The Role of Universities in Promoting Rural Innovation in Latin America

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To the people of Chiapas

Acknowledgments

This report sets the end of an interesting stage of my life. A year when I dared to explore the management world as a mean to give sense to the role of engineering in society. First, I want to express my most sincere gratitude to the professors Andre de Boer and Sirp de Boer for the guidance they gave me for following the master program in Business Administration – International Management. Undoubtedly this was a good choice according to my interests.

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Thankfully,

Andrea Sanchez Ramirez

Contents

List of Figures

List of Tables

Abstract

In this report, the problem of universities' engagement in rural innovation in the context of Latin America is explored. This qualitative research describes the characteristics and requirements of a framework for rural innovation, here referred to as Rural System of Innovation. The Rural-SI approach is based on sustainable and new rurality criteria, and exhibits a hybrid nature between territorial (regional) and agricultural (sectoral) perspectives. Universities' role within such a framework is analysed under the requirements for innovation activity and rural network development. However, for universities to participate in Rural-SI they are required to develop specific characteristics that, in principle, seem very distant from their traditional roles on provision of high education and research. A research framework that maps the functions of universities' engagement for rural innovation within the categories of education, research and innovation is proposed. Additionally, the assumption that in order to approach an innovation role, universities could make use of the already existing capabilities in their traditional roles is stated. The empirical validation of the theoretical propositions is done by means of a singular case study on the Interdisciplinary Research Programme for Human Development in Chiapas, Mexico. This case was chosen due to the stagnation of human development that derived in the Zapatista uprising in 1994. The national, regional and institutional environments around the research programme are also presented. The report ends with a detailed analysis of the research programme under the proposed research framework and a final discussion on the reasons and guidelines for universities to commit to rural innovation.

Keywords: *Innovation, Universities' engagement, Rural System of Innovation Latin America, Chiapas.*

Chapter 1 Introduction

1.1 Background

Latin America has positioned itself as a region of agricultural commodity production such as soy, sugar cane, coffee and cattle among others. This positioning has been achieved partially by strengthening R&D programmes, which are considerably more developed than those in other sectors (Arocena & Sutz, 1999). However it remains unclear whether the benefits of economic growth have been transferred effectively to the rural communities where those activities take place (Janvry & Sadoulet, 2000). Latin America is also known for the large inequalities between urban and rural areas in terms of human capital and wealth. This leads to a constant push-pull competence between urban and rural areas which is reflected in the social problems derived from the unplanned migrations in big Latin American cities (Cerrutti & Bertoncello, 2003). In addition, during the last few years rural areas have been exposed to critical situations due to the food crisis (2008), the financial crisis (2008,2009) and ongoing climate change. Rural communities are badly affected by these effects, but are also considered as a key solution in overcoming, solving or softening the impact of those crises (ECLAC, 2009).

The gap between economic importance and social development in rural Latin America is largely explained by ineffective stimulus for balanced socio-economic development[1]. Adverse macroeconomic flows, political instability, lack of government attention and even environmental threats could be argued as extrinsic factors to the communities, but those are outside the scope of this study. This report concerns with intrinsic factors such as rural communities' difficulties to build up economic, social and technical capabilities (ECLAC, 2009). Governments, agricultural organisations and academics worldwide share the concern on how to balance technological advance, effective policies for economic returns and rural development. Amidst this discussion, innovation has appeared as a powerful tool for rural areas to face its social, economic and environmental challenges (Heemskerk & Wennink, 2004)

Once the word innovation appears in the discourse, universities automatically appear in the scenario of rural development. Universities are seen as potential facilitators of the innovation activity aiming to find responses to rural needs. This requires universities' commitment for innovation capacity development and social compromise (UNESCO, 1998). In Latin America, traditional views for technological development located universities as knowledge sources and rural areas as passive receptors of that knowledge, by means of technology transfer models. Currently the adoption of innovation challenges traditional R&D schemes. Innovation encourages rural

[1] There are several examples on how unplanned and exclusive economic advances have led to social problems such as job displacement and rural migration (Cerrutti & Bertoncello, 2003).

communities to assume a more active role as agents of validation and co-generation of knowledge (Shuller, 2002).

Parallel Latin American universities have started to be interested in implementing innovation as an additional role besides their teaching and research goals. The coincidence of universities and rural development organisations for innovation sets favourable conditions for them to work together in the construction of rural innovation. However, the rural scenario imposes additional challenges for universities. For example, universities should concern on how to interact with rural communities under a new strategy of collaborative work rather than a client-provider relationship, while developing internal strategies for fostering innovation.

1.2 Relevance and Motivation

The following research is conducted at The Dutch Institute for Knowledge Intensive Entrepreneurship, International Management (NIKOS)[2] and the Centre for Higher Education Policy Studies CHEPS, both at the faculty of Management and Governance of the University of Twente, the Netherlands. NIKOS and CHEPS complements in the topics of innovation, higher education and international management constitute a solid scenario for the execution of this research.

Innovation: NIKOS looks at micro interaction patterns in networks of entrepreneurs and other actors, which lead to innovation and consequently change in economic structure on micro, meso and macro levels. NIKOS has a particular interest in University-industry-interaction and emphasises on international environments. This provides a good scenario for deepening an understanding of the issues of rural innovation in Latin America.

Universities: The second participating institution is the interdisciplinary research-institute Centre for Higher Education Policy Studies (CHEPS). CHEPS seeks to increase understanding of institutional, national and international issues that bear upon Higher Education. The university perspective is well supported by the contribution of CHEPS.

