

INNOVATIVENESS PAYS OFF

Aavo Heinlo
Statistics Estonia

For two years already, the former European Innovation Scoreboard has been entitled with a new, fancier name – the Innovation Union Scoreboard. Hence, the European Union has officially been declared to be innovative and it is delightful to see that since 2009 Estonia can be found in the top half of the Scoreboard, among the group of followers pursuing the innovation leaders (European ... 2010: 13). In the latest Scoreboard (Innovation ... 2012: 12), Estonia is the only Central or Eastern European country aside from Slovenia whose innovation index is close to the European Union average.

The composite indicator – the innovation index – includes several indicators sourced from the regular Community Innovation Survey (CIS) covering enterprises. The results of CIS 2010, characterising enterprises' innovative activities during 2008–2010, prove that the years of economic crisis did not lower the innovativeness level of our enterprises.

Introduction

Despite globalisation, the economic progress of a country is still crucially dependent on homeward activities. The capability of an enterprise to develop new goods and services, to transform its structure into a more efficient one and to make its marketing more competitive determines its success on the international level. The success of a country is in turn based on an economic policy that supports and stimulates enterprises in these activities.

The article (Heinlo ... 2010: 73) covering the previous CIS survey (observation period 2006–2008) ended with a rhetorical question: do Estonian enterprises follow the advice of economists and politicians stating that innovation is the best remedy for defeating the economic crisis? The data from the latest survey confirm that the advice was taken, since the innovativeness of enterprises has remained on the previous level: the share of innovative enterprises was 56.4% in 2008 and 56.8% in 2010.

Community Innovation Survey

This was the fifth time that Estonia has participated in the Community Innovation Survey (CIS). The start was made about a dozen years ago, when the reference year was 2000 and the observation period was 1998–2000. That survey was not yet obligatory for enterprises, but CIS has since become a part of the official compulsory statistics in Estonia and is regulated by the relevant EC regulation (Commission ... 2004: 32). The next surveys covered the reference years 2004, 2006, 2008 and 2010 (the latest). The regular surveying allows an analysis of different facets of innovativeness using time series.

Meanwhile, a new version of the innovation statistics “bible” – the Oslo Manual (Oslo ... 2005) – was published. In the new version, non-technological innovation – i.e. organisational and marketing innovation – has been raised to the same level as technological innovation, i.e. product and process innovation. The definitions and suggestions of the updated Oslo Manual were introduced fully in CIS 2008 and in CIS 2010.

Every CIS questionnaire includes an additional one-off module dedicated to some topical subject. In CIS 2010, this module looked in detail at the use of skills and the stimulation of the creativity of

employed staff and the generation of new ideas. As expected, a huge difference between innovative and non-innovative enterprises was revealed.

Survey methodology

Eurostat's methodological recommendations for CIS 2010 made up the methodological base for the Survey, to ensure comparability with the earlier European Union innovation surveys. The sampling frame consisted of enterprises active in Estonia at the end of 2010 as listed in the Statistical Profile of Statistics Estonia.

The sampling frame included industrial and service sector enterprises operating in any of the main economic activities according to the Estonian Classification of Economic Activities (EMTAK ... 2008; based on NACE Rev. 2) as listed in Table 1 (p. 7). All enterprises operating in the listed activities and having 10 or more employed persons were required to participate in the Survey. Countries were free to expand coverage of the Survey to other activities or to micro-enterprises (with less than 10 employed persons). In Estonia, the expansion of coverage was considered inexpedient: the completion of the questionnaire would be an excessive burden for micro-enterprises as well as for enterprises active in the economic activities of construction, retail trade or hotels and restaurants. Besides, there is only limited possibility to compare the data with other countries.

The enterprises in the sampling frame were stratified by two main variables: by economic activity at the two-digit division level of EMTAK; and by the number of employed persons using five size classes, i.e. enterprises with over 250, 100–249, 50–99, 20–49 and 10–19 employed persons. In the case of international comparison, combined size-classes are used: large (250+ employed persons), medium (50–249 employed persons) and small (10–49 employed persons) enterprises.

