growth of the Hungarian SME sector are scare, there is an agreement that the growth of the Hungarian SMEs has been disappointing and problematic. Most Hungarian businesses are very small, the average number of employees is about 4, firms are systematically under-financed, lack the strategic focus, and the managerial-entrepreneurial skills of the business owners are also unsatisfactory. Macroeconomic conditions, discriminating financial system and the regulatory environment is rather harm than help small businesses (Jávor and Rozgonyi 1995, Laky 1998, Halpern and Kőrösi 2001, Papanek 2005, Szerb and Ulbert 2006). Recently, the world economy recession, the macroeconomic imbalances, and the increased competitive pressure of the foreign businesses associated with the EU accession caused further shock to the domestic small businesses. At the same time, there are huge differences between the performance of the mainly foreign owned large businesses and the domestic micro and small firms (Szerb and Ulbert 2002). Major (2002) recognized efficiency problems not only in the micro but also in the medium size businesses sector.

Presently, there is only one published study that aimed to identify the factors of growth in the SME sector. Szerb and Ulbert (2006) applied the OLS stepwise regression method to identify the significant factors of business growth. However, the different dependent variables of growth are mainly influenced by different independent factors. Most observed outcomes corresponding to previous empirical results and the alterations are explained by the limited market economy experience and the transitional nature of Hungary. Business behavioural factors of investment, technology development, export, organizational change and strategic orientation are found to be the major determinants of business growth. Personal behavioural features like ownership experience in other businesses as well as business size, age, legal form, the number of founders and foreign owners are significant but less important determinants of growth.

Szerb and Ulbert (2006) also examined the connection between growth and innovation. While it can be expected that innovation affect business growth positively, the innovation activity of the Hungarian small business sector is generally weak. Most small firms introduce only marginally new products or technology. The majority of innovations are only an improvement of existing products or technology. They are barely enough to maintain competitive position and not sufficient to induce substantial growth. Szerb and Ulbert (2006) presents mixed evidences about the influence of innovation on growth. While both product and technology innovations influence growth (both turnover and employment) positively and significantly, the stepwise regression outcome implies that product innovation is less important, insignificant factor of growth while technology innovation is vital for employment growth as well as when growth is measured as a composite factor.

While the above findings corresponds well to our existing knowledge on the Hungarian SME sector growth and innovation potential, the results and the applied method are questionable. The OLS regression requires the independences of the right hand side variables, while it is clear that most of the in-

fluential variables of business growth do correlate to one another causing multicollinearity problems[3]. Moreover, the nonlinear effect of the variables on the business growth can also be expected, that, again, questions the reliance on any regression method. Another problem is the potential lag and causality effect between innovation and growth. Since it takes some time for the innovation to have an effect on growth, growth and innovation activity data are from the same time period. Moreover, it is not clear that innovation precedes growth, it may happen that growth either negative or positive requires innovation effort. In the following analysis I am trying to handle these problems by applying cluster analysis technique that is not sensitive to the above problems (except causality).

3. Survey and sample description

The basis of my investigation is a representative sample containing 502 SMEs in partnership forms, established in 2004 or earlier. These businesses were randomly selected in a list containing 10 321 SMEs. In order to avoid a large number of very small businesses the sample is stratified according to size: Only those businesses are included that have at least two employees, or in other words one employee besides the owner. The survey was executed in 2007 between March and June. The time span of the investigation is the 2003-2006 time period. The following table shows the distribution of the sample in terms of the size of the businesses compared to the 2004 official statistical data.

Table 4: The sample size and breakdown by business categories

Size category	Number of business units 2004*	As a percentage of 2-249 businesses	Sample size	Sample size/ number of businesses (%)
2-4 employee	153 848	67,41	136	0,088
5– 9 employee	39 613	17,36	133	0,336
10–19 employee	18 170	7,96	102	0,561
20–49 employee	10 636	4,66	80	0,752
50–249 employee	5 028	2,20	51	1,014
Sum	228 241	100,00	502	0,220

*Source :Central Statistical Office: Business demography 2004, Budapest, p. 17.

