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The policy challenge of promoting international and national research networks: a study of the Green Islands Project of the MIT-Portugal Program

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Introduction

Between 2006 and 2007 the Government of Portugal led a 5-year international partnership with three world-known US universities (MIT, Carnegie Mellon University, University of Texas at Austin). These international partnerships presented an opportunity for universities, research centers, and companies in Portugal to “partner” in education and research activities with top US universities. According to the Secretary of State Manuel Heitor, the pillars of institutional development for Portuguese science and higher education were “cross-institutional networking and critical mass” (Heitor and Bravo, 2010). The international partnerships were an initiative by the Portuguese government to engage numerous different institutional partners in education and research collaborations.

The government predicted that an international partnership with world-class universities would help position the country's national universities and research centers at three levels. First, placing Portugal as a attractive location for graduate studies (in the context of the *great brain race*, as used by Wildavsky, 2010) for students from Europe, Middle East and elsewhere to programs taught by MIT /CMU/ UTA professors at Portuguese universities. Second, promoting collaborative research in specific scientific areas (ICT, engineering

systems, biotechnology, digital media, etc.) to create important “research niches” in the Portuguese research system. Third, promoting “test beds” or “living labs” with universities, industrial affiliates, and local authorities, and communities to help solve problems and improve the quality of life of populations.

This paper looks at the third case of a “test bed” or “living lab” of the Green Islands Project (GIP) as a result of a public policy initiative and the implications it had on research collaborations and establishing connections between governments, industry and academia. The Green Islands Project was developed within the MIT-Portugal Program to assess the energy demand and supply in the Azores islands developing renewable energy sustainability of the islands (FCT, 2009).

The research is based on over 30 interviews with privileged actors in the GIP, including policy makers, graduate students, professors, researchers, engineers and local authorities we will first present the general framework that established the MIT-Portugal Program; second, we examine the Green Islands Project as one of the more ambitious and encompassing projects within that Program; third, we address the links between the different institutional partners, in particular, highlighting the difficulties and strains of establishing and overcoming collaborative relations within the national network.

The MIT-Portugal Partnership

In February 2006, Portugal and the Massachusetts Institute of Technology (MIT) signed a 5-year research and teaching partnership, which became known as the MIT-Portugal Program (MPP). The MPP was the first and largest of the international partnerships established with foreign universities. Before committing to the initiative, MIT carried out a five-month assessment of Portuguese universities, research centers and industrial companies to determine interest and define areas of possible collaboration. This led to the MIT report entitled “Assessment of an MIT-Portugal Collaboration”, published in August 29, 2006. The report stressed MIT’s commitment to working in a global context and recognized Portugal’s potential in science and technology stating “Portugal (was) an interesting place for doing

research and a relevant partner for future joint ventures in the emerging knowledge-based, globalized economy” (MIT, 2006:4). The government of Portugal had established science and technology as a national priority. R&D intensity was growing at 6.8% a year and the new doctorate holders were growing at 10% a year (FCT, 2013). Higher education and research institutions, including state laboratories, were reviewed, assessed and reformed. Research consortium and collaborations with industry were promoted while new science infrastructures were created (Plano Tecnológico, 2005; Compromisso com a Ciência, 2006). It is not surprising that MIT identified Portugal as “an interesting place for doing research” (MIT, 2006).

The MIT assessment exercise gave the green light to the partnership initiative between MIT and the Portuguese universities. This was an unusual move as MIT practice was to engage in a one-on-one university exchange. But in this particular case MIT agreed to work with a national consortium of Portuguese universities, thereby altering its usual approach of working with one university. The assessment exercise served to convince the MIT professors that a consortium of universities could bring the best researchers and the best research centers in the country into the partnership. The relative small size of the country combined with the concentration of universities and research centers along the coast in the major cities facilitated travel while allowing MIT professors to benefit from the “niches” of excellence throughout the country.

If we were to sign an agreement with the Government of Portugal, it would only work, if there were people at Coimbra, Technical, Minho who wanted to work with us, it is not just about quality, but about the fact whether they wanted to work with us, whether they were interested, whether they liked us or not. Before making an important commitment, it seemed crucial to see, to check out potential partners, and to give the MIT Faculty to see if they want to do this. We have a lot of opportunities and no one could tell us to go to Portugal, if we did not want to.

