DIFFERENTIATION AND THE MAIN CHARACTERISTICS OF HIGH TECHNOLOGIES IN CONTEXT OF GLOBAL TRENDS

Omelyanenko V.A., Ph.D. student
Sumy State University

High-technologies and globalization are arguably the two most important forces giving to any country broad opportunities. The modern competitive production should be based on the extensive use of high technologies – most advanced technologies currently available, and must be integrated in the world economy. Numerous facts of past decades show that high tech is the momentum of economic development that leads to analyze the main trends in this field.

There are two reasons why it is important to clarify and specify high tech [1]:

1) due to the impact of technologies on the economy, attempts are made to classify economic production and incomes;

2) due to the impact of high tech on the environment, standard marketing strategies are being modifi ed and adapted, therefore, it is necessary to know the products to focus on.

In this context, the current issues are the problem of classification of technologies arising from the rapid development of innovative sector. The way of definition of high technology will be used usually determines which of two major approaches to take. The basic methods use either the percentage of scientific and technical employment in a particular industry compared to all industries or R&D dollars spent as a percent of total sales, a measure of research intensity. Consider these methods more [2]:

1) workforce measures – occupational employment and the percentage of particular occupations within industries changes over time, reflecting changes in employment growth as well as business structure;

2) research intensity – data on research intensity (cost of R&D in a percent of total sales) is derived from studies of publicly traded companies. Currently, the top ten most research intensive industries are: medicinal chemicals and botanical products (SIC 2833); biological products, excluding diagnostics (SIC 2836); prepackaged software (SIC 7372); telephone and telegraph apparatus (SIC 3661); pharmaceutical preparations (SIC 2834); commercial research (SIC 8731); electro-medical apparatus (SIC 3845); computer communication equipment (SIC 3576); and laboratory analytical instruments (SIC 3826). The difficulty of assessing this

criterion due to the fact that the industry is not homogeneous set of technologies. These may include production of a higher level of technological intensity than the average for the industry. As a result, there are many gradations of technology. For example, OECD distinguishes five groups of such, U.S. Census Bureau – 10, etc.

The attendees concluded that many factors contribute to an industry's high-tech nature and that the Census Bureau explored following factors:

- high proportion of scientists, engineers, and technicians (science, engineering, and technician occupation intensity);
- high proportion of R&D employment (R&D employment intensity);
- production of high-tech products, as specified list of advanced-technology products;
- use of high-tech production methods, including intense use of high-tech capital goods and services in the production process.

According to the conventional approaches high tech company is based on intellectual property portfolio (patents and patent applications, trade secrets, information/information services, software etc).

The high technology development strategy in the country should take into account specific global trends in this area. The main trend here is the growing role of the international aspects of technological development, respectively, and in the development of high technologies will intensify international component.

The international factor manifests itself in two main aspects:

1) international innovation and technological cooperation as a way to consolidate the scientific capacities of partner countries;

2) increase of international trade.

According to the Global Insight World Industry Service database, which provides production data for the 70 countries that account for more than 97% of global economic activity, the global market for high-tech goods is growing at a faster rate than for other manufactured goods. During the 24-year period examined (1980–2003), high-tech production grew at an inflation-adjusted average annual rate of nearly 6.4%, compared with 2.4% for other manufactured goods. In 2005, the US high-tech industries employed 5.6 million people paying salaries 85% greater than average private sector jobs. It was also the largest exporter among all industry sectors, accounting for 32% of total manufactured exports in 2004 [3].

The ratio of high-tech imports to GDP more than doubled during the same period. Partly as a result, developing-country exports of high-tech goods have also increased, rising from 11% of total exports in the mid-1990s to 19% in 2002–04 (figure 1, table 1). In the case of lower middle-income countries, high-tech goods represent broadly the same 23% share in total exports as in high-income countries [4].

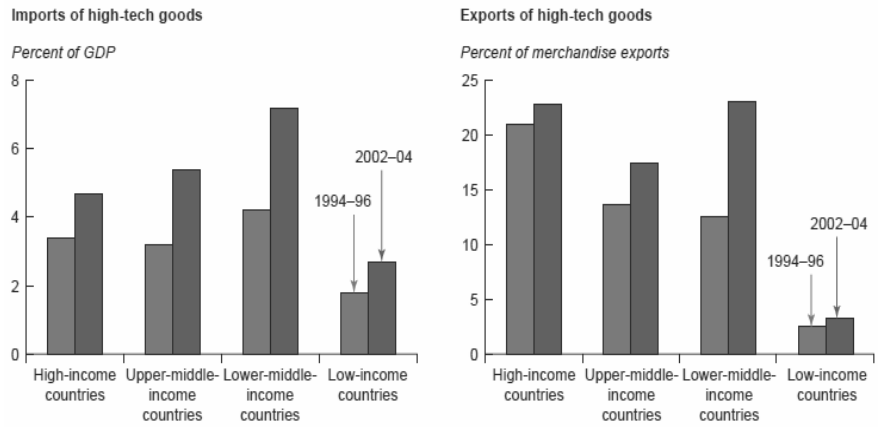

Figure 1 – Developing countries' trade in technology goods [4]

Table 1

Growth of high-tech and other manufactured exports across developed and developing countries (1985-2000)