Business Administration and International Management: Beyond the traditional focus of firms as main executors of business, the globalised context calls for consideration of networks as units of analysis. Therefore, the problem of building innovation capacity for communities could be compared to the problem of developing innovation

[2] Nederlands Instituut voor Kennisintensief Ondernemerschap (NIKOS)

capabilities within a company. The present research is developed under the scenario of graduation assignment in the programme Business Administration in the focus of International Management.

1.3 Research Objectives

The previous sections introduce the problem of universities' engagement to rural innovation. In summary, rural needs can be met by means of innovation, which not only provide relief for the challenges that rural areas face, but can also strengthen the social, economic and technological capacity of those communities. In that regard universities can act as facilitators of innovation activities as well as actors within the innovation system. Additionally universities face the challenge of becoming more than simple knowledge providers: they have to become knowledge co-creators working together with other actors of the Systems of Innovation. The present report explores the problem of how universities can support innovation in the context of rural Latin America. The research aims to fulfil the following two objectives.

1. *Explore the topic of rural innovation in Latin America*
2. *Propose guidelines for universities to direct the supporting process of rural innovation in Latin America.*

The purpose of the research is to explore the universities' engagement with rural innovation in the context of Latin America. The first objective focuses on the need to understand the problem of rural innovation. Although innovation and rural development are well treated by academics there is little literature on rural innovation, especially in the context of Latin America. Once the characteristics of the problem are explored, the second objective reflects the interest of the researcher to bring academic attention to the phenomena of universities' engagement with rural communities. The guidelines derived from this research should be taken only as a starting point for further detailed investigation.

1.4 Research Questions

In short, the research focuses on the analysis of the relations between the keywords *universities*, *innovation* and *rural development* and the factors that enhance or restrain those relationships.

Q_0: *Why and how can universities guide the rural innovation engagement process in the context of Latin America?*

In order to address this main research question, secondary questions are proposed as intermediary steps in understanding the problem. From Q_0 the words *processes* and *context* are explored in detail via the secondary research questions.

By the word *context* it is understood the geographical context (Latin America), the theme (rural innovation) and the political and institutional factors (national, regional and institutional). These are explored through Q_1, Q_2 and Q_3.

Q_1: *How do the concepts of innovation, rural development, universities' engagement relate to each other in the context of Latin America?*

Q_2: *What are the characteristics and requirements of rural innovation in Latin America?*

Q_3: *How is university engagement with rural innovation influenced by national, regional and institutional factors?*

The word *process* involves the actions or functions that universities aim to fulfil. This is more clearly stated by Q_4.

Q_4: *What functions are universities able to develop for enhancing rural innovation?*

But in order to develop such actions, the universities must develop certain the internal capabilities when aiming to contribute to rural innovation. The fifth research question states this as follows:

Q_5: *What is the influence of universities' education and research capabilities for rural innovation engagement?*

As an outcome of the research questions Q_4 and Q_5, a theoretical model is proposed, which maps the functions and capabilities of universities within rural innovation engagement. This model will be further validated by means of an empirical component.

1.5 Report Structure

In order to answer the main and secondary research questions, the document is divided in three main parts: Theoretical, Empirical and Analitical. Figure 1-1 shows a schematic representation of the document structure. The theoretical part covers the topics of geographic context, rural innovation and university innovation. These are discussed in chapters 2 and 3. Chapter 2 presents a literature review, while Chapter 3 presents a research framework for linking the role of universities with rural innovation developed by the author.

