



INFORMATION RELOCATE OPPORTUNITIES FOR THE BIOSCIENCE SECTOR IN CHILE

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ABSTRACT

In this article, the movement of knowledge and discoveries that happen in Chile, between academia and business is reviewed. Examples of knowledge transfer activities, such as training, consultancy, contract and collaborative analysis as well as licensing regarding Chile's life science sector square measure bestowed. In addition, a knowledge transfer 'fitness' index of Chile's six leading universities is derived and analyzed. As a result, an approach for obtaining efficient knowledge transfer activities tailored to the biotechnology industry in Chile is proposed. Indeed, it is recommended that universities that lack intellectual property rights or knowledge transfer capacity concentrate their efforts in developing tailor made consultancy services, focused on biotechnology projects that could be turned into research collaborations with biotechnology companies. Finally, a number of useful information resources about the developments currently taking place in the biotechnology sector in Chile as well as a detail description of the mutual long term benefits of research collaborations to industry and academia are offered.

1. INTRODUCTION

Knowledge transfer is understood as the movement of knowledge and discoveries, mainly from academia, to the general public (CBI, 2001; Lambert, 2003; Reid, 2005). It can occur in many ways, for example, through publications, educated students entering the workforce, exchanges at conferences, or by establishing relationships between academia and industry. According to Lambert (Lambert, 2003) the current industry-university relationship is being shaped by two global research and development (R&D) trends that are gradually changing the way academia and companies currently interact. First, there is a tendency for companies to expand their research away from their own laboratories by actively seeking research collaborations with others. In other words, companies are moving from a close/in house innovation paradigm to an open/collaborative one. Secondly, not only research is being extramurally planned, but also the actual physical location of companies' R&D facilities is being moved where the most important markets are. This is especially true if those markets happen to contain centers of outstanding research (Lambert, 2003; Reid, 2005). Then, industry has a clear incentive to establish R&D collaborations with renowned academic institutions. These trends are turning universities into attractive R&D partners for business. In fact, good academic laboratories operate in international networks, develop cutting-edge research and are constantly being refreshed by the arrival of clever new brains.

In Chile, however, the majority of university-industry interactions are still dominated by the old paradigm which is based on a customer-supplier relationship. A recent study focused on the technology transfer and intellectual property policies of a sample of 20 Chilean universities showed that 7 institutions were currently conducting technology transfer activities, 5 were filing their first patent applications and starting to implement their technology transfer policies, while the remaining 8 had recently started their internal debate on how they are going to approach the whole subject of technology transfer (IP Tour, 2005). Nevertheless, in the bioscience sector, university-industry interactions are gradually being shaped into collaborations rather than simple service agreements. In addition, Business-University interactions are starting to be encouraged and studied by the Chilean government, mainly, through its research and economic development agencies. In fact, these interactions range from essential activities such as teaching and training people, to spinning out new companies primarily based on technologies and information developed at universities. In this article, the knowledge transfer practices that square measure being carried out within the Chilean life science sector square measure reviewed. In addition, the knowledge transfer 'fitness' of leading Chilean universities is analyzed. Finally, an approach for a lot of economical information transfer activities, tailored to the Chilean Bioscience Sector, is proposed.



2. TYPES OF INFORMATION TRANSFER THAT HAPPEN IN CHILE

As shown in Figure 1, most of the information transfer activities that square measure being developed between business and University in Chile will be illustrated as a sequence of events wherever the quality of the knowledge transfer method will increase the any down the chain.]

As shown above, knowledge transfer will be formed in several ways; so, it is likely to become a fancy and non-linear method. In other words, it is not simply a matter of researchers turning out with clever ideas that square measure then became no-hit merchandise. Arguably, the most established and, possibly, successful form of knowledge transfer is the introduction of graduates from university to the marketplace. In fact, (Lambert, 2003) argues that the best form of knowledge transfer comes when a talented researcher moves out of the university and into business, or vice versa.

2.1 Transferring knowledge through teaching

For a long time, teaching and training have been the core activities of higher education institutions, not only in Chile but also around the world. Only recently in Chile, the actual transfer of educated individuals from academia to industry has been studied as a key element of the university-business interaction (Santibáñez, 2004; Ramos-Belmar, 2005). This is clearly the most common type of knowledge transfer used in Chile. For example, internships, company visits, dissertations in industry, key note lectures from companies and industry-sponsored innovation and creativity competitions are some of the activities that are currently being undertaken to promote academia-business interaction in Chile. On the other hand, more classical government Education-type of approaches have additionally been enforced to get business and universities nearer along. For example, full-time and part-time courses and education 'on the job' square measure the most common illustrations of however academe is serving the coaching and education wants of companies in Chile.

