

COLLECTIVE ACTION, ASSOCIATIONAL DEVELOPMENT AND GOVERNANCE OF BIOINDUSTRY IN SPAIN AND JAPAN

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Abstract: Japanese bioindustry and its policies have been developing since the early 1980s. Together with this process, encompassing associations that bring industry, academia and administration together have been established. In Spain the same process was initiated twenty years later. From Olson's theory of collective action, we expect that Japanese associations will begin to fragment and begin to have a negative effect on the Japanese economy. On the other hand, from the theory of governance we should anticipate that Japanese associations are more able to play a relevant role in the governance of bioindustry and produce more efficient economic results than the Spanish associations. In this article we analyze the activities, the membership, the organizational structures and the participation in policy-making of bioindustry associations in Spain and Japan. The results show that the theory of governance is more suitable than the theory of collective action to explain the evolution of associations and their effects on the economy, although bioindustry associations are facing the difficult challenge to integrate venture companies in their membership.

Keywords: Associations, biotechnology, collective action, governance, industrial policy, policy-making.

1. Introduction

Companies and governments in many countries are trying to introduce biotechnology in the production of goods and services in order to promote economic growth, improve health care, reduce environmental problems and find new energy sources. Japanese companies and government have been aiming at the development of biotechnology as an economic activity since the early 1980s, but Spain has adopted this aim just in the beginning of the 21st century. Companies have become organized in associations in order to promote the development of this new industry. However, one country's business interest associations and their relationships with the state have an effect on the role that business associations play in industrial policy, and this role has an effect on the development of the industry that associations represent (Coleman, 1999). This is because the activities of associations affect the decisions of the main actors involved in biotechnology industry: companies, researchers,

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investors and public administration. The theory of collective action and the theory of associational governance propose alternative explanations on the evolution of associations and their effects on the economy. In this article, analyzing the role of business associations in bioindustry in Spain and Japan, we test the explanations provided by both theories. After presenting Olson's theory of collective action and the theory of associational governance, we analyze the collective action and associational development in Spain and Japan, and the contribution of associations to governance, in form of coordination functions and participation in policy making.

2. Business associations and governance

2.1. Collective action and effects of associations

Business associations can play an important role in promoting improvements in industrial efficiency since they promote exchange of knowledge among the concerned companies and between industry and government in order to decide and implement effective industrial policies (Coleman, 1997; Schmitter and Streeck, 1985; Yonekura, 1999). In addition, business associations can provide companies with common services that reduce their costs and improve their competitiveness, and can negotiate with associations that represent other interest groups and solve conflicts that arise between them (Coleman, 1999; Schmitter and Streeck, 1985). However, contrasting with this beneficial effect of the activities of business associations, they also can promote collusive activities among their members, becoming cartels that reduce production, keep high prices, press government for regulations that make difficult the entrance of new competitors, and delay industrial innovation and change (Olson, 1982; Schaede, 2000). Whether the activities of a business association promote the efficiency of an industrial sector or promote collusion among companies depends on the structure of the association, the relationship between the association and its members, and the relationship between the association and other organizations, mainly the state (Coleman, 1999; Olson, 1982; Schmitter and Streeck, 1984; Schaede, 2000).

According to Olson's theory of collective action, when an association represents a small group, the activities of the association pursue to distribute benefits to the members of that narrow group and distribute the costs of that to the rest of the society. These associations are called "distributive coalitions" However, when the association represents a large group, it is difficult for the association to generate costs that do not affect some or all of its members. Thus, associations that represent a large part of the industry, and that are able to reach a unified aim and strategy for the promotion of the interests of the represented large group, develop activities that promote the efficiency of the industry and the national economy. In the theory of collective action these associations are called "encompassing organizations" (Olson, 1982, 1995).

An association, in order to be an encompassing organization, needs to have a large membership that contributes to bear the costs of the activities of the association and that comply with the policies of the association. For this, according to the theory of collective

action, associations have to provide members with selective incentives. Selective incentives are those services and goods that are important for the potential members of the association and that are provided in an advantageous way to just the membership. Thus, members join the association with the aim of receiving these services. If an association does not provide with selective incentives, potential members prefer not to join the association, since they would benefit from the public policies resulting from the activities of the association even if they do not contribute to the effort for promoting those policies (Olson, 1965). However, groups of members of encompassing associations find that, if they are able to provide services by themselves, they can get more benefits from the action of a smaller association that just represents their narrow interests. Thus, in the long term, encompassing associations become fragmented, fail to promote a general strategy that encompasses the different groups of members, and dissolve in a pluralist system composed by several distributive coalitions competing against each other.

Industrial policy for biotechnology and bioindustry associations in Japan were established in the beginning of the 1980s, while in Spain they appeared in the beginning of the 21st century. Thus, according to Olson's theory, we can hypothesize that there is a high risk of fragmentation of the bioindustry associations in Japan. The Spanish bioindustry, since it is new and is still organizing its institutions, can be either characterized by the existence of distributive coalitions or an encompassing organization. These hypotheses are explored in the following sections.