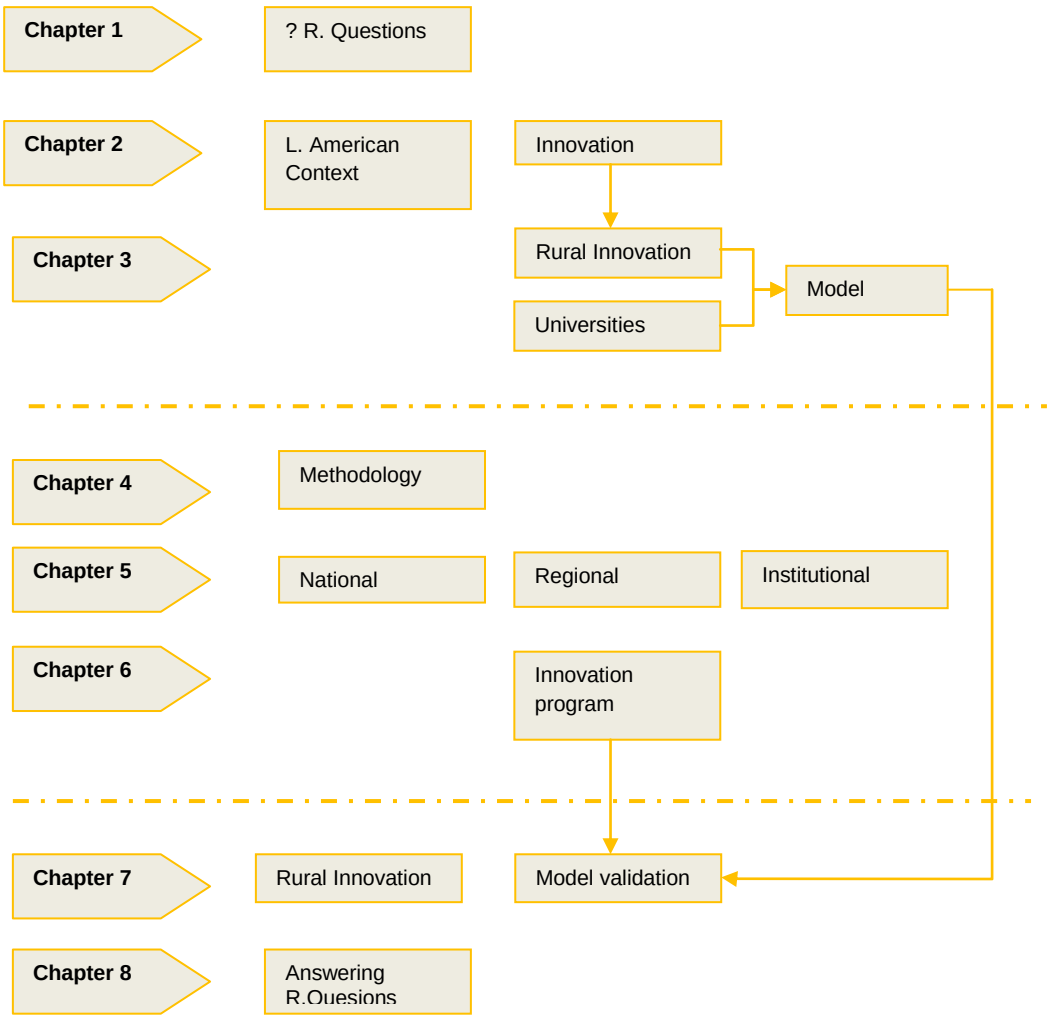


Figure 1-1. Report Structure diagram

The second part of the report (Chapters 4-6) comprises the empirical component by means of a case study. This relates to the validation of the theoretical propositions presented in the first part (Chapters 1-3). Chapter 4 presents the methodology used for the empirical validation, Chapter 5 looks at the national, institutional and regional context, while Chapter 6 goes to the description of the university proposition for innovation engagement.

The final part of the report (Chapters 7-8) aims to link the theoretical and empirical components. Chapter 7 focuses on the analysis of the case study from the rural innovation perspective and the validation of the model proposed in chapter 3. Chapter 8 gathers the theoretical and empirical components for the answering of research questions proposed in section 1-4.

Chapter 2 Literature Review

The literature review is developed in two sections throughout Chapter 2. The first part intends to explore the keywords *Innovation, Rural Development* and *Universities* within the context of Latin America in connection with the first research question (Q_1: *How does the concepts of innovation, rural development, universities' engagement relate to each other in the context of Latin America?).* The second part, the innovation component is expanded to introduce the reader with the framework of Systems of Innovation SIs, its elements, scope and functions, which constitutes the basis for the research framework developed in Chapter 3.

2.1 Research Elements

The following section intends to clarify some relationships among the main keywords of the research: *Universities, Rural Development* and *Innovation.* Firstly, an overview of universities' methods and challenges for participation in rural development are provided. Followed by, a discussion about the meaning of Rural Development and some of the most urgent needs for which innovation can be an effective implementation strategy. This leads to deepening the concept of innovation, and the methods that seem relevant to the application of agribusiness. The section concludes with the reasons why innovative agribusiness is linked to rural needs.

2.1.1. **Innovation**

The world economy has seen, during the second half of the twentieth century, the rise and fall of several industrial production strategies such as *mass production, lean production,* and *specialisation*. But alongside the rise of neo-liberalism and globalisation, firms were pushed to seek out a new strategy, where price, quality and focus were no longer the preferred means to pursue market positioning. A growing body of opinion felt companies should be more concerned on building basic internal operating *capabilities* rather than seeking to achieve specific market positions or financial goals (Hayes, Pisano, Upton, & Wheelwright, 2005). This search for new strategies recalled Schumpeter's ideas about entrepreneurship, and Peter Drucker's term *"knowledge worker"* became of interest again. In this context the idea of a knowledge-based economy emerges, and innovation as the main strategy to pursue such an economic model.

The growing interest for innovation and how to systemise innovation capacity derived in strong academic activity around the framework of *Systems of Innovation* (*SIs*)

(Freeman, 1987; Lundvall,1992; OECD, 1992; Nelson & Rosenberg, 1993; Edquist, 1997; Alcorta & Peres, 1998). Lundvall (1992, p. 1) based his proposition of *National Systems of Innovation NSI* on the assumptions that "*the most fundamental process in knowledge economy is learning, and that learning is a socially embedded process which cannot be understood without taking into consideration its institutional and cultural context*". Edquist (2005) highlights the main strengths of the SIs approach as holistic, interdisciplinary, interdependent and evolutionary in nature.

> Innovation can be defined as the '*process by which firms master and implement the design and production of goods and services that are new to them, irrespective of whether they are new to their competitors, their countries or the world"* (Hall, Mytelka, & Oyeyinka, 2006, p. 11).

Textbox 2-1 Definition of Innovation

In summary, for innovation to take place and SIs to develop there must be continuous learning. The opportunities to learn depend on the degree and types of interactions between and among the different enterprises, organisations and related sectors, as well as institutional behaviours, which determine the extent and rate at which information and knowledge are produced, transferred and utilized. Small improvements in product or production design and quality, as well as changes in processes, techniques, organisation or management routines and creativity in marketing can make production, distribution and marketing of products and services more cost effective, efficient and competitive. (Francis, 2005)

2.1.2. **Rural Development**

During much of the last 150 years, Latin American tropical agrarian landscapes were largely viewed as production sites for domestic food crops and a few traditional export goods. This version of the rural landscapes and peasantries started to change in the 1907's due to neoliberal economic reforms, the ascendance of global environmentalism and environmental justice movements, and an accelerated dynamic of global international migration. These changes enforced a new concept of rural landscapes: "*less linked to commodity production per se and much more identified with nature and cultural conservation, and with the provisioning of global and local environmental services and green goods*" (Hecht, 2010, p. 163)

Concurrently biotechnology changes, expansion of global commodity markets and new production technologies made it possible for traditional temperate zone products to reach record production numbers. However the benefits of this boom did not benefit small farmers. Price declinings or hyper volatility were the norm which made traditional grain commodities an increasingly questionable income strategy. According to Hecht (2010, p. 163) "*rural livelihoods took on far more complex forms and tactic*

that regularly included globalised elements ranging from technologies, discourses, finance, to markets".