Categories/Regions	World	Developed Countries	Developing Countries
Resource based	6.60	5.18	11.00
Low technology	8.85	6.86	11.69
Medium technology	8.45	7.57	13.36
High technology	13.19	11.13	19.21

According to research of patents production function and estimate how internationalisation of technology affects the national patent production of OECD countries in the period 1990-2003, the authors found fact of increase of technology internationalisation with 10 % reduces the share of high technology patents with 3.1 % and the share of ICT patents with 3.3 %. No difference of technology internationalisation impact on technology production between large and small countries could be found. Two explanations for this unexpected result are put forward. First, although ICT is considered as an important General Purpose Technology (GPT), it is already maturing and hence many countries already build a base in this technology. Second, the dynamics in high technology fields is high that patenting is not worth the effort. In that case the impact is underestimated. Focusing on a recent GPT, i.e. biotechnology, an increase of internationalisation of technology of 10 % increases the patent production in biotechnology with 3.2 %. This effect is significantly smaller for small countries, which can be explained by the limited sources of small countries to build a sufficient absorptive capacity when a new technology takes off [5].

Sales, R&D and employment growth for firms in high-, medium-high and

low-technology industries, 2008-09 and 2009-10 (%) is shown on figure 2.

Another important feature of high technology is the issue of transfer, in particular international. The transfer often requires the transfer of a complex technology (patent family) due to the complex nature of various technological solutions. In this case importance of tacit knowledge (consists in the features of pre-commissioning in new use of technology) and international movement of labor as a carrier of tacit knowledge increase. High-tech industry associations from around the world strongly support advancing an ambitious new tariff-reduction initiative to significantly expand product coverage of the Information Technology Agreement (ITA), which is one of the most meaningful trade agreements in WTO.

If we want to be a high-tech economy, we need those high-tech skills. Now the public sector outsourcing is growing, and experts predict the trend will only increase because it is perceived as a way to reduce spending. High-tech industries rely on foreign outsourcing for much of their manufacturing. But in some areas often a lot more about business knowledge than it is about software technology, and it's a lot harder to ship that kind of work overseas.

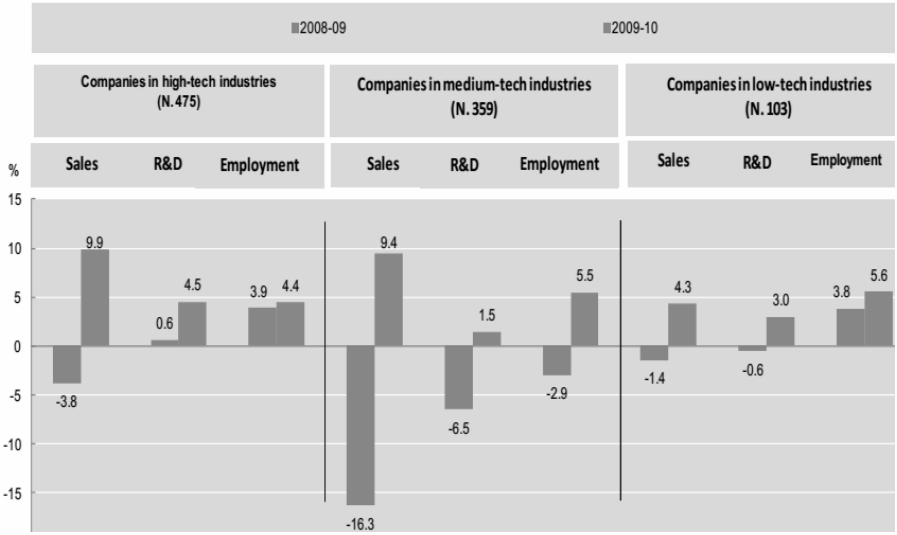

Figure 2 – Sales, R&D and employment growth for firms in high-, medium-high and low-technology industries (OECD STI Outlook 2012 based on EU (2011), EU industrial R&D investments Scoreboard)

There are several locational tendencies that determine the distributional patterns of high-tech industries, which are the application of intensive research and development efforts to the creation and manufacture of new products of an advanced scientific and engineering character.

A high quality, innovative, and efficient local government can facilitate the

development of high tech industries under the following conditions [6]: 1. Understand high tech firms in your region competitive advantages; 2. Invest in human capital; 3. Create a research and development presence; 4. Invest in physical capital; 5. Invest in quality of life; 6. Streamline permitting, planning, and other public services; 7. Adapt other local laws (such as special tax policies and administrative procedures); 8. Provide venture and seed capital; 9. Create support programs for entrepreneurs; 10. Apply information technology in the public sector.

A high quality, innovative, and efficient local government can facilitate the development of high tech industries if it is also careful to understand trends in local industries and the needs these companies have with respect to their public sector partners. At least five main locational tendencies of high tech industry have been recognized:

1. Availability of first quality communication and transportation facilities.
2. Proximity to major universities and research facilities.
3. Avoiding areas with unionized labor.
4. Locally available venture capital.
5. Location in regions of major areas with favorable quality of life.

Generally all factors can be combined in the «technopolis wheel» model [7], which posits seven key components ─ the research university, large technology companies, small technology companies, state government, local government, federal government, and support groups ─ that must interact to advance successful high technology driven economic development.

All these factors determine the main directions of national technology strategies to maximize the benefits of the global economy.

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