The survey consists of six blocks: Basic data, establishment, strategy, future growth, finance, personal characteristics. Innovation is included in the strategy block. Previous surveys of innovation activity, including Inzelt and Szerb (2006), applied an older modified version of the EU/OECD harmonized Oslo Manual and the Frascati Manual which focused on technological - product and process - innova-

[3] To be fair, Szerb and Ulbert (2006) checked out multicollinearity but did not find it to be significant. However, the application of any regression when multicollinearity is theoretically present and the connection between the influential independent variables is vital is not really proper.

tion. In this survey, we rely on the newer version of the Oslo Manual (version 3), which incorporates other types of innovation: organizational innovation as the change of the organizational structure and marketing innovation as the application of new marketing methods (Oslo Manual 2005). Marketing innovation is measured as the penetration of new markets or market segments. Table 5, below, shows the innovation activity of the sample businesses. A note that I measure the engagement of innovation activity and not introduced (finished) innovations.

Table 5: The number and types of innovation in different size categories

Business size in 2003	Types of innovation based on the intensity of innovation effort (intensive or very intensive are calculated)				
	Innovation (any)	Product innovation	Technology innovation	Marketing innovation	Organizational innovation
2-5 employee	49	35	20	28	2
Percentage	*36,0*	*25,7*	*14,7*	*20,6*	*1,5*
6-9 employee	43	31	23	30	10
Percentage	*32,3*	*23,3*	*17,3*	*22,6*	*7,5*
10-19 employee	50	34	30	32	13
Percentage	*49,0*	*33,3*	*29,4*	*31,4*	*12,8*
20-49 employee	31	23	17	23	13
Percentage	*38,8*	*28,8*	*21,3*	*28,8*	*16,3*
50 - 249 employee	25	17	13	17	7
Percentage	*49,0*	*33,3*	*25,5*	*33,3*	*13,7*
Sum	**193**	**150**	**103**	**130**	**45**
Percentage	***38,5***	***29,9***	***20,5***	***25,9***	***9,0***

Based on table 5, 38,5% of the businesses engaged in innovation in the 2003-2006 time period. Most businesses made effort to introduce product (29,9%) and marketing (25,9%) innovations, but only 20,5% tried to innovate new technology and 9% changed the organizational structure. The percentage of the innovative businesses in terms of the size of the business shows some deviations as compared to previous studies: Out of the 6-9 and of the 20-49 size businesses only 32,3% and 38,8% engaged in innovation, while a higher percentage of the businesses with 2-5 employees (36,0%) and with the 10-19 employees (49%) innovate.

The growth of the business is calculated in two categories: the increase of the number of employees and of the real turnover over the 2003-2006 time period. Growth rates are calculated as the slope of the regression line over employment and sales following Weinzimmer et al (1998) and Szerb and Ulbert (2006). This method has an advantage over the absolute and the relative as well as the Birch-index because it takes into consideration not only the starting and the ending points but also the potential ups and downs over the whole 2003-2006 time period. Table 6 reports these growth rates in three categories, positive, zero/close to zero in the case of sales and negative ones.

Table 6: The growth of employment and of real sales in different size categories

Size of business	**Increase in employment**				**Increase in real sales**			
	+	0	-	Total	+	~ 0	-	Total
2-5 empl.	17	91	28	136	37	45	53	135
%	*12,50*	*66,91*	*20,59*		*27,41*	*33,33*	*39,26*	
6-9 empl.	49	49	35	133	50	35	48	133
%	*36,84*	*36,84*	*26,32*		*37,59*	*26,32*	*36,09*	
10-19 empl.	49	28	25	102	47	8	45	100
%	*48,04*	*27,45*	*24,51*		*47,00*	*8,00*	*45,00*	
20-49 empl.	42	21	17	80	36	6	38	80
%	*52,50*	*26,25*	*21,25*		*45,00*	*7,50*	*47,50*	
50-249 empl.	30	8	13	51	27	4	20	51
%	*58,82*	*15,69*	*25,49*		*52,94*	*7,84*	*39,22*	
Total	187	197	118	502	197	98	204	499
%	*37,25*	*39,24*	*23,51*		*39,48*	*19,64*	*40,88*	

Regarding employment growth most businesses did not change employment (39%), 37% increased, and 24% decreased employment. However, there are high variations in different business categories: Around two-third of the 2-5 employee firms neither hired nor fired, 20-49 and 50-249 size businesses increased their number of employees. Similar tendencies can be seen in the case of real sales: The smallest businesses stagnated and the larger size firms increased sales. However, it was the largest share of the 10-19 and of the 50-249 size category businesses that lost real sales implying increased competition where winning or losing was typical and remaining on the same level was relatively scarce.