2.2. Associational development and governance

The theory of collective action just considers whether associations are able to avoid free-riding with the provision of selective incentives or not, and whether they are encompassing organizations or distributive coalitions, but does not analyze the governance capabilities of associations. On the other hand, the theory of associational governance explains the governance capabilities and the economic effects of associations according to their organizational characteristics and their relationship with the state. "Associations act as governance mechanisms by defining and procuring public goods, through organizing and reinforcing cooperative behavior among their members, by engaging in collective contracts with other associations, and by securing delegations of state authority to be used to the advantage of their members" (Coleman, 1999: 129). When associations assume governance roles, they contribute to the policy-making and implementation of policies that promote technological change and the development of new industrial sectors based on quality and flexibility of production, which are characteristics of the production system of bioindustry (OECD, 1982; Orsenigo, 1989).

In order to assume governance roles, associations must reach a certain level of associational development, which includes two characteristics. The first characteristic of a developed association is that it is capable of ordering and coordinating the information and activities asked by its members and by other organizations, especially the state. The second characteristic is that the association is autonomous from its members, and thus the

association is able to rise above the short-term particularistic interests of its members and to define interests that benefit the whole membership in the long-term. In order to reach autonomy from its members, an association needs to provide selective incentives, be recognized by the state and other organizations as the representative of the group, and get resources from a variety of sources (Coleman, 1999; Schmitter and Streeck, 1985).

In addition, in countries and industries where there is a long history of associational governance, associations will have a relevant role in the promotion of industrial efficiency; in countries and industries with no history of associational governance, associations will have a less relevant role (Coleman, 1999). This view is opposite to that of Olson about the fragmentation of encompassing associations, and we also can propose an hypothesis opposite to our previous hypothesis: since there is a longer history of associations' organization and intervention in industrial policy-making in the Japanese bioindustry than in Spain, in this second country associations should play a less relevant role in policy-making and the promotion of the new industry, and thus the development of bioindustry should find more difficulties in Spain than in Japan. These hypotheses are explored in the next sections.

3. Bioindustry and associations

3.1. Bioindustry and associations in Spain

Spanish biotechnological industry is quite young. Few companies applied biotechnology during the 1990s. The most important development of bioindustry in Spain has taken place during the 21st century. In 2000 there were just 160 companies in the biotechnology sector. However, the growth of the sector has been fast. In 2003 there were 280 companies, the whole biotechnology-related market was 900 million euros and there were 10,000 employees. In 2008 there were 942 companies related to biotechnology, 305 of which had biotechnology as their main activity. In the same year, the production was 31,100 million euros and there were 108,374 employees related to biotechnology. Most of the companies that have biotechnology as their main activity are venture companies. Spanish companies are small, 91.4% of the companies have less than 250 employees. Most of the companies are in the health sector (44%) and the food sector (36%); 20% of companies are in agriculture, which has become an important sector for Spanish biotechnology, being Spain the main European producer of genetically modified corn. The most important production is in the health sector (44.6%) (biopharmaceuticals, diagnostics and vaccines), followed by the biochemical and industrial bioprocesses (35.6%), technological services (15%), agricultural biotechnology (8.4%), and food industry (2.5%). The provision of venture capital has grown in the last 10 years, increasing from 5 million euros in 2000 to 97.7 million dollars in 2007. Also the number of patent applications and approved patents has increased, while in 2003 only 36 biotechnology-related patents were approved, in 2009 there were 430 applications and 69 patents were approved (ASEBIO, 2004, 2010; OECD, 2009).

Although the Spanish bioindustry sector has grown fast, it has some weak points. Considering the size of the Spanish GDP and population, biotechnology market and

employment are small compared to other European countries. Although the investment in research infrastructure, the scientific staff and the number of published scientific articles have increased, the quality of research is not good enough and there is little industrialization of inventions, public research does not produce technologies that can be applied by industry, and research is dependent on the public sector (65% of R&D expenditure and 75% of research staff in biotechnology are in the public sector) (Genoma Espana, 2010). In addition, companies have difficulties to find finance (ASEBIO, 2004, 2011), Spanish companies apply for few international patents, between 1989 and 2009 there were no new bio-therapies approved in Spain, and there was only one experimental trial of a bio-treatment (OECD, 2009).

When bioindustry began to develop in Spain in the 1990s, biotechnology was an unknown field for much of Spanish industry, for the government and for the Spanish finance sector. Although in the 1980s a boom had taken place in the biotechnology research at public universities and research centers, there was little industrial biotechnology and the communication between academia and industry was unsatisfactory. In this context, companies in the biotechnology field decided to establish an association of biotechnological companies and research centers. During the process of creation of the association, business and the Ministry of Industry cooperated and discussed the bylaws of the future association (ASEBIO, 2009). The Spanish Association of Biotechnology Companies (ASEBIO) was finally established in 1999.