- Interview with MIT Professor

Having agreed to work with a consortium of Portuguese universities, MIT then agreed to specific scientific fields of collaboration. These fields were engineering design and advanced manufacturing, transportation systems, sustainable energy systems and bioengineering systems. These fields were selected on the basis of meeting certain conditions such as the existence of a fair number of recognized researchers in the fields, largely based on previous collaborations between MIT and Portuguese professors (Horta & Patricio, forthcoming). The main focus of the program was *systems thinking* and in particular *engineering systems*, an interdisciplinary field that approaches the project or the system as a whole through its life cycle addressing technical and human aspects of control engineering, industrial engineering, organizational studies and project management. Portugal provided MIT with the opportunity to “implement research results and demonstrate the value of systems thinking in finding flexible and sustainable solutions to complex, dynamic problems” (MIT-Portugal: A Strategy Re-examined, July 2009). Portugal’s size and socio-economic characteristics made it an exceptional location. Portuguese faculty members with research backgrounds in the identified scientific fields largely supported the initiative, as collaboration with MIT professors would provide a boost to their work. It could also potentially serve as an added incentive in seeking European collaborations within the framework of European R&D Framework Programs. The holistic approach and interdisciplinary flavor of *systems thinking* would be reflected in many of the subsequent research projects funded, including the Green Islands Project.

The engineering systems approach, coupled with the MIT label, had a strong attractive and applied element that would appeal to industrial partners intent on knowledge transfer and seeking investment opportunities. As soon as the agreement was signed with MIT, numerous Portuguese companies revealed interest to join the partnership (author, year). To secure the overall scheme, the Portuguese government committed a budget of roughly 60 million euros for the next 5 years (2006-2011) with half of the funding going to MIT. Several academics interviewed believed that the US universities objectives centered on financial and human resources:

I think the US universities gained two things - first, they gained funding and second, they benefited with more human resources.

- University Professor, UNL

The financial aspects of the program were often mentioned as a reason for MIT to come to Portugal, however, it was usually considered as only one aspect of much larger picture.

Well, there was money. But there was also confidence and trust between people. Building trust takes time and it is very important. The first thing that was necessary was to convince the Americans to come to Portugal. At first, they didn't want to come. Finally they came, well they stayed 6 months (to assess the research conditions) and were impressed.

- Policy Analyst, Ministry of Science, Technology and Higher Education

Initially the program was highly concentrated on three universities - Technical University, University of Minho and the Faculty of Engineering of the University of Porto but with time more universities joined the consortium.

Over the next five years, with the necessary funding and human resources, the MIT-Portugal Program developed a number of PhD programs, professional master's degrees and various short courses. The MIT-Portugal Program has so far involved 6 Portuguese universities, with 8 colleges in joint degrees. About 270 Portuguese faculty or scholars had some type of appointment at MIT and 70 MIT faculty members maintained a relationship with Portugal (Heitor, 2012). About 600 students participated in the MIT-Portugal Program. This includes 370 PhD students, of these, 23% were foreign students attracted to MIT-Portugal Program (Pfothenhauer et al., 2013). The Program also included 20 collaborative research projects between MIT and Portuguese researchers. One of the projects was the Green Islands Project, a core project developed in the Azores Islands.

The Green Islands Project

The Green Islands Project was a FCT funded collaborative research project set in the MIT-Portugal Program but, from the start, it was also much more than just one more research project. The Green Islands Projects exemplifies a particular type of project identified as a flagship initiative of the MIT-Portugal Program (MIT-Portugal, 2009). The Regional Government of the Azores played a key role in supporting the Project. The Regional Government and the Regional Energy Agency (ARENA) promoted and integrated several aspects of the programs such as graduate training, research support and promoting university-industry relations.

The GIP has scientific, social and political objectives. It has as its objective to meet the energy needs of the local population through the implementation of test-bed or a platform of experimentation to ensure renewable energy sustainability of the Azores islands by 2018. Its core objective was to reduce the archipelago's dependence on imported fossil fuels. By 2018, the Azores would produce 75% of electrical production and 40% of primary energy through renewable energy sources. This was an ambitious goal since according to the initial assessment the Azores imported 90% of its energy needs (Silva, 2010). The project required powerful simulation models and design tools to help understand the dynamics of renewable energies, energy markets, and consumer behavior. An integral part of the project was to develop methods to address the uncertainties of technology development, energy prices, and social acceptance of new ways of living (MIT-Portugal, 2009).