Amidst this political, economic and technological scenario, a *New Rurality* framework has been developed for conducting rural development strategies to improve the standard of living in non-urban neighbourhoods, countryside and remote villages. New rurality acknowledges rural development principles as rural territory, with human beings as the heart of sustainability, equity as the basis for economic growth, democracy and citizen participation and equally important, social capital. (IICA, 2000, p. 20).

According to Hecht it can be argued that today there are four overarching types of tropical rural spaces in Latin America with various degrees of salience in the political arenas: the environmental, the "socio-environmental"[3], the agro industrial, and peasant landscapes (Hecht, 2010, p. 163). Consequently, rural development actions mostly aim to satisfy individual, social, economical and environmental needs of rural communities. Those requirements are not independent but interlinked, for example, the failure to satisfy economic needs, such as employment can derive in unplanned urban migration and detriment of environment (Janvry & Sadoulet, 2000). Table 2-1 lists some of the most urgent needs of rural areas.

Three needs on the list are highlighted due to their relevance to innovation namely, *access to innovations to increase the value of products, appropriate management of natural resources, and strengthening of social capital.* Innovation is considered as an important precursor in the fulfilment of economic needs, since innovation is likely to lead to more efficient economic activities and higher market-value. From the environmental perspective, the improvement in products and processes contributes to the preservation of natural resources, such as water and soil. Additionally the innovation process reinforces the networks of knowledge and social participation (World Bank, 2008).

[3] This comes from the Latin American term "socioambiental" which basically integrates the social with the environmental. Its emphasis is on the cultural unlike sociobiology, where the emphasis is on the biological. (Hecht, 2010)

Table 2-1. Mapping needs for rural communities in Latin America. (Self elaboration).

Individual Needs	**Social Needs**
- Health - Access to education - Access to basic sanitary services and appropriate housing	- Preservation of rural life and traditions - *Strengthening of social capital* - Inclusiveness in regional politics - Protection of cultural assets as indigenous knowledge - Protection against conflict and urban migration phenomena
Agro industrial	**Environmental**
- Access to markets in fair conditions with respect to big companies - Fair economic compensation for the products. - *Access to innovations to increase the value of products* - Protection against macroeconomic boosts - Employment	- *Appropriate management of natural resources* - Protection against climate change and natural disasters

A common misconception is that innovation is unimportant for less densely populated or peripheral regions. Notwithstanding the fact that urban cities and urban districts present more favourable conditions for innovation and technological change, peripheral and rural districts display high potential for incremental innovation and process innovation (Doloreux, 2007). Natural resource-based activities can be converted into knowledge-based industries by means of capital formation, innovation and technological advance (De Ferranti, Perry, Lederman, & Maloney, 2002).

Innovative agribusiness

Innovation in agriculture and food can be understood as new knowledge and technologies in agriculture and food production, processing, and marketing applied in economic and social processes. As a result of such innovations, farmers, processors, and traders become more competitive, producers sell better-quality products and generate greater profits. Innovation in agriculture relates to new and improved seed varieties, tissue vaccines, cropping and husbandry techniques. It also includes the application of quality protocols, organisational restructuring, improved management, and selling to new markets and buyers. Innovation can lead to improved management of natural resources and ultimately generate society wide benefits (Pomareda & Hartwich, 2006). The current research focuses on the co-generation process of innovation in a rural environment, for which users of traditional or new agribusiness are able to identify deficiencies in those products or processes, and consequently commit to alternatives for its improvement.

2.1.3. **Universities**

According to Lundvall's proposition, if learning is the most important process in a knowledge economy, universities are therefore called to become an important role for promoting innovation (Mowery & Sampat, 2005). The SIs approach focuses on three kinds of learning: *Competence Building* (e.g. training and education), *Research and*

Development, and *Innovation* (Edquist, 2005). While Latin American universities have been traditionally entitled to the roles of instruction and research, the role of entrepreneurs and contributors to social and economic advance is relatively new for them. (Thorn & Soo, 2006). Nonetheless, due to skill-based technology changes, universities are becoming increasingly important also for industries that typically are not considered research intensive (Tunzelman & Acha, 2005), such as innovative agribusiness.

Universities' challenges to display their full potential for rural engagement obey to a large range of circumstances, i.e. sparse demographic distribution, lack of infrastructure, strong migration patterns, few links with agriculture , and for some countries, adverse political situations (Velloso, 1991). The sum of these adverse conditions and low education provision enforces a poverty circle: low attention to rural areas leads to low concentration of human capital, which is reflected in lower rural life standards and poverty.

Traditional models of universities engaged in agricultural development through basic and applied research and technology transfer to local communities in commodity production. (Arocena & Sutz, 1999). However, despite the biotechnological advances (Lehrer, 2007), universities' potential for rural engagement has been underutilised due to the weak mandate for development-oriented research and poor university–farmers dialogue. Even when universities assume a holistic approach towards rural priorities, there is little agreement about the strategies to address rural development and rural innovation.

2.2 SIs elements, scope and functions

Having introduced the concepts of universities, innovation, and rural development in the Latin American context, it is possible to summarise that in the search for solutions to rural challenges, universities and communities are called upon to work together in the field of innovation for agribusiness. The remaining question is how these elements should be interlinked to enable effective innovation activity. Bbefore answering this question (Chapter 3), the framework of Systems of Innovation is presented with regard to its elements, scope and functions.