ASEBIO is the association of the Spanish biotechnology companies in all sectors, but universities and public research centers also are members. The main activities of ASEBIO are the provision of services (like consulting and training) to its members, promotion of the internationalization of its members, promotion of contacts among members and between members and other organizations, analysis of the situation of the sector and government policies, and the representation of the sector's interests in front of the society, industry, and government. ASEBIO is also member of the European Association of Bioindustries (EUROPABIO).

In addition to ASEBIO, there is another association related to biotechnology, the Spanish Federation of Biotechnologists (FEBiotec). It is a federation of regional associations of biotechnologists, founded in 2008. The main aims of FEBiotec are the promotion of biotechnology as a university degree and as an economic activity, and the defense of the biotechnologist as a professional. For this, one of its objectives is the establishment of an official association of biotechnologists with compulsory affiliation recognized by the state (same as the bar association or the doctors association). Its main activities are the organization of congresses, conferences and courses, and the diffusion of information about courses and jobs in the biotechnology sector.

3.2. Bio-industry and associations in Japan

Industry applying modern biotechnology began to develop in Japan in the early 1980s encouraged by public cooperative R&D programs, and 150 companies began to invest in biotechnology research (Miyata, 1994). In 1998 the biotechnology-related market in Japan was

1.2 trillion yen, and in 2005 it was 1.8 trillion yen (Miyata, 2000; JETRO, 2007). In 2006, Japan was the second country with more biotech companies (1,007), after the US. Japan is the OECD country that shows the least proportion of small companies and the largest proportion of big companies in biotechnology: 32% of companies have less than 50 employees and 36% have more than 250 employees. Japan is leader in areas like pharmacogenomics, protein engineering, glyco-engineering, tissue engineering, bio-informatics, genome medicine and preventive medicine, and shows a high proportion of patents applications in the areas of glyco-technologies, microorganisms and enzymes, biochemistry and bioinformatics. Also, 8 of the top 50 regions in biotechnology international patent applications between 2004 and 2006 are Japanese regions (however 18 of the 50 regions are regions of the US). In addition, of the 138 bio-therapies approved in the world between 1989 and 2009, 10.5 were developed by Japanese companies, and in 2007 in Japan there were 23 bio-therapies in phase of experimental trial (OECD, 2009). In addition to the large size of companies, another characteristic of the Japanese bioindustry is the small number of venture companies, although their number has increased much since 2000 due to the increase of start-ups resulting from law reforms. In 1998 there were only 60 biotech venture companies in Japan, but in 2006 they were 586 (OECD, 2009).

The Japanese bioindustry has some weak points. Compared to the US, Japan shows a slow development of bioindustry. Japan held just 11.9% of international biotechnology patent applications in 2006, third after the US (41.5%) and the EU (27.4%). Same as Spain, although much research is developed in universities and public research centers, this generates few new products and venture companies. Also, venture capital is underdeveloped in Japan. Venture investment in life sciences in Japan was 68.2 million dollars in 2007, even less than in Spain. However, the proportion of venture capital invested in life sciences as a share of all national venture capital investment is higher in Japan (24.3%) than in Spain (7.3%), which shows that bioindustry is leading the development of venture capital in Japan. The biotechnological market is growing more slowly than had been forecasted. In 2002 it was forecasted that in 2010 there would be a market of 25 trillion yen in Japan. However, in 2006 it had grown to just 1.85 trillion yen (JABEX, 2007).

The largest association in the Japanese bioindustry is the Japan Bioindustry Association (JBA). This is an incorporated non-profit association¹ related to the Ministry of Economy Trade and Industry (METI), established in 1987 from the previous Association of Industrial Fermentation. The initiative for the establishment of JBA came from METI, with the aim of promoting the development of bioindustry. In addition to companies from all sectors related to biotechnology, also public research centers, universities, local governments, and individual researchers are members of JBA.

The main activities of JBA are the promotion of the relationship between industry and academia in order to promote the industrialization of biotechnology, the promotion of the internationalization of its members, the representation of the Japanese bioindustry interests in front of the society and in international forums (like the OECD), the development of surveys and R&D projects entrusted by the government (mostly METI), and the submission of

opinions to the government. However, since the establishment of the Japan Association of Bioindustries Executives (JABEX), of which JBA is one of the founding members, JBA delegates most of the representation activities in front of the government to JABEX, and provides this association with secretary services.

JABEX was established in 1999 by the main biotechnology associations and companies in the modern biotechnology industry as a voluntary non-profit association. It acts as a unified think tank and lobby of all sectors in modern biotechnology in front of the government and the Parliament. The reason for its foundation was the feeling of crisis in the Japanese bioindustry in the 1990s and the aim of taking part in the development of a unified policy for the whole modern bioindustry.