The Green Island Project is both a research and innovation endeavor that links universities, research centers, industries, national and regional authorities in a multidisciplinary "test-bed" or "living laboratory" that includes various projects to promote sustainable energy and mobility systems through local assessment of needs. This initiative involves different academic fields from engineers, energy and transportation experts and social scientists. The Azores provided

the site for an holistic approach to assess energy needs and to find solutions that was characteristic of the general MIT-Portugal Program. The islands' energy needs provided a closed system to develop, test and implement solutions in a cost-efficient manner. The Azores was a scalable living laboratory model for coupling policy options with technological ones.

The geographic characteristic of the islands provided an ideal setting for an innovation project that takes into account the production, storage and stability of an isolated electrical system. Moreover, individual islands could provide even smaller scale electrical network for testing and implementation, hence acting as case studies.

The archipelago of the Azores consists of 9 volcanic islands located in the North Atlantic Ocean. The geophysical location and environment of the islands have made them of particular relevance to certain fields of science. Seismologists and volcanologists, in particular, have clustered to the Azores to study its intense seismic activity. Marine scientists and biologists have also convened to the islands to study marine biodiversity, hydrothermal ecology and deep-sea coral and energy springs in the ocean sea floor. Marine science activities in the islands grew considerably in the last decades leading to the establishment of reputable marine science research groups. The best-known marine science research center in the country is the Associate Laboratory of CIMAR- Center of Marine and Environmental Research, which includes researchers from the Marine Ecology Group of the University of the Azores. The CIMAR network cluster includes a number of universities, research centers and a museum. Another major area of scientific interest is renewable energy. Various research activities have been financed by the European Union, including the recent ISLE-PACT, a group of 50 islands to study energy sustainability.

The Regional Government of the Azores has supported R&D with an aim to innovate and develop the economy of the archipelago. Among the innovation measures is an investment plan (2010-2014) to transform the energy sector into renewable energy development. This included the construction of new geothermal centrals in the islands of São Miguel and

Terceira, a new wind farm in São Miguel and Faial and new hydro-electrical plants in Flores and São Jorge as well as further upgrading and improvement of existing sites. In 2007, the Government of the Azores led the GIP initiative in linking its energy concerns to the MIT-Portugal Program. Research objectives coupled with economic investments in renewable energy sources and linked with a rationale to overcome insularity motivated the regional government to support the GIP. Together with FCT, the national science-funding agency, and the MIT-Portugal Program the framework was set for a partnership between different institutional partners. The agreement associated 18 teams from the University of the Azores to establish a sustainable energy systems based on endogenous resources that would place the Azores as a reference in efficient energy uses and renewable energy.

One of the most pertinent studies undertaken within the GIP is the “Sustainable Corvo” project. Corvo is the smallest and most isolated on the islands with a population of a few hundred people. The community of Corvo relied on bottled gas for cooking and heating needs and were likely to store several bottles of gas due to lack of access to the island during winter months. The % of freezers was significantly higher than other islands or regions of the country. Corvo was a “living lab” in the potential transformation of the island into a scientific and technological showcase of joint university-industry capacity under government incentives.

The GIP was structured into three distinct phases. The initial phase of the project would characterize the energy resources and the potential for renewable energy of the various islands. University researchers and academics would undertake this first phase. A second phase to address and propose solutions and develop technologies based on the previous characterization. This phase would lead to interaction between the universities and industry. In the third and final phase industry, universities and government would implement the solutions assuring renewable energy to the Azorean population. This third and final phase has been put on hold since the financial economic crisis took hold of all investments in the country.