Let us connect now growth (real sales) and innovation in the different size category businesses. According to table 7, the highest the share of innovating businesses (48%) is when real sales grow positively in every size of business category, as expected. However, relatively more businesses are innovating when real sales are negative as compared to stagnating businesses, that is opposite to our believes. The connection between present real sales growth and innovation is not linear but quadratic. The differences are the most significant in the small businesses employing 10-19 and 20-49 employees. A potential implication of this finding is that most stagnating businesses do not innovate then after a few years when sales decline begin to innovate to increase sales. There is also a higher probability that the success rate of the late innovation is lower as compared to the other cases when innovation begins when sales are going up.

Table 7: The connection between innovation and growth of real sales in different size categories (as a percentage of the innovating businesses)

	Size of business	Any Innovation	Product innovation	Technology innovation	Marketing innovation	Organizational innovation
Positive growth	2-5 empl.	45,95	32,43	21,62	29,73	0,00
	6-9 empl.	34,00	22,00	14,00	24,00	8,00
	10-19 empl.	61,70	40,43	36,17	40,43	14,89
	20-49 empl.	47,22	36,11	25,00	36,11	22,22
	50-249 empl.	55,56	48,15	29,63	37,04	18,52
	Total	48,22	34,52	24,87	32,99	12,18
Stagnation	2-5 empl.	33,33	22,22	8,89	15,56	2,22
	6-9 empl.	37,14	28,57	28,57	25,71	8,57
	10-19 empl.	12,50	0,00	12,50	0,00	0,00
	20-49 empl.	0,00	0,00	0,00	0,00	0,00
	50-249 empl.	50,00	50,00	25,00	25,00	25,00
	Total	31,63	22,45	16,33	17,35	5,10
Negative growth	2-5 empl.	32,08	24,53	15,09	18,87	1,89
	6-9 empl.	27,08	20,83	12,50	18,75	6,25
	10-19 empl.	44,44	33,33	26,67	28,89	13,33
	20-49 empl.	36,84	26,32	21,05	26,32	13,16
	50-249 empl.	40,00	10,00	20,00	30,00	5,00
	Total	35,29	24,51	18,63	23,53	7,84

If this can be true in other country SMEs , then this may explain, at least partially, the weak connection between innovation and business growth found in some empirical studies. In our case the correlation coefficients between real sales growth and innovation is below 0,1 and insignificant.

4. Analysis

As I described in the introduction, most empirical analyses, including my co-authored article, about business growth and innovation applied some regression technique that I considered to be inappropriate to investigate the firm innovation-growth phenomenon. The examination of the present sample characteristics reinforces these doubts. In order to avoid multicollinearity, nonlinearity and causality problems, the cluster analysis technique, that groups together businesses that have similar features, is applied. The eight group classification results are presented in table 8.

Table 8: The classification of the sample businesses by cluster analysis

Clusters	1	2	3	4	5	6	7	8
Number of firms	93	79	73	48	51	51	55	43
The size of business in 5 categories	1,58	1,68	1,44	2,81	3,43	3,43	3,93	3,98
Increase of the number of employees 2003-2006 3 categories	2,38	1,68	1,85	1,92	1,59	1,75	1,36	2,14
Increase of the real sales 2003-2006 3 categories	2,35	1,71	2,05	2,21	1,31	2,18	1,87	2,33
Planned increase in real sales over the next 3 years 3 categories	0,47	2,33	0,55	0,50	2,27	0,53	2,25	0,91
Planned increase in the number of employees over the next 3 years 3 categories	1,22	2,19	1,22	1,17	2,51	1,20	2,51	1,47
Engagement in product innovation in 2003-2006 3 categories	0,10	0,33	0,23	1,04	1,29	0,14	0,09	0,21
Engagement in process innovation in 2003-2006 3 categories	0,09	0,25	0,11	1,02	0,75	0,10	0,07	0,12
Engagement in organization innovation in 2003-2006 3 categories	0,01	0,09	0,03	0,27	0,43	0,04	0,00	0,07
Engagement in marketing innovation in 2003-2006 3 categories	0,14	0,32	0,15	0,96	1,12	0,12	0,18	0,16
Innovation budget in 2003-2006 in 4 categories	0,16	0,30	0,10	2,92	3,02	0,02	0,09	0,05
Number of owners at establishment 4 categories	2,39	2,14	1,90	2,35	2,27	2,51	2,42	2,63
Geographic extension of sales	2,10	2,28	1,78	2,52	2,73	2,49	2,40	1,51
Size of product diversification based on 4 level industry classification	1,20	1,29	1,34	1,17	1,47	1,27	1,45	1,56
Size of real investment in 2003-2006 4 categories	0,83	1,24	0,47	1,71	2,29	2,20	2,36	0,26
Age of business in 4 categories	3,71	1,90	2,22	3,56	3,06	3,31	3,44	3,56

All 15 variables are found to be significant at a 0,001, except diversification that is significant at the 0,05 level. Out of the 15 variables there are four growth (two present and two future), and five innovation related variables. Besides the size of business, there are the control variables of age, diversification, number of owners, geographic extension of sales as well as the magnitude of investment. In the following analysis I focus on the growth-innovation connection analysis with respect to firm size, and just touch the potential connection to the control variables.