In addition to JBA and JABEX, there are three other incorporated associations. The Japan Health Sciences Foundation (JHSF) and the Society for Techno-Innovation of Agriculture, Forestry and Fisheries (STAFF) are associations that organize the cooperation between the Ministry of Health and Welfare and the pharmaceutical and related industries in the first case, and between the Ministry of Agriculture, Forestry and Fisheries and the agroindustry, agriculture cooperatives, regional governments and universities in the second case. These two associations have the aim of promoting innovation in their sectors, and have taken the development of biotechnology as one of their main aims. They have activities similar to JBA in their areas and realize surveys and R&D projects entrusted by their respective ministries. The third incorporated association is the Japan Biological Informatics Consortium (JBIC), which was founded in 1998 with the cooperation among companies in modern biotechnology, electronics and information sectors, and all the ministries related to bioindustry. Its aim is the promotion of bioinformatics and the analysis of DNA, RNA and proteins, in order to promote the development of new products and medicines.

In the last years, two voluntary associations of biotechnology venture companies have been established. One is the Bio-venture Association Originated from Universities (BVAU), established in 2003 by biotech venture companies born from universities' research results in the health sector. Its aim is to promote the establishment and growth of bioventures from university's research. For this, it organizes workshops on the problems biotech ventures are facing, submits recommendations to the ministries related to biotechnology, and provides information to its members. The other association is the Japan Bio-venture Development Association (JBDA), established in 2001 with the aim of promoting the establishment of biotech venture companies. Its activities are the submission of information, the promotion of cooperation among companies and between them and research centers, the organization of seminars for the presentation of new technologies and for the presentation of companies' products, and the training of staff.

4. Organizational development of associations in bioindustry

4.1. Associations' activities and organization in Spain and Japan

Analyzing the activities of associations (ASEBIO 2010, 2011; JBA 2009, 2011) we see that,

although Japanese and Spanish associations undertake many of the same activities, they show important differences in both the contents of each activity and their effect as selective incentives.

ASEBIO provides to its members with many services by free or with discounts, which means that these activities are selective incentives for the membership. These activities are the concession of grants; the provision of business services by partner companies (consulting, training, web site design and laboratory products); marketing and business promotion by organizing meetings among members, organizing meetings on request, providing information on public funding programs, and so on; organization of the annual conference Bio Spain (with registration and booth rental discounts); publication of a catalogue of member companies; consultancy services on starting a business in biotechnology, on the ethics code, on the participation in public research projects, on public funds, and on finding business partners; institutional representation of the sector's interests in front of the public administrations; provision of space for activities organized by members; organization of events for the internationalization of companies, including the management of the travel expenses grants of the Spanish Institute of External Trade (ICEX) — ASEBIO negotiates the amount of the grant for each event with ICEX and manages the distribution process — and the relationship with foreign delegations; publication of a monthly bulletin, press releases and promotion of the sector in the mass media.

Although some of these services could be purchased at a higher price in the market, other services are more difficult to be found in the market, since they require a specialized knowledge of the biotechnology sector, and thus are provided by the association; for example, consultancy on starting a biotech business, on the application of the ethical code, or help for finding a business partner in biotechnology. On the other hand, institutional representation is a public good since all companies in the sector enjoy the results (policies and regulations that affect the sector) of that activity. Publications, like reports on the sector and policies for the sector and a magazine, are also public goods since they can be enjoyed by free through internet. However, the name of the member companies and news on them appear in the publications, which is a form of free publicity of members. In conclusion, ASEBIO promotes affiliation with the provision of many business services to its members and the provision of opportunities for establishing contacts with other organizations.

On the other hand, JBA has a wider range of activities and, rather than promoting affiliation through the provision of business services to the members, promotes affiliation by providing chances for establishing contacts with other companies and research centers and for increasing technological knowledge with the participation in workshops, and by providing chances for taking part in R&D projects entrusted by the government. This is possible thanks to the huge funds that JBA receives from the government in order to undertake R&D projects and surveys. This also requires that the association has large organizational capabilities, with a large budget and specialized staff. For example, JBA's budget for 2010 was 943.4 million yens, of which 81% came from the government for entrusted research projects and surveys, and just 15% came from the membership fees. Also, JBA has a staff of 38

employees, while ASEBIO's staff is just 6 employees.

Also, the organizational structure of JBA shows a higher capability to undertake more activities than ASEBIO. The organization of ASEBIO is formed, in addition to the direction and the secretariat, by 10 working groups set up by the members (funding, internationalization, organization of the conference Bio Spain, communication, training, innovative medicines, molecular diagnostic, agriculture and environment, food industry, and industrial biotechnology). On the other hand, JBA's organization is composed by 6 permanent committees and many other subcommittees and working groups, which have the following functions. The Industry and Academia Committee concedes prizes and scholarships and publishes a magazine (partially free for non-members). The Technological Information Committee is divided in nine study groups on different technological areas. In 2009 it organized 150 conferences and 2,599 individuals took part in them. The Safety and Environment Committee undertakes surveys and discussions on the international agreements about safety and environment (the Cartagena Convention) and takes part in international forums. The Industry and Society Committee develops activities to promote public acceptance of biotechnology. The Intellectual Property Committee studies intellectual property issues and submits recommendations to the Patent Agency. The International Standards Committee analyzes issues on international standards for biomass use, gene analysis, property rights, and so on, and takes part in international forums. Bio Japan Committee is in charge of the organization of the annual conference Bio Japan. The Bio-venture Promotion Forum promotes the establishment of bio-ventures by organizing workshops and surveys on their situation. The International Biotechnology Exchange Committee organizes international missions and establishes contacts with foreign organizations. The Research Center analyzes the effects of the Convention on Biodiversity, establishes relationships with countries rich in bio-resources and promotes the access of Japanese companies to foreign bio-resources. The representation of bio-industry is undertaken by JABEX, and we will analyze its role later.