Government-University-Industry Collaborations: strains & shifts in the partnership

A number of Portuguese universities were involved in the GIP from the beginning. The main Lisbon engineering school, *Instituto Superior Técnico* (IST), led much of the initiative and together with the Engineering School of the University of Porto (FEUP), the Associate Laboratory of the *Instituto de Engenharia de Sistemas e Computadores do Porto* (INESC-Porto), and the University of the Azores formed the academic core of the partnership. The other partners involved were regional entities such as the Regional Government of the Azores, the Regional Energy Agency of the Azores (ARENA), and companies such as Electricity of the Azores (EDA). The industrial partners involved were EFACEC, and Portugal Telecom (PT). Other collaborations came from the Faculty of Sciences of the University of Lisbon (FCUL), the Faculty of Science and Technology of the University of Coimbra (FCTUC), the Institute of Meteorology, *EDP-Energias de Portugal*, and *Go4the Globe*, a local company that promotes renewable energy solutions. Last, but not least, MIT participated and played a pivotal role throughout the entire period.

The industrial partners involved were large electricity or energy companies with significant innovation portfolios and experience in R&D. EFACEC, for example, is a 100-year-old company that started in the manufacture, repair and installation of mechanical and electrical equipment. Today it is a multinational company with an international strategy in North and South America, in Asia and Europe, that has branched to instrument and power transformers, automation and control, renewables, transports and logistics. It employs 4,500 people throughout the world and has collaborated in projects with ESA and CERN and won numerous innovation awards. *EDP-Energias de Portugal* is one of Europe's main electricity operators with business plans in the Iberian Peninsula and in Brazil. *Portugal Telecom* is a global telecommunications operator with operations in Mozambique, Angola, Kenya, China, Brazil, Cape Verde Islands, S. Tomé e Príncipe and Namibia. The energy field entertains big international players and they were interested in participating in the Green Islands Project with the assured participation of MIT.

The Regional Government of the Azores assumed a key role in supporting the Green Islands Project. It is not surprising that the first phase of the project was based on the policy options defined by the government and its interaction with researchers.

The Regional Government said they would give their support and they really did. They also said that the MIT-Portugal Program would help promote this (renewable energy) policy. We became institutionally connected as good partners... good partners of the government initiative.... Where there is a scientific alignment and a policy alignment.

- Interview with MIT-Portugal Program Coordinator

Researchers recognized the support of the Regional Government of the Azores to the project and in the endeavor to include the University of the Azores.

At the beginning the University of the Azores was not involved but then the Regional Government made 600 thousand euros available for projects carried out by the University of the Azores so that the university could contribute to the objectives of the GIP. This was extremely helpful and integrated the University in the GIP.

- Interview with university professor, IST/UTL

These additional supports contributed to ensure that Azorean researchers and academics participated in the program. The University of the Azores contributed with studies in wind energy, natural resources, and the social assessment of energy consumption. There is no engineering school in the Azores so the academic contributions came from fields that could contribute to the holistic nature of the project.

Although renewable energy was at the heart of the project, efficient and ecological transportation issues were closely associated with it. Projects such as “Power demand estimation and power system impacts resulting of fleet penetration of electric/pug-in vehicles”

focused on the power grid of the island of S. Miguel and simulation analysis of scenarios of electric vehicles. Indeed, the summary report claims that islanded systems proved to be very effective in the provision of ancillary services and with little effort requested to the electric vehicle (MIT-Portugal, 2011).

While some of the universities involved had previously collaborated in projects, most were collaborating for the first time. This first-time basis may have contributed to the slow start of collaboration. The scale and the expected impact of the project may have also contributed to cautious exchanges between partners. Overall, the collaborations between the academic institutions, the energy companies and local power developed gradually with various reservations and concerns throughout.

At the start of the project all the institutional partners mentioned some of the difficulties involved in the collaboration. One of the concerns raised had to do with the inclusion of particular islands. The choice of the Azores for the study had been consensual and yet there were divergences centered on the choice of islands which regional government officials felt they had a say.

I call this the 3D- D for dimension, dispersion and distance. Distance for the big center; dispersion there are 610 kilometer between the two furthest islands, St^a Maria and Flores; and the reduced dimension of the islands. How do we overcome these constraints? (..) And then the project called Green Island appeared and the island of Flores was chosen because of high renewable rates of consumption, (..) but there was political will, there were universities with a program, there was MIT, there was the MPP, the Technological Plan of the Socrates Government, and there were technicians.... And there were companies. Either I am ambitious or I lose everything. So we integrated the island of S. Miguel, which is larger. If this island is not included then the project is nothing.