2.2 Transferring information through practice services

The development of studies and therefore the provision of expert recommendation supported technical skills, experience and information of university's employees square measure proving to be a common service that's being wanted by several corporations in Chile, in particular, those from R&D intensive sectors. Indeed, a recent study showed that nearly half Chile's best firms have needed practice services from one or a lot of universities in their mercantilism period (RamosBelmar, 2005) On the other hand, academia has learned to appreciate its practice business as a noteworthy and profitable supply of revenue (Santibáñez, 2004). However, this whole consultancy chance is still at Associate in Nursing early stage of development. For example, the Biotechnology Centre, at Universidad de Concepción, is well-known in Chile for offering technical practice services; but, only recently such services square measure being publicized via the Centre's web site. Regarding however practice financial gain is distributed among Chilean universities, it is normally split between the tutorial employees that applied the work and therefore the university. The proportions and terms of this distribution of income will vary between universities (Santibáñez, 2004). For example, one third of the income generated from consultancy work at Universidad Austral de Chile, goes to the university, while the rest is distributed among the staff that conducted the study. On the other hand, at Universidad de Valparaiso, the distribution of consultancy income is not regulated at all, so in practice, university staff can carry out consultancy work on their own or on behalf of the university (Santibáñez, 2004).

Although university's advice is highly regarded by industry, Chilean universities, in general, are reluctant to allow much time to their academics for consultancy work (Santibáñez, 2004; Ramos-Belmar, 2005). There are very little incentives for academics to pursue consultancy work and, in some cases, peer-pressure among investigators can make academic advisors or consultants feel they are not being loyal to their academic vows.

2.3 Transferring knowledge through contract research

Contract analysis refers to research work conducted by a university on behalf of a company wherever all the project specifications, like research objectives, length, methodology and deliverables, are ruled by a service contract (CBI, 2001). Commonly, the entity paying for the service is looking for a probe establishment to assist it solve a particular technical challenge that's typically associated with a poster application of its merchandise or services. With reference to contract research in Chile, it is normally commissioned by corporations or by the Chilean government. Most of the contract research activities carried out by universities in Chile are to do with agricultural research, being the fruit and forestry sectors the most active areas that outsource their research needs to universities (Venezian, 1993; Jarvis, 1994). Indeed, in 1964 the Chilean Ministry of Agriculture created The Institute of Agricultural Research, INIA, a private, non-for-profit corporation dedicated to the development, adaptation and transfer of technologies from its laboratories to



the agricultural sector in Chile. Nowadays, INIA is famous for its contract research capabilities in genetics and in vitro cultures of different crops and forestry specimens.

2.4 Transferring knowledge through research collaborations

Usually, research collaborations are understood as cosponsored research programs, where both, university and industry contribute resources and share the benefits of such collaboration, proportionally to their contributions (Lambert, 2003; Reid, 2005). Indeed, probably the most actively encouraged business-academia interactions these days in Chile are research collaborations. For example, the Chilean Foundation for Agrarian Innovation, FIA, has implemented a research collaboration program based on consortiums. According to FIA, a consortium is understood to be “An association of business and technological entities, including university organizations, for the purpose of jointly developing a program or project in the areas of research, development, and innovation based on the complementary efforts of the entities comprising the consortium”(FIA, 2005). In other words, a consortium is seen as a management vehicle to link the interests and skills of the Chilean scientific community with the public and personal sector so as to assist increase the aggressiveness and business innovation of the state. In general, university and business contributions can be within the form of infrastructure (equipment, lab space, etc), highly qualified personnel and intangibles assets (information, contacts, ideas, processes, etc). What is more, companies square measure typically expected to contribute a lot of monetary resources than universities or square measure anticipated to act as collateral for funds contributed by the government or some funding agency (CBI, 2001; Lambert, 2003; Reid, 2005). With reference to the advantages expected from such collaborations, it is widely united that patents, publications and knowledge square measure the most wanted outcomes. However, prototypes, feasibility studies and trained personnel (PhDs, MScs) are turning into progressively common, especially in Chile (Brunner, 2001; RamosBelmar, 2005).

