

THE DYNAMICS OF INNOVATION STRATEGIES IN EUROPEAN ECONOMIES

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Abstract

Innovation is closely related to economic behavior and progress that is often path dependent. This paper provides the evidence of how enterprises' strategies for innovation changed in the context of external changes, i.e. what kind of changes occurred in innovation strategies of European enterprises since the pre-crisis period and how these changes are related to broader environment. For this purpose, CIS6 micro data from 16 economies and CIS8 macro data from 22 economies were processed and compared. It was estimated that medium- and less successful, in terms of firm performance, innovation strategies had sprouted, whereas the most successful innovation strategies had been rarefied due to the grown necessity for cost reduction and for greater flexibility. Only a few countries are still leading in developing new products or in significantly changing existing products as they did about 7 years ago. However, the greater part of the sample economies do not follow the old leadership patterns. Even though more and less innovative economies can still be distinguished, the countries comprising more and less innovative clusters have changed.

Keywords: Change, dynamics, innovation strategy, European economies

Introduction

The dynamics of innovation strategies has recently attracted the attention of a number of scholars (Archibugi, Filippetti, Frenz, 2013; Biais, Rochet, Woolley, 2013; Oberg, Verganti, 2014; Schulze, MacDuffie, Taube, 2015; etc.). The increased interest in this topic is often related to the recent economic crisis that began in 2008 when many industries, economies and enterprises were forced to learn the lesson of the Schumpeterian waves in real life.

Turbulent times significantly affect enterprises' innovation strategies and they experience notable changes. This is because innovation is closely

related to economic behavior and progress that, more often than not, is path dependent, shaped by the conditions in which it takes place and marked by its prior trajectory. For instance, Aidis, Estrin and Mickiewicz (2010) state that significantly lower levels of entrepreneurship in Central and Eastern Europe, in comparison to economies coming from other legal traditions, are determined by the former regime.

Hence, for many companies, especially international ones, institutional environment (in its broad sense, i.e. including social, financial, cultural, etc. dimensions) of target business locations plays a significant role in designing business strategies and directing the change, especially in turbulent times. This paper provides the evidence of how enterprises' strategies for innovation changed in the context of external changes, i.e. what kind of changes occurred in innovation strategies of European enterprises and how these changes are related to broader environment.

For this purpose, enterprises' former and most recent innovation strategies were compared. The basis for the analysis of the former innovation strategies was pre-crisis Community Innovation Survey (CIS6) that encompassed 16 European economies: Bulgaria (BG), Cyprus (CY), the Czech Republic (CZ), Germany (DE), Estonia (EE), Spain (ES), Hungary (HU), Ireland (IE), Italy (IT), Lithuania (LT), Latvia (LV), Norway (NO), Portugal (PT), Romania (RO), Slovenia (SI) and Slovakia (SK).

On the other hand, the basis for the analysis of the post-crisis innovation strategies was the most recent Community Innovation Survey (CIS8) that encompassed 22 European economies: Belgium (BE), Bulgaria (BG), Germany (DE), Estonia (EE), Greece (EL), France (FR), Croatia (HR), Italy (IT), Cyprus (CY), Latvia (LV), Lithuania (LT), Malta (MT), Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Slovenia (SI), Slovakia (SK), Sweden (SE), Serbia (RS) and Turkey (TR).

Indeed, the informed research period is designated by major economic and social changes due to the economic crisis of 2008-onwards, so the investigation of the dynamics of innovation strategies of that period is fairly deliberate. Also, it is important to note that, currently, CIS is the newest available broad scale database related to innovation research.

Methodology

For the investigation of the former innovation strategies, I relied on my previous research (Stankevicius, Jucevicius, 2013; Stankevicius 2014a, 2014b, 2015). The innovation strategies were composed of 60 innovation variables in total across 127,674 enterprises. The strategies were formed by means of exploratory factor analysis of CIS6 micro data.

For the investigation of the most recent innovation strategies, CIS8 micro data on strategies for innovation were used. CIS8 includes 16 variables

describing innovation strategies: eight variables reveal if each of eight strategies is highly important, and next eight variables reveal if each of them is not relevant (% of “yes” responses per country). The database gives also the possibility to distinguish between innovative (including enterprises with abandoned/suspended or on-going innovation activities) and non-innovative enterprises. The variables are presented in Table 1.