2.2.1. **SIs elements**

The SIs framework appears as a response to the traditional approach of applied research as main precursor to technology development and finally to economic production (Lundvall, Johnson, Andersen, & Dalum, 2002). The SIs framework involves organizations, institutions, policies and intangibles. The systematic facet of SIs refers to the comprehension of a group of actors, each with a particular role, with multiple links existing between them. With this view, innovation is seen as the result

of the coordination of the actors. The actors and their functions are likely to change with time according to the demands of innovation, so SIs cannot be fully prescribed and the relations among the actors should remain flexible.

Organisations are the formalised structures or bodies that operate the SIs. They are the players or actors with predetermined roles within the innovation process. These roles include basic and applied research; knowledge dissemination; invention; product and process research; design, experimentation and development; and new product commercialisation (Alcorta & Peres, 1998). According to Arnold and Bell (2001) the actors should be grouped into five domains, which are all highly interactive with each other: *demand, business system or enterprise, education and research system, intermediary organisations, and infrastructure*.

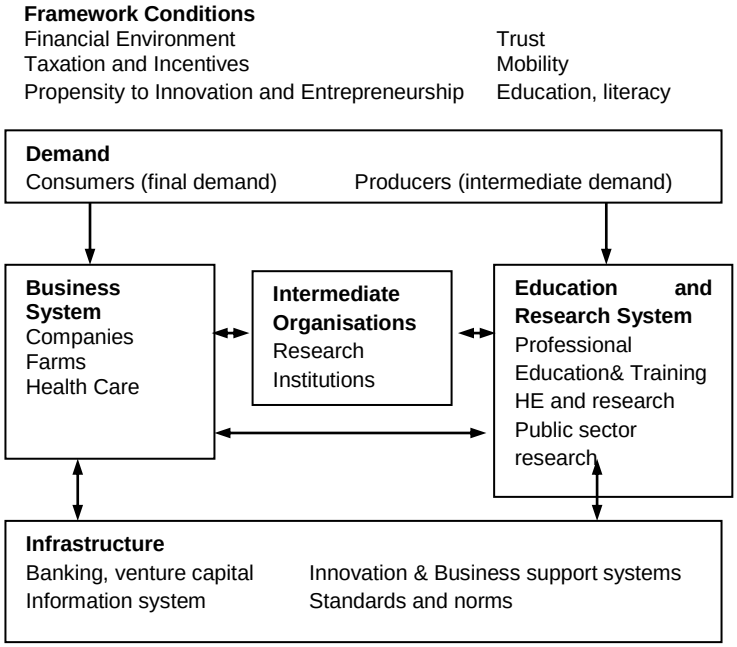


Figure 2-1. Diagram for National Systems of Innovation Source (Arnold & Bell, 2001)

Institutions are understood as the rules and laws that orient the SIs, or from a more informal perspective, as the established practices and common habits and routines that govern the behaviour of the organisations and individuals (Alcorta & Peres, 1998). Policies are another element of Systems of Innovation, which provide direction and coordination to the SIs. The government's role regarding policy is to make up for market deficiencies, i.e. guaranteeing resources when the market and firms are not interested in financing something themselves. The two main mechanisms for public policy are the funding of university or government research and programmes directly supporting different aspects of the innovation process. (Hall, Mytelka, & Oyeyinka, 2006).

According to the OECD, the key driver of SIs is the level and efficiency of the *intangible investments*, which are the outlays aimed at increasing the stock of knowledge other than through the purchase of physical assets. Those include: investment in technology, investment in education and training, in management techniques and support systems, and in the formation of technological and commercial links with other organisations. Examples of the construction of intangibles are provided by good practices of the Global Universities Network of Innovation (GUNI), which highlights practices and programmes of universities to promote topics such as: sustainable development; cooperation in community and local development; values, ethics and educating citizens, among others (GUNI, 2009).

2.2.2. **Systems of Innovation scope: National, Sectoral and Regional**

The first level of SIs was the National Systems of Innovation (NSI) which arose from discourses about competitiveness, technological and economic advances in a globalised scenario (Lundvall et al., 2002). Beyond the interdependent character of NSI economies to compete and interact, the academics acknowledge the need to develop innovation systems that retain strong "national" characteristics, reflecting the significant influence of historical evolution on contemporary structure and policy (Mowery & Sampat, 2005). However, NSI fails in examining the structure and dynamics within the subject countries. In response to this gap, two main streams have been developed for exploring innovation at the regional and sectoral level. Table 2-2 summarises the main highlights in the discussion about the regional and sectoral perspectives in relation to rural and agricultural innovation, which will be further developed in the remainder of this section.

The Regional Systems of Innovation (RSI) provides elements for understanding institutional and organisational dimensions at the subnational focus (Cooke, Gomez Uranga, & Etxebarria, 1997). By using RSI as a framework for analysis, the innovation activity can be understood from a geo-socioeconomic perspective, that includes elements of analysis such as, territorial networks and local economies (Cannarela & Piccioni, 2008). The case of semiconductor, IT and high tech innovation activity in Silicon Valley can be used to illustrate the use of RSI: "*As Castilla and colleagues showed successful interactions among industries were highly embedded, exclusive, localised and heavily reliant on network modulation in a milieu characterised by vibrant and active social capital (Castilla et al., 2000)*" (Cooke, Heidenreich, & Braczyk, 2004, p. 3)

Table 2-2. Regional versus Sectoral perspectives for Innovation Systems.