Regional allocation as the third dimension could not be taken into consideration when sampling, as most strata had a too small number of enterprises in them. Therefore, the regional analysis of the Survey results had to be limited to estimates of the main indicators without going into details.

The final sampling frame consisted of 3,234 enterprises, and the sample of 2,083 enterprises divided into 240 strata. Compared to 2008, there were nearly 800 enterprises less in the sampling frame and 400 enterprises less in the sample. The economic crisis thinned out the number of active enterprises and reduced the number of employed persons in small enterprises below the survey limit. 51 strata were empty and 41 consisted of less than three enterprises, making the data gained on the respective stratum confidential. Secondary confidentiality added the same number of strata for which data cannot be published. This is a typical phenomenon in a small country.

Enterprises with 50 or more employed persons were surveyed by census. In case of enterprises with less than 50 employed persons, 18 of the 96 strata were empty, 60 strata were surveyed by census, and simple random sampling was used only in the case of 18 strata with the following conditions: the size of the sample was at least 30 enterprises; in a stratum consisting of less than 225 enterprises, the sample size comprised at least 25% of the frame; and in a stratum consisting of 225 or more enterprises, the sample size comprised at least 20%.

The Survey questionnaire (Ettevõtete ... 2010) maintained the content of the Eurostat core questionnaire with an added module on use of skills and stimulation of creativity. This was supplemented with some questions and characteristics of national interest: presence of foreign equity, division of the market region between the Commonwealth of Independent States and the rest of the world, sales to non-residents. To facilitate the completion of the questionnaire, enterprises were provided with extensive instructions containing definitions, explanations and examples (Aruande ... 2010).

There is a question that often arises during the analysis of CIS results: to what extent do these results characterise enterprises as a whole? Indeed, the financial statistics of enterprises published in the database of Statistics Estonia covered over 58,000 enterprises in 2010. This is

18 times more than in the CIS frame, but as most of these were micro-enterprises, the difference in turnover or number of employees is not so drastic at all (Table 2, p. 8).

As shown by Table 2, the innovation survey covered two thirds of the employees and three quarters of the turnover in case of industrial enterprises. Among service enterprises, the coverage is more modest, achieving 40% for employment and 50% for turnover. Consequently, there is no doubt about the representability of CIS. It is worth to note that CIS also covers financial and insurance activities (85 enterprises in 2010) which are not included in the financial statistics of enterprises – the reason is that their financial statements have a different structure.

Data collection

Differently from the older postal innovation surveys, the main data transmission channel for CIS 2008 as well CIS 2010 was the electronic environment on the website of Statistics Estonia. Enterprises had the additional possibility to download the questionnaire as a PDF file, print it out and return it after filling. In CIS 2008, 28% of the respondents used the old-fashioned way; in CIS 2010 their share was only 21% while 79% of the respondents preferred the online method. To guarantee a high response rate among foreign-language enterprises, these enterprises were given the possibility to order the Russian or English translation of the questionnaire by e-mail. In absolute figures, out of 2,083 sampled enterprises 1,735 or 83.3% responded (80.7% is the weighted result), which was two percentage points higher compared to CIS 2008. 81 strata had a 100% response rate. The final weights for each stratum were calculated according to its response rate.

16 May was the deadline for data submission. The response rate was only 50% at the end of July. Repeated reminders by e-mail and phone finally increased the response rate to the required 72% in October. In case of a lower response rate, there would have been a need for non-response analysis.

To perform data input and processing, the software introduced at Statistics Estonia for earlier surveys was developed further, including the development of special software for data checking and generation of output tables. In case of incorrect data, logic errors or item non-response, the respondent was contacted by phone or e-mail to correct the data. On the whole, it was necessary to contact over one third of the respondents (i.e. 657 enterprises), which indicates the apathetic and negligent attitude of enterprises towards completing the questionnaire. And this was a questionnaire where nearly all questions could be answered with a simple Yes/No or Likert scale items.

General data on enterprises

The analysis of the innovation survey results is based on the dependence of enterprises' innovativeness dimensions on main variables (economic activity and size) and supplementary variables, such as the fact of belonging to an enterprise group, presence of foreign equity, location of market, turnover, share of exports in turnover, and so on (Table 3, p. 9).