- Interview with member of the Regional Government

Differences were also evident with regard to the motivations and reasons to join the collaboration. Industry, in particular, highlighted the commercial value of their participation:

On the one hand, industry needs to open its eyes and allow degrees of freedom that reflect a jovial spirit, an alternative and broad spectrum of ideas; on the other hand, the university and the academe has to understand that objectivity and convergence move industry... For us, something that we believe in, even if it will take a year, or two or five years, or if it is tomorrow, it is inevitable that we think in terms of technological entrepreneurship. We have collaborators, we have partners, we have clients, we have shareholders, and therefore we have to create wealth. And that vision of creating wealth, of generating value makes us do everything we do. We don't enter projects just because... no, we don't do things just because....

- Interview with EFACEC engineer

Academics expressed a rather deep sense of incomprehension and misunderstanding between universities and industry:

I think that for many years now universities have been distant from applied research that could be of interest to companies. By the same token, companies frequently don't believe in research produced in universities, and therefore we frequently get the feeling that the companies don't know what they want....

- University Professor, FCUL

When the time comes to implement the results, then the companies in the Azores will do it, (...). This is going to be very difficult to do with companies. It was hard to do with universities; it is going to be much harder with companies. If two competing

companies want to do the same thing, then we'll have a clash. I try to stimulate alliances. This is my vision and my interpretation and someone else can have a completely different interpretation.

- University Professor, Coordinator, IST

The MPP required a formal institutional partnership between university-industry. The government collaboration and funding brought a number of local teams into the project and ensured the assessment of various energy components. So a formal university-industry-government collaboration followed. Working together was necessary to ensure funding, to ensure the objectives of the Green Islands Projects, and to ensure the MIT participation.

As the project progressed and contacts and exchanges became more frequent. Real collaborations between university and industry began to increase. Two factors played an important role in smoothing out the collaborations between the different institutional partners. The first was the framework of the MIT-Portugal Program itself. The Program defined rules and established the context for collaboration- It was established for all collaborations within the MIT-Portugal Program and not just for the Green Islands Project. The Program included PhD and Masters programs, student and faculty exchanges, visits and workshops. This framework of international activity provided a strong incentive for various collaborative joint actions and broke down barriers between the different institutional partners. The second reason was the presence of MIT itself. MIT is world-recognized university with excellence in teaching and research and widely regarded in the field of engineering and technology transfer. Companies and businesses were motivated to associate with a project that had the formal participation of MIT professors. The presence of MIT faculty helped bring the GIP partners together; thus MIT was a *facilitator* of the national network.

The great advantage of the GIP was that it brought together a number of competencies spread through different institutions; it tried to bring them together and arrive at conclusions based on the experiences of all the entities involved. The

link to MIT gave us a new perspective and another larger experience of what is going on in other parts of the world. I think that was the main advantage.

- EDA Administrator

In general, in the past these universities did not collaborate ... that is, things were unstructured and irregular ... I think that the friendships and complicities that developed with the project.... this is an added value as important as other factors.

- University Professor, FCTUC

As academic research began to intersect with industrial progress and government economic development policy collaborations became more evident. The arrangements and networks form the basis of the triple helix model that provides the source for innovation and problem resolution (Etzkowitz, 2002).

No one has doubts that partnerships are necessary to “evangelize” the scientific and technological system and industry. If our science system can’t project itself onto industry it is useless. Our industry cannot do it without the backing from science and technology. We are not self-sufficient.

- Engineer, EFACEC

Renewable energy is now economically competitive on the islands. In 1988, when we installed the first wind farm on the islands, it was not because they were beautiful... it was because they contributed to the sustainability and protection of our environment. Already they were economically competitive vis-à-vis other energy production sources. On these islands, because the system is so small, we don’t have economies of scale.. our electrical power systems are so small, we can only use diesel and it is very expensive, therefore we have to ensure the competitiveness of renewable energies. This is our main concern. This is what we have to do. Our bet is justified on economic reasoning.

The GIP partners that form the network became increasingly aware of the importance of these collaborations and on the need to work together in the partnership. This was accomplished by the involvement of other members in the partnership, such as MIT. It was also accomplished by the role developed by students in the partnership that helped build links in the network.