In addition, JBA undertakes activities entrusted by the government. Between 2007 and present, JBA has been implementing nine surveys, five R&D projects and one training program for foreign development assistance entrusted by the government, in addition to other five activities of JBA that received public support. These activities are considered to promote the public interest because the government is the beneficiary of their products and because they benefit the whole biotechnology industry. Thus, survey reports are used for policy-making and research has the aim of testing the feasibility of future research programmes, or to provide with products considered important for the industry. Thus, JBA acts as a semi-governmental organization, being highly financed by the government, providing to the government with services based on its members' capabilities, and providing with survey results that are used in the formation of new policies.

Contrasting with Japan, in Spain, ASEBIO's relationship with the government is much more independent, receiving a little finance from the government for the organization of international missions and for the provision of government's information to companies.

4.2. Associations' membership in Spain and Japan

ASEBIO was established in 1999 by about 50 members. Between 2006 and 2011 the membership raised from 80 to 159 members. Half of the members of ASEBIO are in the health sector, 16% in services, 13% in agriculture and food, 8% in bioprocess, and 13% in other sectors. About the type of organization, 59% are consolidated biotech companies, 11% are multinational companies, 10% are start-up companies, 7% universities and public organizations, and 13% are other kinds of organizations. According to the type of membership, 28 members are "public members" (universities, research center, national and regional public offices related to research, regional clusters) and the other 131 members are companies.

Associational density is the index that shows the proportion of one sector's companies that are affiliated to one association. The associational density of ASEBIO decreased between 2000 (31.2% of the companies) and 2005 (15% of the companies), due to a faster increase in the number of biotech companies (from 160 to 477) than the membership (from 50 to 70). However, this density has been stable between 2005 and 2008, doubling both the number of biotechnology companies (942 companies) and the number of member companies (140 companies).²

In Japan, JBA had a membership of 241 companies in 2000, which represented 75% of the biotech-companies in Japan that year, and 75 public members. However, JBA has lost membership. At present it has 87 public members and 198 member companies, which represent less than 20% of the Japanese biotech companies.³ The reason for the decrease of JBA's associational density is, in addition to a diminution of the membership, the important growth of the number of venture companies, more than 500 in the last 10 years, most of which do not join JBA. Although the number of JBA's member venture companies has grown from almost zero in 2000 to 32 in 2011, most of venture companies are not members of any association. Also, the establishment of biotech venture associations provides venture companies with alternative ways of reaching services and representation. The fact that the Bio-venture Association Originated from Universities has 61 affiliated venture companies, twice than JBA, shows that this kind of companies find more convenient not to join JBA.

5. Associations' coordination functions in Spain and Japan

Bioindustry associations have an important function consisting in the promotion of the coordination of other actors in bioindustry, by establishing forums where different companies, researchers, financial companies, public administrations and so on can interact and engage in exchange of information and opinions, develop cooperative research and take part in policy-making (Valls, 2002). These activities are developed in two ways. One is the participation of organizations from different fields in committees, study groups and other meetings internally in the association. The other way is the organization, by the associations, of external conferences and councils in which other organizations take part.

JBA has many committees and working groups in which business and public members interact. However, while there is a balance in the participation of different kinds of members

in many of them, in others, especially in committees that handle topics related to international affairs, safety and environment and public acceptance, all members are companies (analysis based on data from JBA, 2001). On the other hand, ASEBIO has a fewer number of working groups than JBA and, although public members participate in all ASEBIO's working groups, they do this with a lower proportion than in the case of JBA (analysis based on data from ASEBIO, 2011). In both associations the participation of public members is higher in committees and working groups that are highly technical, like training or committees related to R&D, and lower in committees more related to regulatory issues. Also, public actors show more participation in the direction of the association in JBA, where they hold 11 of the 35 director posts, than in ASEBIO, where they do not hold any post. However, in both associations, business members have a higher general participation, more rights in the decision making of the direction of the association, and pay much higher fees. It must not be forgotten that these associations are associations of the bioindustry, and thus their final aim is the promotion of the business interests, although this makes necessary the participation of other actors and the promotion of their interests as well.