Table 1. Relevant indicators and labels of innovation strategies in CIS8

Indicator	Label	Indicator	Label
STMKEUR_HIGH	Enterprises that consider developing new markets within Europe highly important	STMKEUR_NR	Enterprises that consider developing new markets within Europe not relevant
STMKOTH_HIGH	Enterprises that consider developing new markets outside Europe highly important	STMKOTH_NR	Enterprises that consider developing new markets outside Europe not relevant
STIHCOŚ_HIGH	Enterprises that consider reducing in-house costs of operation highly important	STIHCOŚ_NR	Enterprises that consider reducing in-house costs of operation not relevant
STEXCOŚ_HIGH	Enterprises that consider reducing costs of purchased materials, components or services highly important	STEXCOŚ_NR	Enterprises that consider reducing costs of purchased materials, components or services not relevant
STINNPĐ_HIGH	Enterprises that consider introducing new or significantly improved goods or services highly important	STINNPĐ_NR	Enterprises that consider introducing new or significantly improved goods or services not relevant
STMKT_HIGH	Enterprises that consider intensifying or improving the marketing of goods or services highly important	STMKT_NR	Enterprises that consider intensifying or improving the marketing of goods or services not relevant
STFLEX_HIGH	Enterprises that consider increasing flexibility / responsiveness highly important	STFLEX_NR	Enterprises that consider increasing flexibility / responsiveness not relevant
STALL_HIGH	Enterprises that consider building alliances highly important	STALL_NR	Enterprises that consider building alliances not relevant

To estimate the direction of the dynamics of innovation strategies, the contents of former and latter strategies for innovations were compared.

Column charts were used to illustrate the differences between innovative and non-innovative enterprises.

Ultimately, hierarchical cluster analysis was performed. The dendrograms (Ward's method, Squared Euclidean distance) let us to observe changes in innovation strategies across the sample countries visually. This part of analysis was supplemented by k-means cluster analysis and a scatter plot. Both innovative and non-innovative enterprises were divided into two clusters, and distance from cluster centre was measured in each case. The sums of respective cluster centers and distances from the centers were used as the data for the scatter plot.

Strategies for innovation: former and latter

If to compare enterprises' strategies for innovation in time, one can definitely notice dynamics. The summary of the enterprises' key strategic orientations for innovation is provided in Table 2 on the next page.

The most apparent difference between the pre-crisis and post-crisis periods is the increased orientation towards cost reduction: both in-house costs of operation and costs of purchased materials, components or services. Not only innovating firms are predominantly interested in reducing costs, but non-innovative ones find the strategy of costs optimization the most relevant out of all given variants.

Interestingly, this type of strategy was considered to be medium-successful before the turbulent times. Then, the most successful in terms of firm performance innovation strategy was semi-open, knowledge-intensive leadership, i.e. the development of new or significantly improved products within networks for innovation, typically financed by third parties (Stankevice, 2014a, 2014b). However, now the focus has moved from introduction of new or significantly improved goods and services to cost reduction, i.e. from risky leadership to safe common welfare. This change could also be explained by unwillingness to form new networks for innovation (too risky) and/or inability to get external funding for innovation. Besides, Kraemer-Eis and Lang (2011) also emphasized the decline in the number and value of venture capital investments and their incomplete recovery. Hence, after the global financial crisis innovative firms simply used to look through building alliances and introduction of new or significantly improved goods and services much more than before. OECD (2012) also state that the economic crisis has negatively affected business innovation and research and development (R&D) in all countries.

Table 2. Former and latter innovation strategies: innovative and non-innovative enterprises