Building Bridges

In a triple helix context, post-graduate students are not only part of a research program, but are also valuable bridge builders. Students, current or former, involved in the GIP fulfilled the roles associated to them in university-industry relations: they were responsible for a significant part of the knowledge produced, they became an important channel for knowledge transfer between industry and universities, and were essential in the setting up or reinforcement of collaboration networks (Thune, 2010). Considering the knowledge produced, it was possible to conclude that MPP doctoral students collected a significant part of the field data. This included not only visits to locations to assess the best solutions for a sustainable renewable energy strategy, but also the connection and cooperation with the regional utility company, EDA, that supplied the researchers with important raw data, along with privileged access to infrastructures. This bridge with EDA, originally created by MPP and the senior researchers, was maintained and reinforced with by the students involved, and proved essential to the outcomes of the GIP.

The doctoral students involved in GIP were not the only type of students that had a role to play in the building of bridges. During the interviews it became clear that the consortia involved in the project was built on previous personal connections, and that those were often based on former students that were now working in different areas. It was possible to identify this type of connection based in former FEUP students now working in EFACEC or EDA, or former master's IST students working on ARENA. This role of students, current or former, as

bridge builders reinforces the assumption that collaborative research project start from previously created, and some times long established, networks (Thune, 2010). Nevertheless, the interaction of several of those networks, an interaction that was stimulated by the context of the MPP, allowed for the creation of new bridges between different actors.

One of the main goals of the International Partnership Program was to promote the internationalization of Portuguese universities and R&D institutions and to increase cooperation between them. One way to accomplish this was to reinforce scientific and advanced training capacities through international, competitive and innovative graduate programs for student learning and training.

At the beginning the partnership was designed as student-centred. Students from Portugal going to study in the US; students are the core of the program, as should be.

- Portuguese Policymaker, responsible for the MPP

The initial challenge for the faculty involved in the MPP was to formally establish the graduate teaching programs – masters and doctoral programs. In most cases, the challenge was profound due to timing requirements and practically non-existent PhD programs.

The first big challenge, as soon as the program was approved in 2006, was to have the PhD programs functioning by September 2007. And that was how we began, with MIT, to design the program, the disciplines, the units, and to create. This was done from scratch, between four, three universities. In the first year of the MIT program, we designed educational programs; afterwards we began to think of creating research projects. (...) The rectors signed an agreement between the universities and the program is offered in association.

- Interview with University Professor; MIT-Portugal Coordinator

An MIT professor described the contrast between the experience of “opening” Portuguese universities to the outside and the academic experience within MIT itself:

MIT has been recruiting students from all over, and I myself work with half the people from somewhere else. Compare that with the Technical, when I first came there, all the students were from there. If you went to Porto all the students were from up North. A foreigner was somebody who came from the Algarve. They did not have Spaniards, or Greeks or other people. In many ways, it is very different. Having Portuguese people here, sure it was nice, the food is great, but it did not have the same kind of effect as this kind of openness to the outside that it helped catalyze. I mean, I met a lot of Portuguese students who did their advanced degrees abroad, but the institutions, meanwhile, remained very self-centered and localized to outside influences.

- MIT Professor, MPP

The masters and doctoral programs were open to all students and began to attract students from Europe, Northern Africa and the Middle East. The doctoral programs were set up on the basis of collaborations between two or more Portuguese universities and MIT. The PhD students became immersed in a network of national universities such as University of Porto, University of Lisbon, the Technical University. The students could follow courses in the different universities thereby gaining expertise offered from the consortium of universities. Within a couple of years, these educational collaborations between the universities led to the creation of joint degree programs.

MIT helped create four doctoral programs: bioengineering systems, engineering design and advanced manufacturing, sustainable energy systems and transportation. There were also three Master's programs created in sustainable energy systems, transportation and engineering design and advanced manufacturing. The type of program and the form of collaboration with MIT varied from program to program. The bioengineering program, for example, created intensive teaching modules with students travelling to the different

universities and with MIT professors teaching modules. The transportation PhD program, however, was first offered at the Technical University and eventually came to be offered in association with other Portuguese universities as the level of confidence and trust between partners increased.