2.5 Transferring information through Technology Licensing and Spin-Out corporations

Technology licensing is commonly better-known in Chile as technology transfer. In essence, it refers to transferring the right to use a particular technology or invention in exchange of a payment. In other words, a university patents an invention and charges a fee to any third party WHO desires to access or use such invention. However, in some cases the most effective way for a university to maximise its come back on its holding is thru a spin-out company. This usually means that the technology is licenced to a start-up company instead of a well established existing company. In other words, the new born company –co-founded by the university Associate in Nursing the science lab that invented the technology– gets a license (usually an exclusive license) to secure the proper of use of the technology, which would act as its core element for worth creation. In this way, the university owns part of the corporate, but at the same time, the company has more freedom to further develop its exclusively assigned intellectual property. In Chile, technology licensing and spinning out companies have become hot topics, in particular, after an important increase in the number of business incubators, currently 10, (Hernandez-Cuevas and Valenzuela, 2004; Corfo, 2006). These organizations support the entrepreneurial process, helping to increase survival rates of innovative start-up companies. Typically, they provide space for a number of businesses under one roof, and are located around Chile’s leading research centers (Corfo, 2006).

3. THE KNOWLEDGE TRANSFER FITNESS OF LEADING CHILEAN UNIVERSITIES

Chilean universities are widely recognized as being among the best in Latin America. There are 63 universities in Chile, which can be divided into 25 state-subsidized (public) and 38 non-state-subsidized (private) institutions (World Bank, 2004; Mineduc, 2005). Chile currently uses competitive funding mechanisms to promote science, technology and innovation. However, most of the research and development is still being carried out by public universities (World Bank, 2004). In addition, the Chilean government invests 0.6% of its gross domestic product (GDP) in science and technology and it intends to double this investment from 0.6% to 1.2% of GDP by the year 2010 (Mineduc, 2005). Based on the work carried out by Santibáñez in 2004 (Santibáñez, 2004), Chile’s top 6 public universities were evaluated in terms of their level of institutional performance and development of Knowledge Transfer policies. Santibáñez findings were converted into a rating scale that has three levels of information transfer performance: Level one, or poor institutional performance; Level 2 or medium/regular institutional performance and Level three or acceptable institutional performance. In Figure 2 the average performance innumerable the information transfer policies of Chile’s high six universities square measure illustrated. In particular, their information transfer performance is compared at each step in the knowledge transfer chain mentioned on top of.

4. CONCLUSION

Arguably, there is some interesting information transfer activity occurring in Chile. In effect, knowledge is presently being transferred from academe to business at many dimensions, from teaching and training to spinning out



corporations. However, knowledge transfer in Chile might be thought of at Associate in Nursing early stage of development, as not only the overall information transfer fitness of Chile's leading universities was graded as medium or regular, but additionally a recent study found that simply thirteen of all analysis intensive universities have enough intellectual property, or technology transfer assets, to set up an instantaneous licensing relationship with industry (IP Tour, 2005). At present, technology transfer activities are being carried out by atiny low variety of universities and so the extent of overall university-business interactions in Chile could also be perceived as restricted or nearly nonexistent. However, the IP Tour study highlights that nearly 100 percent of all Chilean universities square measure commencing to implement technology transfer policies and square measure initiating concrete actions with regards to securing their holding by filing patent applications (IP Tour, 2005). Then, it may be argued that the proportion of universities which will be thought of as 'technology transfer aware' is some twenty third of all Chilean universities (10% beginning technology transfer activities + thirteen presently conducting technology transfer activities). Nevertheless, the remaining 77% of universities square measure not concerned in any technology transfer activity nevertheless. Further investigations on why is this happening square measure required. In this context, an choice to facilitate accelerate the event of business academe interactions could also be to foster consulting services tailored to the biotechnology business in Chile. After all, providing consultancy services ought to be less advanced and abundant clear-cut than fitting contract analysis agreements or spinning out corporations.

However, one point that wants to be taken under consideration in any high-standard service is to avoid any conflict of interest. This may happen once a university worker, through a relationship with an external organization is in the position of influencing university affairs to get an instantaneous or indirect monetary reward. Sometimes it might additionally happen once the analysiser's activities with an organization have a negative impact on his research or teaching responsibilities; or once he offers Associate in Nursing inappropriate advantage to a shopper company in harm of the university. On the other hand, it is essential to carefully think how commercially-sensitive data are going to be handled by the university. If this is not properly addressed, or if the project is poorly managed, prospects of future collaborations and knowledge transfer activities with industry may be undermined. However, in the case a consulting agreement is successfully turned into a research collaboration, future intellectual property rights need to be negotiated. Ideally, collaboration contracts should be developed as soon as possible to cover the ownership and exploitation of future intellectual property.

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