	2006-2008		2010-2012	
	Innovative	Less-innovative	Innovative	Non-innovative
Dominant innovation strategies	<ul style="list-style-type: none"> • Continuous engagement in intramural R&D • Networking due to external funding, e.g. from EU • Enter new markets by intensifying or improving the marketing 	<ul style="list-style-type: none"> • Replace outdated products • Improve quality of products • Increase range of products • Increase flexibility / responsiveness • Reduce labor costs 	<ul style="list-style-type: none"> • Reduce in-house and external costs • Increase flexibility / responsiveness • Introduce new or significantly improved products • Intensify or improving the marketing 	<ul style="list-style-type: none"> • Mostly, innovation strategies non-relevant at all • <i>If relevant, then it is:</i> • Reducing in-house costs • Reducing costs of purchased materials
Modest innovation strategies	<ul style="list-style-type: none"> • Replace outdated products • Improve quality of products • Increase range of products 	<ul style="list-style-type: none"> • Continuous engagement in intramural R&D • Networking due to external funding, e.g. from EU • Enter new markets intensifying or improving the marketing 	<ul style="list-style-type: none"> • Developing new markets outside and/or within Europe • Building alliances 	<ul style="list-style-type: none"> • Innovation strategies non-relevant • <i>Especially rare:</i> • Developing new markets outside Europe • Introducing new or significantly improved goods or services • Intensifying or improving the marketing

Similarly, entering new markets by intensifying or improving the marketing, which was estimated to be the second most successful innovation strategy (Stankevica, 2014a, 2014b), was not in focus after the financial crisis any more. Moreover, developing new markets, especially outside Europe, has become one of the most modest strategies for innovation now. Again, this fact demonstrates the enterprises' unwillingness to risk and invest into the development of new markets.

Figures 1 and 2 illustrate which innovation strategies enterprises recognized as highly important and not relevant in 2010-2012.

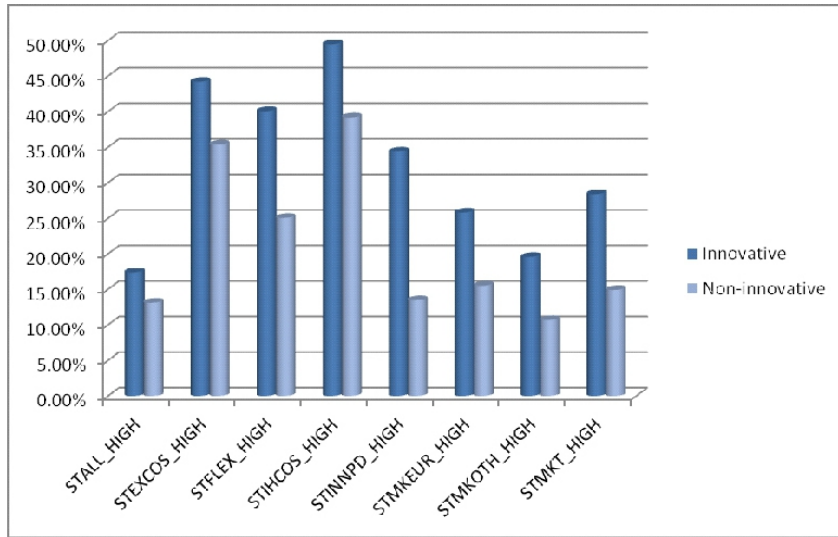


Fig. 1. Enterprises which recognize innovation strategies as highly important, 2012-2012, % on average

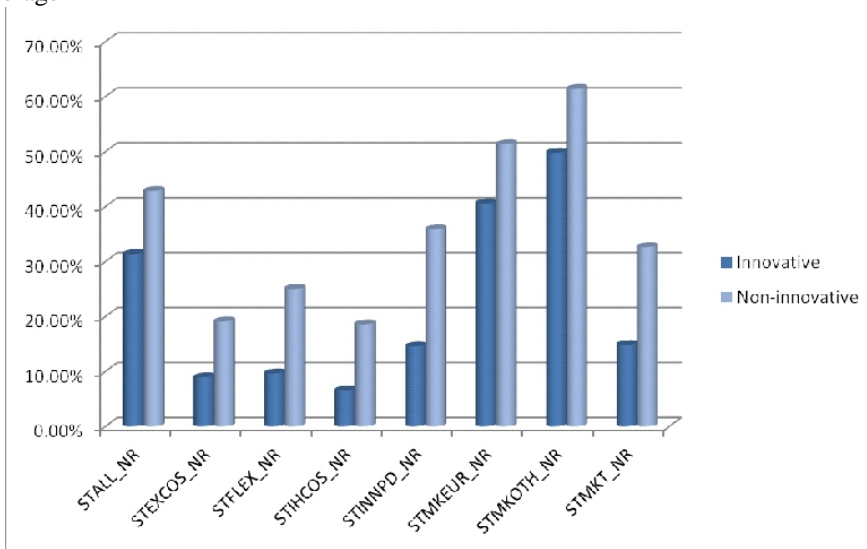


Fig. 2. Enterprises which recognize innovation strategies as not relevant, 2012-2012, % on average

One more aspect is that now the enterprises strive for greater flexibility and responsiveness than before. However, such an attempt was one of the indicators of less successful innovation strategies in 2008, but again, in 2012 the enterprises preferred greater flexibility and reduced costs to developing new markets, developing innovations and building alliances.