Our objective was to create PhD programs. That was our priority; to get our universities working together, because research projects already existed. We wanted to create new degree programs that were distinct, that had quality.

- Engineering Professor, Transportation Program, IST

The MIT trademark ensured the teaching quality to attract high-level students to the program. The students benefitted from an innovative research and education environment and from international mobility exchanges. Scholarships and grants were provided that facilitated student mobility to the US. Many students spend varied periods of time at MIT, ranging from two-weeks to two years. Students were also integrated and participated in research projects.

But MIT also brought to the partnership its special relationship to industry and commercial ventures. MIT is known as a unique university founded as a science-based technological university, closely linked to industry (Etzkowitz, 2002). Therefore, MIT provided an entrepreneurial focus that recognized the importance of the commercial value of research. Throughout the world universities have begun to integrate entrepreneurial roles into the traditional missions of teaching and research but MIT has been proclaimed a champion in this regard. Entrepreneurial skills and the capacity to work and collaborate with industry are seen as enhancing employability and transferable skills.

Students in collaborative doctoral programs or collaborative research programs have been identified as the “bridge builders” between university and industry (Thune, 2010; Borell-Damian et al, 2010). This is more evident in the case of graduate students that are being trained in professional practices and competencies to fulfill future roles in universities,

government and industry. The doctoral students in the MPP were seen as part of the collaborative arrangement between government, university and industry and MIT.

In certain fields such as engineering and life sciences university-industry collaborations have been called a “normalized practice” (Behrens and Gray, 2001). Collaborating with industry has become a routine learning environment. Some studies refer to graduate students as “tokens” or “gifts” in the traffic of exchange between university and industry raising numerous conflicts of interests and disputes that may arise regarding secrecy, publication, and patenting considerations (Slaughter et al., 2002). But it is also possible to contextualize university-industry relations as a process of negotiation that sees the establishment of new sets of alliances with students as links and liaisons.

In the case of the Green Islands Projects students interact between universities, industry and government. Students “bridge” and forge links between academic work in the universities and professional work in industry and local assessment exercises requested by the regional government.

Many students looked to the MPP as a source for opening doors and future life opportunities:

My idea was, first, there was a world-class university, which is MIT, and therefore I know that I would study with MIT professors. Second, it was the ability to develop projects that were directed at real life with energy companies. I would not be stuck in an office, studying theory. (..)

- PhD student, GIP in MIT-Portugal Program

The practical and entrepreneurial aspect of MIT combined with its academic program led to the creation of an environment that could promote to start-up companies:

The MIT environment.... lead me to think about starting a company. There are more students in the Program that are thinking about starting companies. This is a form of

networking. The ability to know someone that I can ask questions because they are going through the same thing. I can ask....how do you deal with this.. how do you deal with that... I know where to get support. I know whom to ask about this field in particular. Therefore this environment because really interesting.

- PhD student in MIT-Portugal Program

Conclusion

The International Partnership Program was a government initiative to promote the internationalization of Portuguese universities, to foster university-based research in national networks of collaboration; and to encourage university - industry collaborations. It is still an on-going program and therefore it is still early to conclude on all its different impacts.

It is still early to conclude on the GIP's objectives regarding the ambitious goals on transforming the islands into an archipelago of energy sustainability. The project has suffered significant financial setbacks in the wake of the current economic and financial crisis and companies are taking a more cautious approach to investment. Government funding has also been cut and the GIP is facing a financial hurdles. The next few months are critical. Industry will need to decide if it will invest in renewable forms of energy and government will have to prioritize its energy strategy.

It is, however, possible to conclude on some of the other impacts of the MIT-Portugal Program. The doctoral program is an example of a successful output. The quality of the program and its global reputation was highlighted in The Chronicle of Higher Education (Pfothenauer, 2010) and in the overall assessment carried out by the Academy of Finland in 2012. The Academy of Finland emphasizes in its 134 pages of assessment that "MIT has been particularly successful in PhD training" (2012:5). The doctoral programs were able to attract a number of international students and to link university-industry training in innovative ways.

The government-university-industry relations created and promoted an energy strategy for the Azores based on scientific collaborations and policy agreements. Policy choices matter and make a difference in positioning universities and training students.

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