The distribution of enterprises covered by the Survey by different characteristics has been presented in Table 3 (p. 9). Traditionally, the number of enterprises is the main quantity used in CIS analysis. In this context, large companies, such as Eesti Energia or Skype are of the same value as a textile firm with 10 employees operating in a small town. If the turnover or size were used as weights, the results obtained would be quite different. After all, enterprises with 100 and more persons employed constitute only 10% of those covered by the Survey, but they account for a half of the total turnover and slightly over a half of employment. The main survey objects are small and medium enterprises; therefore it is preferred to use the number of enterprises as the basis. Most of the large enterprises are innovative anyway.

To begin with, it must be noted that over the course of ten years – from 2000 to 2010 – one can observe a steady upward trend in the share of service enterprises in Estonian economic

structure. In 2000 the share of manufacturing enterprises in the Survey was 10 percentage points higher than the share of service enterprises, whereas by 2010 the scales had already tipped in favour of service enterprises by four percentage points.

It can also be noticed that the share of enterprises belonging to an enterprise group is on the rise – and not only on account of groups with the head office abroad. In these ten years, the share of enterprises belonging to a group with a head office in Estonia has increased 1.5 times. If the trend continues, one of the next surveys might reveal that already more than a half of the enterprises covered by the Survey belong to an enterprise group.

As concerns the choice of main market, there have been no remarkable changes. One third of the surveyed enterprises consider the foreign market and two thirds consider the home market to be their main market. However, the share of enterprises considering countries in the Commonwealth of Independent States as their main market is two times lower than ten years ago, as less than every fiftieth enterprise specified this area as their main market in 2010. At the same time, the share of export in turnover grew from 34% in 2000 to 47% in 2008 but then fell again to 41% in 2010 due to the economic crisis.

Taking a glimpse at the distribution of enterprises by turnover, it is evident that the changes reflect, above all, the economic growth during 2000 to 2007. In 2000 the average turnover per employed person equalled 49,000 euros, while in 2010 it was 2.5 times higher at 125,000 euros.

In the analysis, it is practical to use technological intensity as a variable for manufacturing enterprises and knowledge intensity as a variable for service enterprises (Table 4, p. 10). It must be noted that in the meantime the new classification of economic activities (EMTAK) was implemented. As a result, the corresponding classifications of intensities changed and the comparability was altered. But the share of low-technology enterprises in manufacturing decreased by five percentage points already in 2000–2006, before the classification changes. Therefore, the trend of modest growth of technological intensity in Estonian manufacturing can be considered reliable. The share of knowledge-intensive service enterprises also rose by a few percentage points in 2010 compared with 2008.

Innovativeness of enterprises

According to the definition (Oslo ... 2005: 45–52), two main types of innovativeness are distinguished. Enterprises are technologically innovative if during the last three years they have introduced to the market new or significantly improved products (goods or services) or implemented new or significantly improved processes (in the production of goods or services, in delivery or in supporting activities). An enterprise can also be technologically innovative without the implementation of any innovation if it has had, during the same period, innovative activities (and expenditure) with the aim to develop or implement some technological innovation. Such activities could be still ongoing, suspended or even abandoned as not all attempts are destined for success. In 2010 every tenth enterprise had discontinued some innovation project during 2008–2010, while every sixth enterprise was continuing an innovation project. However, the share of enterprises with innovation activities but without implemented technological innovations is quite low, accounting for only a few percentages of the total number of enterprises.

Enterprises are non-technologically innovative if during the last three years they have implemented an organisational or marketing innovation. Questions about the presence of non-technological innovation in the enterprise were included in the CIS core questionnaire to the full extent only in CIS 2008. They differ somewhat from the questions, definitions and sub-classifications in earlier surveys. Thus, when studying the time-series for non-technological innovation, it must be taken into account that the data are not fully comparable.

The three-year period underlying the definition of innovativeness is also called the 'innovation window'. A fixed observation period is very important for comparability of surveys covering different periods. The length of the 'innovation window' is related to the average time that new

products spend on the market. Of course, this time varies by activity and ranges from a few months to decades.

The products and processes of an enterprise that has existed less than three years are new in principle. However, if the enterprise has come into being on the basis of a previously existing enterprise or through separation from another enterprise, it could nevertheless be considered a non-innovative enterprise.

