research scientists for consulting and research contracts. The Japanese model for the commercialization of semiconductors is often used as a reference for biotechnology commercialization. The pattern of funding in Japan gives priority to applied research to the detriment of basic research. Since the USA. and other countries show limited restrictions in the publication of basic research, Japan might rely on that free and available information to advance faster and cheaper in the direction of commercial feasibility[31].

C. PERSONNEL AND TRAINING

Properly trained scientific and technical personnel are vital to any country's industrial competitiveness in biotechnology. The commercial development of biotechnology will require several specific types of technical personnel such as: specialists in DNA and monoclonal antibodies technology (MAb) like molecular biologists and immunologists; industrial microbiologists and biochemists; enzymologists and cell culture specialists; and as biotech companies move more into continuous processes and bioreactors,chemical and biochemical engineers. Shortages of these types of specialists will be a limiting factor in the rate of growth and commercial success in biotech companies. In that sense training programs must be a permanent consideration in the governments research policies.

Apart from the above factors, there are other aspects that play a role difficult to quantify but nevertheless important. The abundance or scarcity of raw materials can determine the direction of biotechnology in a country. Risk taking is associated with innovation, and innovation is now widely recognized as being a cornerstone of the success of economic ventures. This is particularly true in biotechnology. North Americans are in general more willing to risk than Europeans and this, to date has manifested itself in the vigour and number of biotech companies in North America.

VI. BIOTECHNOLOGY IN SPAIN

Compared to other scientific disciplines, Spain has traditionally had the highest scientific level of achievement in the biological sciences. Two of its Nobel laureates are from medicine, and molecular biology. However, until 1986 scientific research and development took place in Spain without a framework with which the Administration could undertake appropriate planning and coordination. In 1986 the National Plan for Scientific Research and Technological Development was established. The absence of such a plan has