	Regional System of Innovation RSI	**Sectoral System of Innovation SSI**
Example	IT industry at the Silicon Valley (Castilla, Hwang, Granovetter, & Granovetter, 2000).	Livestock and agriculture, flowers, horticulture, agro-processing, biofuels, forest products (Hall, 2008)
Focus	Geo-socioeconomic perspective that includes elements such as territorial networks and local clusters (Cooke, Gomez Uranga, & Etxebarria, 1997). (Cannarela & Piccioni, 2008).	Agriculture as main economic activity. Other economic activities are considers as boundaries within the SSI. (Malerba, 2002) Rural development and environmental sustainability as outcomes. (World Bank, 2006).
University engagement	Complementary expertise of academia, industry and government *Triple Helix* model. (Etzkowitz, 2003) Generative and Developmental possibilities for universities' engagement. (Gunasekara, 2006).	Installed agriculture universities and R&D institutes for knowledge development in rural context. (Hall, Mytelka, & Oyeyinka, 2006). (Rajalahti, Janssen, & Pehu, 2008).
Soft components	Psychological Environment (Cannarela & Piccioni, 2008)	Socio-technical systems. (Geels, 2004)

On the other hand, the focus on industry-specifics leads to the framework of Sectoral Systems of Innovation (SSI), explicitly for the rural case, Agriculture Systems of Innovation (ASI). SSI shares the same principles of interactive learning and evolutionary character as SIs. However, it emphasises more on monitoring the laws of motion, dynamics, emergence and transformation within, and in our case the agricultural sector. Moreover SSI also stresses that the boundaries of the sector should include interdependencies and links among related industries and services, and that these boundaries change over time (Malerba, 2002). Therefore, it becomes clear that ASI focuses on agricultural development, while poverty alleviation and sustainable development are considered as outcomes (World Bank, 2006).

The problem of universities' engagement with regions is highly recognised by RSI academics and supranational institutions. In general there are two main trends to guide the role of universities. A generative stream focuses on supporting knowledge capitalisation role, while a developmental stream seeks for deeper involvement with regional, institutional and social capabilities (Gunasekara, 2006). The generative approach is based on the complementary expertise of academia, industry and government to facilitate new systems for innovation and novel collaborative processes

for creative development in a scheme known as *Triple Helix* (Etzkowitz, 2003; Nilsson, 2006).

A more developmental approach calls for considering universities as being more active actors, able to shape regional outcomes and network topologies rather than merely being pathways linking other actors and recipients of systems determined within national level/sectoral governance networks (OECD, 2007). Universities are seen as coordinators and disseminators of tacit knowledge rooted on the clusters, and codified knowledge introduced by external sources (investors, R&D, universities themselves, etc). Such knowledge interaction is called to be more effective than the merely dissemination of knowledge through local production networks (Bathelt, Malmberg, & Maskell, 2004).

From the sectoral approach the evolution of universities' engagement with strengthening agriculture capacity has gone through several models, from *technology generation and transfer* to *knowledge and technology dissemination* (Rajalahti, Janssen, & Pehu, 2008). Despite the outcomes of these approaches throughout the second half of the twenty century, there is much evidence to suggest their failure to bring about economic and social transformations (Hall et al., 2006). The ASI rises as a new framework to for agriculture development by relying more on social capital while taking advantage to the already existing R&D institutions in the rural context. Universities and research centres are encouraged to facilitate the development of a stronger global community of practice in the field of agricultural innovation to further develop and test the innovation systems perspective (World Bank, 2008). However there is not so much academic activity on the field of universities' role for agricultural innovation.

Another point of consideration is the *soft* components of the environment where innovation takes place. Regional perspective considers inherent to the system of innovation, the territorial networks that host the SIs. Consequently, the accessibility and nature of the networks delimit the scope of the innovation system (Doloreux, 2007). Sociologists of innovation emphasise the presence of a *psychological* environment that, along with the socio-economic environment, shapes innovation diffusion and local networks development (Cannarela & Piccioni, 2008).

From the sectoral perspective, experts also suggest widening the innovation system to socio-technical systems that focus not just on innovations, but also on the fulfilment of societal functions (Geels, 2004). For the case of AIS, Hall (2008) highlights that even strong incentives are not sufficient to create new networks for learning. Also that habits and practices are the main bottle necks to new arrangements emerging and to innovation.

2.2.3. **Functions of Systems of Innovation**

The evolutionary character of the Innovation System emphasises that despite the flexible character of the system a constant goal of development of innovation capacity should always be pursued, leading to actors developing the capacity to respond to innovation challenges despite constantly changing conditions (Rajalahti et al., 2008). Besides this "overall function", Edquist claims the need to define activities in SIs as the factors that influence the development, diffusion, and use of innovation. However, Edquist himself finds a paradox between the evolving character of the SIs and the attempt to prescribe its activities. He argues that "*SIs evolve over time in a largely unplanned manner, and even if we knew all the determinants of innovation processes in detail, we would not be able to control them and design or "build" SIs on the basis of this knowledge*". Therefore, innovation policy can only influence the spontaneous development of SIs to a limited extent. (Edquist, 2005).

Still, the proposition of a functional analysis for SIs (Hekkert, Suurs, Negro, Kuhlmann, & Smits, 2007) would constitute a method for systematically mapping those processes taking place in innovation systems and resulting in technological change. Textbox 2-2 provides an overview to the functional analysis over a National System of Innovation .

Beyond the traditional concerns related to the process of innovation, RSI approach suggest to consider building innovation capacity in the regional context by means of the scenario of learning regions (Morgan, 1995). The concept of a *learning region* has become a keystone of regional development, initially developed at the European Union context with a fast acceptance by governments worldwide. The idea of choosing regions as units of analysis for the innovation activities is based upon the network paradigms of interactive innovation and social capital. Moreover, Cooke et al., (1997) claim that in order to stimulate systemic innovation at regional level, the financial, learning and productive 'cultures' among the SIs actors that may coexist.

Function 1: Entrepreneurial activities. The role of the entrepreneur is to turn the potential of new knowledge, networks, and markets into concrete actions to generate,and take advantage of,new business opportunities.