Considering the organization of forums external to associations, we see that the activity of ASEBIO is limited to the organization of the annual conference Bio Spain, which brings business, researchers and representatives from the public administrations together. ASEBIO complains of a lack of coordination between the bio policies of different regional governments and between the activities of different bioclusters, and is trying to promote their coordination with their participation in the meetings of Bio Spain (ASEBIO, 2010).

On the other hand, JBA is more active in organizing external forums. In addition to the organization of an annual conference (Bio Japan), JBA also organizes other national conferences. One is the Conference of All Bio-Groups, organized since 1990, which brings regional bioindustry associations and the METI together, and discusses topics in order to develop regional bioindustry. Another conference is the Life Summit, organized every year since 2000 by initiative of JABEX and the Alliance of Diet Members for the Promotion of Life Sciences. This conference brings industry, researchers, politicians and public officials together, and they discuss on the situation of bioindustry and on proposals for developing new policies. Another conference is the Bio-Clusters Exchange, organized since 2004, which brings researchers, venture companies, regional administrations and METI together in order to present the results of research done in bio-clusters and to present different ways of promotion of cooperative research and of industrialization of research results. Also JBA organizes since 2004 meetings for the exchange of experiences and the promotion of cooperation between the bioindustry associations of Hokkaido and Kansai.

6. Participation of bioindustry associations in policy-making

6.1. Participation in policy-making in Spain

The political action of ASEBIO consists on the exchange of opinions through meetings with public officials and members of the government, the publication of public statements,

and the submission of positioning papers and proposals. ASEBIO also has submitted its opinions in the Biotechnology Committee and the Agriculture and Food Committee for the elaboration of the National Plans for R&D 2004-2007 and 2008-2011.

One of the main demands of ASEBIO is the establishment of a national strategy in order to coordinate the ministries implied in biotechnology — the ministries of finance and environment are especially criticized for not supporting the development of bioindustry —, and the policies of regional governments, among which are occurring duplicities in infrastructures and research projects. Also ASEBIO proposes the creation of a consultative body with the participation of industry, universities and public research centers, for the elaboration of biotechnology related policies. In addition, ASEBIO appeals for its participation in the policy-making for innovative medicines.

The reform of the finance system is another of the main demands. On the one hand, ASEBIO demands a reduction of taxes on R&D and start-ups. On the other hand, ASEBIO appeals for the establishment of a status of new innovative company that would provide biotechnology start-ups with a more favorable tax treatment.

Other ASEBIO's demands are the increase of public purchases of biotechnology products as an innovation policy, the regulation of technology transfer contracts, the clarification of the property of the inventions resulting from public-private cooperation, the promotion of staff training, the promotion of the generation of biocombustibles from biomass, and the facilitation of SMEs participation in programmes financed with public funds.

About the policies of the European Union (EU), ASEBIO is demanding the creation of a unified European market for GMOs and therapies, and a unified European patents system. In reference to this last measure, ASEBIO criticizes the Spanish government strategy, which consists on the protection of the Spanish language in the European procedures, which ASEBIO considers is delaying the establishment of the unified patents system. Other European policies demanded by ASEBIO are the establishment of harmonized quality standards for genetic diagnostics and the establishment of a unified regulatory framework for functional foods at EU level.

6.2. Participation in policy-making in Japan

Same as the Spanish bioindustry association, JBA exchanges information with the government about the economic and technological situation of the sector and government's policies. For this, JBA organizes meetings, conferences and workshops, publishes public statements, and submits opinion papers and proposals. In addition, JBA undertakes two more political functions. One is the development of surveys and R&D projects entrusted by the government, which we have analyzed in a previous section. The other function is the participation since 1999 in the planning and follow-up of a national strategy for the development of bioindustry in Japan.

The elaboration of a national strategy for biotechnology had its first step in the 21st Century Bioindustry Foundation Conference, which took place in 1998 and brought biotechnology companies, universities, public research centers, and all the ministries related

to biotechnology together. This conference revealed the weaknesses of the Japanese bioindustry and established the need of a unified political strategy for its development. The next year JABEX was founded, published its draft of national strategies for the development of bioindustry (the “Helix Plan”), and organized the Bioindustry Technology Strategy Council. Representatives from industry, academia and all the ministries related to biotechnology took part in this council and, adopting the “Helix Plan” and the report of the 21st Century Conference as its discussion bases, elaborated the “Bioindustry National Strategies”. Later, the “Bioindustry National Strategies” were adopted by the government as the “National Strategy for Industrial Technology-Biotechnology Area” in 1999 (Valls, 2002). This strategy was further developed in the “Biotechnology Strategy Guidelines”, which were elaborated by the Biotechnology Strategy Council in 2002. The members of this council are the Prime Minister, the Chief Cabinet Secretary, the Minister for Science and Technology Policy, the five Ministries related to biotechnology (Education, Agriculture, Industry, Health and Environment) and 12 selected members from industry and academia, including JABEX, Keidanren and the Federation of Pharmaceutical Manufacturers’ Associations of Japan. These Guidelines have oriented the policies for bioindustry during the last 10 years.