Cluster 1 consists of 93 mainly micro-size, old firms, established in the late 1980s. In the examined 2003-2006 time period they increased both sales and employment, but in the following three years they do not plan to grow. The source of the growth in the examined time period was not really known since they did innovate almost nothing and the level of investment was also very minimal.

The cluster 2, 79 businesses are about the same size as cluster 1 ones, but they are much younger, established in the early 2000s. In the examined 2003-2006 time period their growth rates were moderate but in the following three years they plan to increase both sales and employment. However, their innovation activity, innovation budget and investment were relatively low.

The 73, relatively young cluster 3 businesses are the smallest amongst the eight clusters. They increased sales in the 2003-2006 time period but they plan very minimum further enlargement. Similar to the two previous clusters they did not innovate and invest almost anything. They seem to focus on keeping their present costumers rather than increasing employment or sales.

The 48 cluster 4 old businesses are mainly small firms having 6-19 employees. They increased the number of employees moderately, but real sales raise were not bad in 2003-2006, and they plan to follow this strategy over the following three years. Their overall innovation effort was the second best amongst the eight clusters.

The most innovation efforts were made by 51, cluster 5 businesses where the size of the firms were dominantly 20-49. These businesses looked that they increased both employment and sales very moderately in 2003-2006 but they should plan strong increase in both categories in the following three years. Besides innovation they invested the most. These businesses seem to be the late wakers to change the stagnating or declining trend of business growth.

The 51 cluster 6 and the 55 cluster 7 firms are very similar to each other, there are only a few differences between these two groups: They are old, relatively large firms engaging and spending innovation only a little. One notable difference that cluster 6 businesses had stronger growth in 2003-2006 and did not really plan further growth, while cluster 7 firms had lower growth in the previous time period but planned increase sales and employment in the flowing three years. One potential source of growth was investment, probably expanding existing production capacities.

Cluster 8 businesses are the largest and the oldest in the data set. While their employment and growth was good in the 2003-2006 time period they did not plan to increase this expansion in the following three years. The source of growth was most likely a previous time period investment and innovation, but both innovation and investment was minimal in 2003-2006. Probably they can see the future as very uncertain, and trying to concentrate on maintaining their position rather than boosting growth.

Taken together, only cluster 4 and 5 99 businesses, around 20% of the whole firms engaged acceptable innovation strategy. However, the aim of cluster 4 businesses is mainly to maintain competitive position (late innovation) while cluster 5 businesses plan further growth. A seemingly interesting characteristic of clusters 2 and 7 firms is the planned growth without innovation effort, relying only on investment.

5. Summary and conclusion

Despite the high interest amongst scholars in innovation related topics our knowledge is still limited about the innovation strategy of small businesses especially in the micro size category. The connection between innovation and growth is ambiguous, various investigations have contradictory results. Although, we do know that innovation activity increases with the size of the business. Moreover, most small business innovation just only marginal improvements of already existing product or technology, therefore instead of R&D, absorption capacity plays the key role.

My examination based on a representative survey sampling 500 Hungarian SMEs having at least two employees. The connection between innovation activity and growth was in the centre of interest. It cleared up that the connection between business growth and innovation is not linear but quadratic

that raises the problem of causality. It means that stagnating business have the lowest level of innovation activity, and both negatively and positively growing businesses innovate more. This phenomenon was the most prevailed in the 10-19 and the 20-49 employee business size categories. A potential implication of this finding is the lack of future strategic focus: Some mall business owners do not innovate until they can maintain their level of sales. They do start innovating when growth begins to decline.

The interrelation between growth and different innovation activities were further examined by cluster analysis. We could recognize a very contradictory picture. Only two cluster businesses, about 20% of the whole sample that could be considered as innovative, however the business attitudes toward growth were ambiguous. There were some businesses aiming to grow without innovation and investment, and there was a cluster of firms where innovation served only to maintain competitive position.

Unfortunately, my analysis is proper only to raise more questions and doubts about the connection between growth and innovation in the small business sector. The clarification of the connection between innovation to other strategic variables and ultimately growth remains to further researches.

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