Technological innovativeness

The results of CIS 2010 point to the conclusion that in 2010 the technological innovativeness of Estonian enterprises remained at the level of previous years. Hopefully the marginal decline in the share of technologically innovative enterprises from 48.7% in 2004 to 46.7% in 2010 does not indicate the beginning of a downward trend (Figure 1, p. 12).

As always, the mean value tells only half of the story. The real picture has much more colours. The distinguishable growth of innovativeness in industry that took place during 2000–2006 slowed down in the following years. Conversely, in services, the year 2004 stands out – there was a need for many rearrangements in 2002–2004 in connection with the accession of Estonia to the European Union (EU).

It must be noted that CIS 2008 and CIS 2010 differed from previous CIS surveys also due to the implementation of the new classification of economic activities (EMTAK). With the new classification, comparability with earlier results was doubtful in case of some individual economic activities, but comparability by groups of economic activities and by other enterprise characteristics (number of employed persons, belonging to an enterprise group, presence of foreign equity, etc.) was not affected.

A more detailed comparison (Figure 2, p. 12), where product and process innovations are separated, shows that the share of process innovators is greater than the share of product innovators, again with the exception of service enterprises during the period of accession to the European Union. What is more, the shares of enterprises with product and process innovations decreased in 2010 compared to 2008 levels in industry as well in services – the decrease was one-two percentage points for product innovators and six percentage points for process innovators. At the same time, the decline did not affect technological innovativeness as a whole; there were just fewer such enterprises that tried to implement product and process innovations simultaneously (the share of these enterprises was 19% in 2008 and only 15% in 2010). Instead, they were focusing on one kind of innovations only.

Already in the analysis of the results of previous surveys (Kurik ... 2002, Viia et al ... 2007, Innovaatiline ... 2011), the certain one-sidedness of technological innovation in Estonian enterprises was pointed out. The bulk of innovation expenditure is related to investments in new technology, machinery and equipment. Nevertheless, certain changes did occur in the structure of innovation expenditure in 2010 (Table 5, p. 13).

Eight kinds of innovation activities were distinguished in the CIS 2010 questionnaire (design was added to the earlier seven activities), but the amount of expenditure was asked only for four kinds of activities in 2010, which are listed in Table 5. Innovation-related training, marketing, design and other activities were omitted, since already the testing of questionnaires prior to 2010 showed that enterprises are not able to separate expenditure connected with innovation from total expenditure on the listed activities. Consequently, the Survey does not reveal the entire value of innovation expenditure but does supply the main costs.

A comparison of innovation expenditure to turnover in 2008 shows that this ratio for technologically innovative enterprises exceeded 3% only in five EU Member States, being the highest in Sweden at 4.9%. As seen from Table 5 (p. 13), Estonia was among those countries in 2008 and even had a record-high ratio (5.5%) in 2006. The peculiarity of small countries is that the value of an indicator can be crucially changed by the activity of a single enterprise. The leap

in innovation expenditure in 2006 was caused by large innovation-related investments in the water transport activity.

In developed industrial countries, the expenditure on research and development (intramural plus extramural) makes up about a half of innovation expenditure, and the investments in machinery, equipment and software make up roughly a third. Until recently, Estonia had a different structure of innovation expenditure, characteristic of Eastern European countries. Only in 2010 did Estonia move closer to the structure of industrial countries: two fifths for research and development (R&D), and slightly over a half for investments in capital assets. This result of CIS 2010 confirmed independently the growth figures obtained from a R&D survey for 2010.

Comparing enterprises by supporting variables (Table 6, p. 14), nothing new was revealed by CIS 2010 compared to previous surveys: large enterprises are more innovative than small ones, enterprises belonging to a group are more innovative than those not belonging to a group, and the presence of foreign equity increases technological innovativeness. But a substantial shift took place in case of variables connected with the main market and the share of export. In earlier years, the technological innovativeness of enterprises considering the home market as the most important was higher or similar to the innovativeness rating of enterprises prioritising the foreign market. In the same way, the innovativeness of enterprises for which export prevailed in turnover did not reach the level of enterprises where the share of export in turnover remained within 10 to 50 percent. This was no longer the case in 2010 and enterprises ranked logically in respect of the share of export – the higher the share of export, the more innovative the enterprise. As for the explanation, there is reason to assume that more and more enterprises that used to operate as subcontractors are trying to enter the international market with original products. The drop of domestic demand caused by the economic crisis also played a role.