Dynamics of innovation strategies across countries

Fig. 3a and 3b portray how enterprises’ strategies for innovation have elaborated since the pre-crisis era. The pre-crisis portrait can be found in Stankevice (2014a, p. 178). The former and current innovation shapes are compared taken into consideration both innovative and non-innovative enterprises (fig. 3a and 3b, respectively).

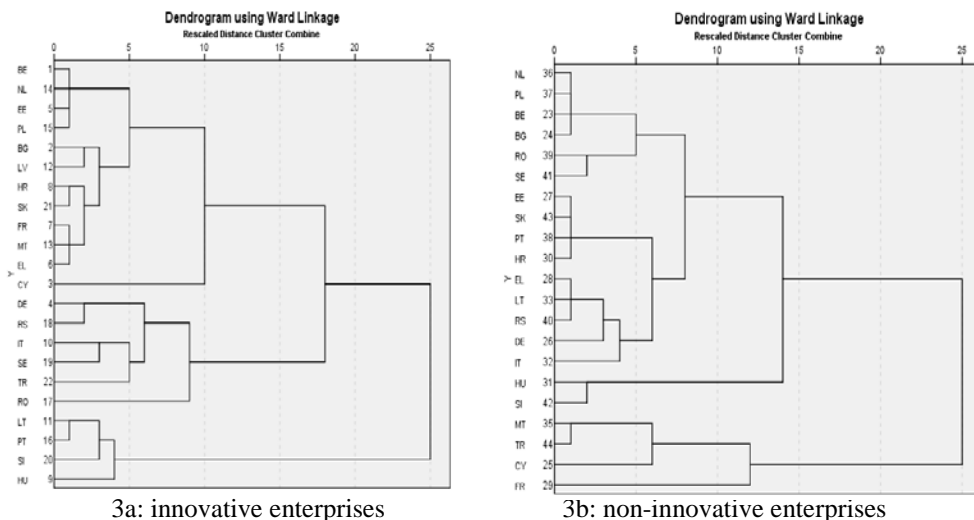


Fig. 3. Country clusters by taxonomies of innovation strategies: most recent state

Hence, the figures above and the one from Stankevice (2014a, p. 178) represent rather different groups of countries, even though a few similarities may also be observed. It is important to remind that some discrepancies may have been influenced by partially different samples and variables. In other words, despite the relative continuity, still, the occurred changes of innovation strategies were pretty notable. If to divide the economies into two groups, the first one would score lower on all CIS8 innovation strategies, while the second one – higher on all of them (Table 3). The result was reached due to 2-means cluster analysis (sig. in ANOVA < 0.05 for each variable).

Table 3. Clusters of CIS8 innovative enterprises

	Cluster	
	1	2
Enterprises that consider building alliances highly important	11.09%	21.78%
Enterprises that consider reducing costs of purchased materials, components or services highly important	33.50%	51.63%
Enterprises that consider increasing flexibility / responsiveness highly important	31.96%	45.71%
Enterprises that consider reducing in-house costs of operation highly important	37.04%	58.10%
Enterprises that consider introducing new or significantly improved goods or services highly important	26.85%	39.62%
Enterprises that consider developing new markets within Europe highly important	19.06%	30.50%
Enterprises that consider developing new markets outside Europe highly important	14.69%	22.94%
Enterprises that consider intensifying or improving the marketing of goods or services highly important	22.85%	32.25%