Function 2: Knowledge development. According to Lundvall the most fundamental resource in the modern economy is knowledge, and accordingly the most important process is learning. Therefore, R&D and knowledge development are prerequisites within the innovation system. This function encompasses "learning by searching" and "learning by doing".

Function 3: Knowledge diffusion through networks. This way, network activity can be regarded as a precondition to "learn by interacting". According to Hall et al., (2006) while all forms of learning are important, successful Systems of Innovation are characterized by a high degree of interactive learning.

Function 4: Guidance of the search. Universities can contribute to this function by analysing and assisting in the evaluation of technologies, processes and policies.

Function 6: Resource mobilisation. Resources, both financial and human capital, are necessary as a basic input to all activities within the innovation system.

Function 7: Creation of legitimacy/counteract resistance to change. This function can be analysed by mapping the rise and growth of interest groups and their lobby actions. Along the efforts for innovation, it is normal to find comparable resistance to change. In that case, the actors must find a way to form coalitions which can function as a catalyst.

Note: Function 5 has not been mentioned since it is not relevant for university engagement at this stage.

Textbox 2-2 Functional Analysis Systems of Innovation (Hekkert et al., 2007)

This scenario enforces universities to develop collaborating strategies with government and firms. From the interaction with communities, universities can take a lead role for building institutional capacity with emphasis in creating associative approaches. And in cooperation with local governments, universities can undertake an advisory role as knowledge providers for the structuring of regional policies. (Gunasekara, 2006)

2.3 Conclusion

The first part of the chapter reflects upon the secondary research question Q_1 (*How does the concepts of innovation, rural development, universities' engagement* relate to each other in the context of Latin America?)

With globalisation, the dominance of production strategies such as mass production, quality and specialisation is on decline. And not only do firms strive to compete in a global scenario but also amidst acute resource restrictions. To succeed in such a challenging environment, nations have opted to build an economic model based on

knowledge, and "human capital" as a main and inextinguishable resource. Latin America's reliance on natural resources represents a challenging, but not impossible scenario for enforcing a *knowledge-based economy*[4]. Universities, as the main actors in innovation, face substantial difficulties to devote attention to rural areas due to the relatively low human development and human capital in those areas. Another undeniable factor is the large centralisation of higher education activity in Latin American cities.

Rural development has undergone significant changes due to liberalism and through the detriment of natural resources. Rural Latin America faces the challenge of maintaining its position as a food supplying region amidst strong economic and environmental pressures. Perhaps more importantly, is to solve the acute social problems related to rural underdevelopment. When used responsively, innovation appears to be a promising strategy to address the rural priorities due to its holistic character and emphasis on social capital.

The chapter finishes with an introduction to the Systems of Innovation framework in relationship with its elements, scope and functions. This provides the basis for developing the secondary research questions Q_2 and Q_4 in the following chapter.

[4] The term Knowledge Economy has been used to as initially proposed by Druker, and later by the parents of System of Innovation (Lundvall, Edquist, among others). However from this point the term Knowledge-based Economy will be used. This distinction emphasizes knowledge as tool for economic activities, while the first focus on knowledge as a product.

Chapter 3 Research Framework: Role of Universities within Rural-SI

The previous chapter discussed how the keywords *rural development* and *universities* converge to *innovation* (Figure 3-1). In short, rural development could be achieved by means of innovation, and at the same time universities aim to develop its innovation capacity. Chapter 2 also presented the framework of Systems of Innovation given its importance on knowledge creation and dissemination with basis on social capital.

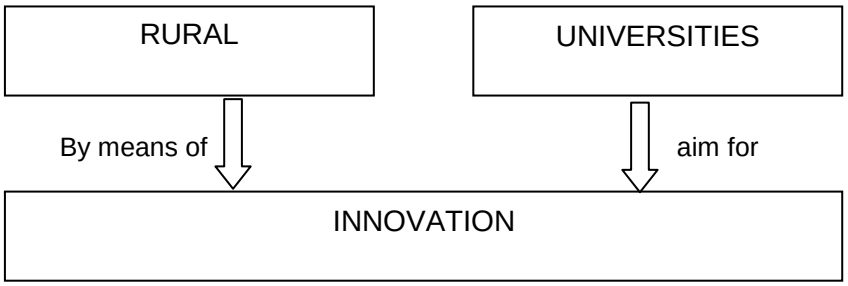


Figure 3-1 Convergence rural development and universities interest for innovation

The present chapter aims to develop a theory for university engagement with rural innovation. This theory is built upon two main arguments. Firstly, that a tailor-made System of Innovation for rural innovation that fits the characteristics and requirements of rural communities is necessary. This in terms of this research is translated into the answering of the secondary research question Q_2 (*What are the characteristics and requirements of rural innovation in Latin America?*).

Secondly, traditional Latin American universities aiming to engage in innovation could make use of the institution capacities in training and research as springboards for the construction of their innovation strategy. This explicitly refers to the research question Q_5 (*What is the influence of universities' education and research capabilities for rural innovation engagement?*).

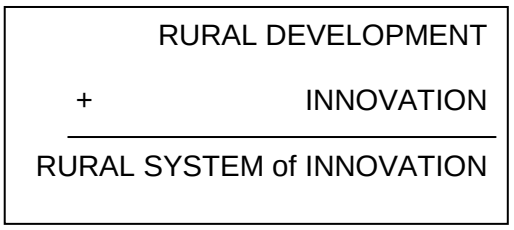
These two claims come together in the proposition of a theoretical model based on demand and supply schemes. The demand corresponds to the rural innovation functions (Q_4: *What functions are universities able to develop for enhancing rural innovation?),* and the supply to the university's capabilities.