The “Biotechnology Strategy Guidelines” define three main strategies for the development of bioindustry. The first strategy consists on the improvement in research and development. For this, it establishes that the government must increase its R&D budget for life sciences, especially for basic research. It also states the need to coordinate the different government offices, improve the management of public research projects, improve education and training in biotechnology related fields, and strengthen the collection of biological and genetic resources and its coordination. Finally, it proposes to focus research efforts in areas in which “Japan holds the competitive edge”: pharmaceuticals and medical supplies, microbial and bioprocess engineering, and functional foods and agriculture, and to promote R&D in cross-disciplinary technologies, and focus investment in biotools and bioinformatics, which are generally purchased from abroad.

The second strategy is the strengthening of the industrialization process, which is divided in three actions. One action consists on the reform of the incentives system for industrialization, which includes: the reform of pricing incentives of the biotech-related pharmaceuticals and medical supplies and equipment; the clarification of the labeling system for functional foods and crops and the protection of related intellectual property; the reduction of the costs of biomass resource collection and conversion for energy production; and administrative reforms in order to define rules and evaluation methods of biotechnologies. The second action consists on the strengthening of capabilities in the industrialization process, which includes: the creation of internationally competitive large corporations that act as leaders of the sector; the vitalization of start-up businesses by promoting networks that include both venture companies and large companies, and the promotion of large companies as venture capitalists; and the reinforcement of universities and public research centers as sources of technological seeds, which requires the improvement of the communication between research institutions and companies. The third action consist on

the development of a favorable business environment, including: R&D and its linkage to industry, which requires to develop integrated databases; the creation of systems that link technology and industrial products to society's needs, in the medical and health care, food, environment and energy fields; the promotion of a strategic intellectual property policy; and the strengthening of industrial competitiveness through the creation of clusters that include regional networks of universities, public research centers and companies.

Finally, the third strategy consists on the permeation of public understanding. The actions included in this strategy are the disclosure and dissemination of information, the presentation to the public of government's "firm stance" on safety and ethics, and the improvement of life sciences teaching in schools.

However, the results of the national strategy are not considered satisfactory by the industry. Although the creation of start-ups and venture companies has increased greatly — between 1995 and 2005 the number of biotech start-ups was 1,503, and in 2006 there were 586 biotech venture companies (JETRO, 2007)—, the market is growing very slowly. The forecasted size of the market in 2010 was 25 trillion yen, which requires a growth of 1,880% from the year 2001. But, between 2001 and 2006 the growth had been of just 139%. Contrasting with this, in the same period the American biotechnology market grew 219% (JETRO, 2007). This means that the distance between the Japanese and the American bioindustry is increasing. Also, public and private investment in biotechnology has not risen as expected. For this, JABEX is appealing for a redefinition of the strategy in order to reinforce its implementation (JABEX, 2007, 2009).

7. Associational development, pluralization and governance of bioindustry

As stated by the theory of governance, and according to the data we have analyzed, the long history of government-industry cooperation in industrial policy-making, which in the Japanese bioindustry began to develop in the early 1980s — but had already been started by the previous Association of Industrial Fermentation —, has driven to a much more developed associational system, and a more relevant role of associations in the governance of the sector, including their participation in policy making, the execution of R&D projects entrusted by the government and the organization of forums to facilitate the coordination among other organizations. On the other hand, in Spain, ASEBIO shows a less developed organization and its political participation is less institutionalized, consisting basically on the influence on policies from outside the institutional policy-making process. Because of this, JBA has more capabilities than ASEBIO to take part in, and promote, the development of a national strategy for bioindustry, and to promote the coordination among different public administrations and other organizations in bioindustry.

However, considering the economic results of bioindustry, both countries show weaknesses. Both countries are slow in developing new goods and services from basic research, which means the relationship between research institutions and companies needs to be improved. Both countries have difficulties in providing finance to venture companies. Spain

shows a very low capacity to develop technologies and products that get a patent. Japan shows a slow growth of the biotechnological market and of the creation of venture companies that are able to consolidate. Thus, we cannot say that the existence of an association that has an important governance role in Japan leads automatically to satisfactory economic results. The importance of JBA as think tank, forum for discussion and collective learning between actors from different parts of society, the participation of JBA in the national strategy planning, and the surveys and R&D activities of JBA, compose a mechanism that analyzes the problems that bioindustry is facing and looks for ways to improve the situation. But, it is not the only element that affects the economic results. However, if the governance system is effective, it would detect the problems and promote the elaboration of measures to correct them. The warning by JABEX about the situation and its appeal for a reinforcement of the national strategy can be a step in this direction. On the other hand, the low affiliation of venture companies in JBA could indicate that there is a problem of lack of representation of venture companies' interests in the association. This makes necessary to consider the hypotheses we constructed from the point of view of the theory of collective action: associations in the Japanese bioindustry should be in process of fragmentation.