In addition, 2-means cluster analysis was also performed with two variables only: building alliances and introducing new or significantly improved goods or services (sig. in ANOVA < 0.05 for each variable). This was done in order to estimate which countries better correspond to the most successful in terms of firm performance innovation strategy of CIS6 – semi-open, knowledge-intensive leadership. These economies are: Cyprus, Germany, Greece, France, Croatia, Hungary, Lithuania, Latvia, Malta, Portugal, Serbia, Slovenia, and Slovakia. By the way, in CIS6, Germany and Slovenia were leading in the implementation of the informed innovation strategy, so this pattern remained unchanged. Also, in Spain, Hungary, Italy and Slovenia, this strategy attained the highest scores in comparison with the other innovation strategies, whereas Latvia, Lithuania and Romania scored lowest. Hence, Spain and Italy has become less innovative, whereas Latvia and Lithuania have advanced. This corresponds to OECD (2012) finding that the crisis revealed the pre-crisis weaknesses of some countries, especially some southern European countries.

Similarly, two more variables – developing new markets within and outside Europe – became subject to k-means cluster analysis (sig. in ANOVA < 0.05 for each variable) in order to estimate economies which better reflect the another innovative strategy of CIS6, i.e. expansive, marketing-intensive leadership. Based on CIS8 data, these economies are: Hungary, Lithuania, Portugal, Slovenia, France, Croatia and Latvia. However, back in CIS6, Norway and Slovakia obtained the highest factor scores for this strategy followed by Latvia, Estonia and Hungary. Hence, just as in case of semi-open, knowledge-intensive leadership, the strategic orientation of some countries have changed more than that of others.

The scatter plot of CIS8 economies based on cluster centers and distances from them is provided below (fig. 4).

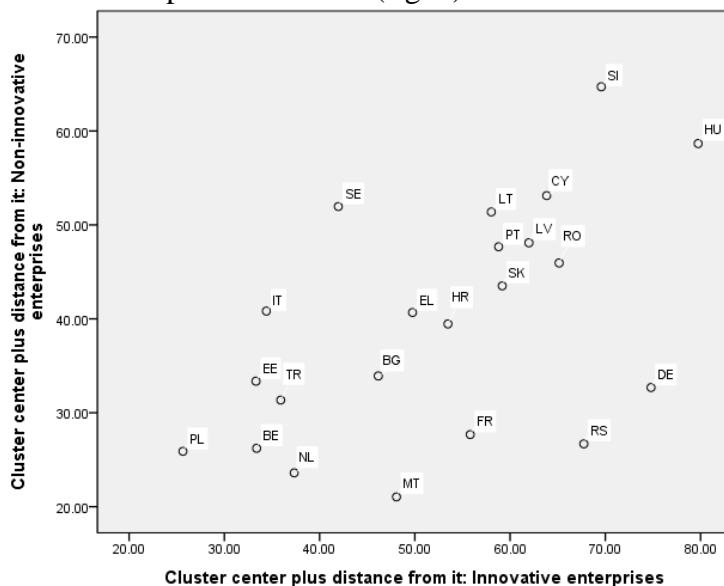


Fig. 4. Scatter plot of CIS8 economies

The plot above demonstrates how close or distant CIS8 economies are in terms of the taxonomies of innovations strategies pursued by innovative enterprises. Based on the comparison with fig. 3, one can conclude that significant changes took place. Even though some countries are still close to each other just as before (e.g. Latvia, Lithuania and Romania), the majority of them have changed their closest neighbors.

Conclusion

If to compare the former and most recent innovation strategies of European enterprises, one can estimate a clear shift of focus from the most-sophisticated and medium-sophisticated innovation strategies to medium-sophisticated and less-sophisticated innovation strategies. To put it differently, the focus has moved from introduction of new or significantly improved goods and services and from conquering new markets to cost reduction and increasing flexibility and responsiveness. Not only innovative enterprises are now predominantly interested in reducing costs, but non-innovative ones find the strategy of costs optimization the most relevant out of all given variants.

Regarding the taxonomies of innovation strategies within the clusters of economies, while some estimated patterns remain unchanged, the other ones demonstrate dramatic changes. For instance, only a few countries are still leading in developing new products or in significantly changing existing

products despite the grown necessity in cost reduction. However, the greater part of the sample economies do not follow the patterns similar to pre-crisis times. Even though one can still distinguish between the groups of more and less innovative economies, the members of these groups have mostly changed. Now, the group of medium and less successful (in terms of firm performance) innovation strategies has sprouted, whereas the group of the most successful innovation strategies has shrunk.

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