Naturally, the survey was not limited to pinning down the share of innovative enterprises. The technologically innovative enterprises were also asked about their innovation objectives, information sources and co-operation; respondents were asked to evaluate the importance of different factors on the following scale: “high”, “medium”, “low”, or “not relevant”.

The most important innovation objectives for technologically innovative enterprises in the period 2008–2010 were improving the quality of goods and services, expanding the range of goods and services, and replacing outdated products or processes. Almost 40% of enterprises gave these objectives a “high” importance rating. On the other hand, the importance of increasing production capacity was rated “high” only by every third enterprise, the importance of reducing labour costs by every fourth and the importance of reducing environmental impact by every eighth enterprise.

Among the information sources for innovation activities, the top ranking for 2008–2010 was given to internal sources within the enterprise or enterprise group (31% of technologically innovative enterprises considered this source of high importance), followed by suppliers (28%) and clients (18%). Universities achieved a score as low as 4%, which was even lower than the score of fairs and exhibitions, competitors and consultants.

42% of technologically innovative enterprises participated in innovation co-operation during 2008–2010. Half of them had suppliers, clients or enterprises from the same enterprise group as co-operation partners. Every fourth or fifth enterprise listed competitors, private R&D institutions or universities among their partners. But only 3% of those who had innovation co-operation rated universities as the most valuable partners in co-operation; and this does not differ much from the assessment given in past surveys. From time to time, there are reports in the media on fruitful co-operation between universities and enterprises. In the light of CIS, those are the exception rather than the rule. The situation can only be improved by an efficient and coherent innovation and research policy.

Non-technological innovativeness

Non-technological innovation comprises two types of innovations:

- *Organisational innovation is either a new business practice for operational procedures; a new method of work organisation for distributing responsibilities and decision making; or a new method of organising external relations.*
- *Marketing innovation is either a significant change to the aesthetic design or packaging of a product or service; the use of new media or techniques for product promotion; a new method for product placement or a new sales channels; or a new method of pricing products or services.*

The questions about non-technological innovation have changed from survey to survey. The questions have been entirely identical only in last two surveys conducted after the publication of the new version of the Oslo Manual. As mentioned above, this limits comparability with the earlier surveys. Nevertheless, one aspect reflecting the close connection between the two main types of innovation has been the same in all surveys. Namely, during the observation period, technologically innovative enterprises implement some organisational or marketing innovation much more often than technologically non-innovative enterprises. In the case of CIS 2010, the difference was exactly threefold – 57% of technologically innovative enterprises had implemented a non-technological innovation during 2008–2010, whereas only 19% of technologically non-innovative enterprises had done so. The difference was slightly smaller for service enterprises (60% versus 22%) and larger in industry (55% versus 16%).

Some trends seen in Figures 3 (p. 15) and 4 (p. 16) can be attributed to the aforementioned comparability problems, but the different economic situation and accession to the EU in the earlier years must also be taken into account. In any case, the non-technological innovativeness of Estonia in 2008 was close to the EU mean, and only the Czech Republic performed better among the Eastern European countries. At this point it is appropriate to refer to the literature which often claims that, on the one hand, enterprises in the new Member States often use out-of-date management practices, while on the other hand, the fast and intensive development in these countries does not allow enterprises to straighten out their internal processes.

61% of the enterprises that implemented some organisational innovation during 2008–2010 attached great importance (rated as “high”) to the objective “reducing the time in responding to customer or supplier needs”. A little less than half of the enterprises considered the objectives “improving the quality of your goods or services” or “reducing costs per unit output” as very important. The lowest rating of importance was given to the objective “improving the ability to develop new products or processes” – only 37% of enterprises rated its importance as “high”.

In the case of marketing innovations, the predominantly highest rated objective was “increasing or maintaining market share”, with 74% of innovators giving it a high importance score. “New geographic market” was considered highly important by 40% of marketing innovators and “new customer group” by 30% of marketing innovators.