Bioindustry associations in Spain and Japan have seen reduced the proportion of companies they represent on the total of companies in bioindustry. In the Japanese case, even the total number of members has decreased. However, most of the reduction of associational density is due to the increasing number of venture companies in the sector, which do not join the associations. In the Spanish case, biotech venture companies have not created their own interest association, and there is no association competing with ASEBIO for the representation of biotechnology companies. Thus, although ASEBIO is not integrated in the policy-making for bioindustry, it is listened by the government as the representative of the Spanish bioindustry. On the other hand, in Japan, biotech venture companies have established two interest associations. One of them, the Bio-venture Association Originated from Universities (BVAU), has been able to establish contacts with politicians and public officials, who have assisted to conferences and workshops organized by this association. However, this association has not taken part in the elaboration and follow-up committees of the national strategy, nor has taken part in the policy-making of other policies. JBA and JABEX continue to be the privileged representatives of bioindustry in front of the government. However, the fact that venture companies prefer to join another association instead of the JBA and JABEX, or not to join any association, is a fact that shows a difficulty for these associations to represent the interests of venture companies, and shows an increasing pluralization of this industry. But, this is not the process considered by Oson's theory of collective action, it is not a fragmentation of the existing associations in the different subgroups they represent. The process that is happening is the formation outside the existing associations of groups (venture companies) that did not exist before, and the existing associations have not been able to encompass them. Since the Spanish ASEBIO shows a higher participation of venture companies, one important reason for their lack of interest in JBA can be that the activities (the selective incentives) of this association are oriented to the needs of larger companies

rather than to the provision of services important to SMEs.

8. Conclusions

As established by the governance theory, as a result of a different history of relationships between the state and industry, the Spanish and the Japanese bioindustry sectors show a different degree of associational development, which is higher in the Japanese case. Because of this, in Japan associations have more resources and play a more relevant role in policy-making, in R&D, and in the coordination of other organizations related to biotechnology. However, this developed governance system has not lead to a completely successful bioindustry in Japan, although it has not either failed. In order to better understand the situation of the bioindustry in Japan, and the effects of the governance system on it, it is necessary to develop more research focused on the specific measures included in the national strategy for biotechnology.

As stated by the theory of collective action, associations in the Spanish and in the Japanese bioindustry provide with selective incentives to their membership in order to encourage affiliation. However, the kinds of selective incentives are different. In Spain, the association provides many services important to biotech SMEs. In Japan, the association provides members with opportunities for establishing networks with other members, increasing knowledge with the participation in workshops and other meetings, and taking part in cooperative R&D projects. This difference of activities implies, on the one hand, that the Japanese association plays a more relevant role in the governance of the sector. On the other hand, it implies that the Spanish association provides more services that are important to venture companies than the Japanese association does. This is one reason of the low membership of venture companies in the Japanese association.

The increasing existence of venture companies in bioindustry means that the interests of business become more pluralized. However, this is different from the pluralization process considered in Olson's theory of collective action. It is not a process of fragmentation of existing encompassing associations, but the difficulty for them to include in their membership new groups in bioindustry.

Finally, Japanese associations can learn from Spanish associations about how to promote the participation of SMEs and venture companies in the association. Also, Spanish associations could learn from Japanese associations how to promote forums for the participation of different actors related to bioindustry and how to promote a national strategy for bioindustry.

Notes

- 1 Incorporated non-profit associations are recognized by a specific ministry as organizations that promote public interests in that policy area. Their baylaws have to be approved by that ministry, and they have a preferential relationship with the ministry, including the representation of a particular group and the establishment of contracts with the ministry in

- order to do activities in behave of the ministry.
- 2 We have calculated this index with data provided in ASEBIO, 2011. In 2011 there are 159 members. However, due to the lack of data on the number of biotechnology companies, we can not calculate the present associational density.
 - 3 We have calculated this index with data from Biotechnology Strategy Council, 1999; JBA, 2000, 2011; and OECD, 2009. Due to the lack of recent data on the number of biotech companies, this index has been calculated with the number of biotech companies in 2006.

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スペインおよび日本のバイオ産業における集合行為、 アソシエーション発展とガバナンス

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スペインのバイオ産業は日本のバイオ産業より20年後に発展し始めて、その業界団体も設立された。オルソンの集合行為論によれば、日本におけるバイオ産業の業界団体は分裂し始めると予測できる。しかし、ガバナンス論によれば、スペインのバイオ産業の業界団体よりも日本のバイオ産業の業界団体のほうが、より発展していて、政治力があると予測ができる。本稿では、スペインのバイオ産業団体の機能と日本のバイオ産業団体の機能を比較しながら、オルソンの集合行為論とガバナンス論について考察する。そのために、団体の組織、団体の活動、団体の会員と政策決定・遂行過程への団体の参加を分析する。その結果に基づいて、業界団体の進展とその経済的な効果の説明に関してはガバナンス論のほうが適切な理論であると結論づける。

キーワード：アソシエーション、バイオテクノロジー、集合行為、ガバナンス、産業政策、政策決定過程

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