Use of skills

The separate module in the CIS 2010 questionnaire dealt with two issues: use of skills and stimulation of creativity. Both aspects are linked to the innovation capability of an enterprise. Enterprises were asked about eight different types of skills, specifically, whether during 2008–2010 they employed someone with the particular skills in house or obtained those skills from external sources. As an alternative, an enterprise could say that the particular skills were not used or were not relevant for the enterprise’s economic activity. It was possible to report in-house capability simultaneously with outsourcing. For that reason, the sum of percentages in each row of Table 7 (p. 17) exceeds 100% exactly by the share of those using both options simultaneously. If an enterprise chose to answer with “skills not used or not relevant”, it was no longer possible to tick the first two possibilities.

Both innovative and non-innovative enterprises preferred to have employees with skills connected with engineering, applied sciences and database management. On the other hand, such skills as software development, web design and advertising were mainly outsourced.

Enterprises were clearly divided into two groups with respect to use of skills. On average, innovative enterprises used the listed types of skills twice as often as non-innovative enterprises. That was true in case of both in-house employment and outsourcing.

Stimulation of creativity

The second question of the additional module investigated the methods that enterprises used during 2008–2010 to stimulate new ideas or creativity among their staff. If any such methods were used, the enterprise was asked to assess its success on the following scale: successful, not successful, success unknown (Table 8, p. 18).

Not surprisingly, in every second innovative enterprise brainstorming sessions were taking place and work teams were created during 2008–2010. As a comparatively new development, every third innovative enterprise used incentives for employees to develop new ideas, and as many as every fifth enterprise considered creativity training to be essential.

Again, there is a huge difference between innovative and non-innovative enterprises. The latter used creativity-stimulating methods two to three times less often, and when a method was used the enterprise had no knowledge about its success (or lack of it) in more than half of the cases.

Profitability from innovativeness

In case of the previous innovation surveys, it was possible to state that innovative enterprises have a faster growth of turnover and number of employees. However, in case of CIS 2010 this statement must be rephrased due the economic crisis (Table 9, p. 19). The favourable message is still true for turnover – during the observation period 2008–2010 the turnover of innovative enterprises declined less, compared to non-innovative enterprises. But the opposite was true in case of the number of employees, which showed a slightly faster decline in innovative enterprises.

There were no remarkable differences between the two groups of enterprises in terms of export growth or its share in turnover. However, all the surveys conducted so far, CIS 2010 included, have shown that the productivity level (turnover per employee) of innovative enterprises is much higher and is growing faster than that of non-innovative enterprises.

A detailed analysis of the survey data by economic activity and type of innovation can reveal various interesting facts. At this point, let's content ourselves with a comparison of product innovators and non-innovators in industry. In 2008–2010 the turnover of product innovators rose by 11%, their export grew by 32% and the number of employees remained practically the same. In case of the product non-innovators, the growth of turnover and export was limited to 5–6% and the number of employees fell as much as by 13%. These figures should be enough to convince that innovativeness pays off.

As a conclusion, let's take a closer look at the correlation between innovativeness and survival. CIS 2010 is too recent for that purpose, but as of July 2012 three and a half years had already passed since the reference year of CIS 2008. The survival rate of innovative and non-innovative enterprises can be compared by adding a further variable to the CIS 2008 database, specifying whether an enterprise as ceased or terminated its economic activities, is bankrupt or subject to bankruptcy proceedings. It should be noted that, by definition, the death of an enterprise does not include exit from the population due to merger, take-over, break-up or restructuring. This comparison shows that 93.2% of innovative enterprises covered by CIS 2008 had survived until July 2012; for non-innovative enterprises the survival rate was 93%. So, it must be concluded that during and after the economic crisis innovativeness did not give enterprises any advantage in terms of survival. The implementation of an innovation is always connected with certain risks and those risks do not always pay off. But these equal survival rates show at least that taking the risk is no more dangerous than deciding not to risk at all. At the same time, innovation surveys prove that a risk-taking enterprise can expect faster growth of turnover and exports, compared to a non-innovative enterprise.