3.1 Rural Systems of Innovation (Rural-SI)

The SIs approach provides relevant elements to approach the problem of enhancing innovation in rural areas. Consequently, a Rural System of Innovation framework, namely Rural-SI, is used.

"Rural Systems of Innovation" is a new, broad approach aimed at the systemic understanding and facilitation of the interaction among all factors and actors for generating, diffusing, and utilizing new knowledge for rural development (KIT, 2009).

Figure 3-2 shows schematically KIT's proposition for a Rural System of Innovation. Although the Rural-SI approach has been used by specialised agricultural universities and institutions (i.e. KIT, ARD-World Bank), this concept has not being well accepted among academics of innovation.



Fiaure 3-2 Rural Svstem of Innovation

The adoption of Rural Systems of Innovation acknowledges the use of innovation as a mechanism for knowledge creation and diffusion through the interaction of actors, institutions, policies and intangibles as described in section 2.2.1. However, the rural context imposes a dilemma for the definition of the SIs scope: whether the Rural-SI corresponds to a regional or sectoral approach. According to the discussion in section 2.2.2, the territorial focus of the regional scope provides valuable elements to the conceptualisation and analysis of Rural-SI. However, the strong influence of agriculture main economic activity in the rural context cannot be ignored. Accordingly, the development of Rural-SI is strongly linked to the development of AIS, and vice versa.

Based on the statements of specialised institutions (IICA, 2000; Hall el al., 2006; Francis, 2005; ECLAC, 2009) it is possible to map the main characteristics of a Rural-SI as follows:

GOALS: Human development, poverty alleviation and agricultural development.
METHODS: Need for a holistic view of the social, economic and cultural characteristics of rural communities.
CRITERIA: New Rurality and sustainability as supportive criteria for the execution of practices and development of policies.
ECONOMIC DIMENSION: Agriculture persists as the main economic activity; however other non-agricultural activities are becoming economically important.
GLOBAL IMPACT: Environment conservation and food security concerns have risen in recent years.

3.2 Universities' engagement for Innovation

Parallel to the acceptance of innovation as a tool for rural development, universities also acknowledge innovation as an alternative for social and economic engagement. However, becoming innovative is neither an easy nor a simple process. Thorn & Soo describe the possibilities for innovative universities within natural resources-based economies as follows:

> *Even if economies see their challenge not in creating new technology, but transferring and adopting existing technologies, they cannot afford not to develop a domestic R&D capacity… As suppliers of advanced education and dominant players in research, universities in Latin America play a central role in developing such a capacity.* (Thorn & Soo, 2006, p. 5)

The challenge to fulfil innovation as a third mission might simply appear overwhelming to the Latin American universities when they are already striving with their traditional roles. Most of the Latin American universities are focused on providing education, while research is left for the largest or specialised ones. The concept of university as a driver of innovators is incipient, although some successful cases appear in the region (InfoDev, 2010). Therefore, Latin America is encouraged to develop endogenous strategies that stimulate entrepreneurship while recognizing the distinct but complementary roles of universities and industry. (Thorn & Soo, 2006)

However, there are some threats in the promotion of innovation. The first one corresponds to the idea that universities focus their efforts for innovation independently of the training and research capabilities. The institutional capacities and institutional character developed under the education and research missions should not be ignored when planning innovation initiatives. Instead, those constitute a valuable basis for building up innovative capacity within a university (Figure 3-3).

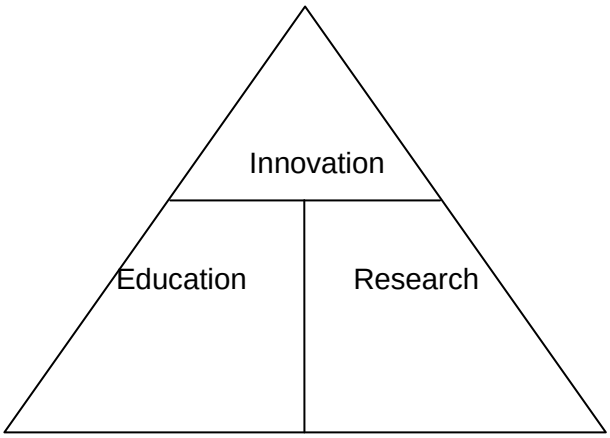


Figure 3-3 Building up innovation capacity at universities

The second risk refers to the mechanisms for innovation capacity building. The RSIs literature points out two streams for university-engagement, a generative for knowledge capitalisation, and a developmental for shaping regional institutions and enhancement of social capabilities (Gunasekara, 2006). In general generative actions attract more attention than the developmental ones. This might be caused by a shorter distance between innovation activity and economic capitalisation, and a more straightforward template for the planning and accountability on those actions (COLCIENCIAS/OCYT, 2001). Another reason is that *triple helix* literature has been developed under the assumptions of symmetrical power relations between universities, governments and firms (Gunasekara, 2006). However, this is not always found in Latin American scenarios. On the other hand developmental actions are far more complex to coordinate and execute, since those include deeper changes on broader fields of action. In conclusion, there is a strong trend that universities focus their innovative role towards generative actions for direct economic impact - research clusters, entrepreneur programmes, business parks - while developmental actions with social focus remain separate from the innovation agenda.

3.3 Universities' engagement with Rural-SI

Once the elements and characteristics of Rural-SI are defined, the discussion now focuses on the motives for those elements to interact. While it is obvious that the main function of the Rural-SI is to bring about innovation in the rural context, universities as actors of the SIs should be given a more elaborated description of subfunctions to pursue. In other words, rural innovation demands require a set of generative and developmental activities. To satisfy these demands universities exhibit their institutional features and capabilities embodied in their roles of teaching, research and innovation. Figure 3-4 presents a schematic representation of this.

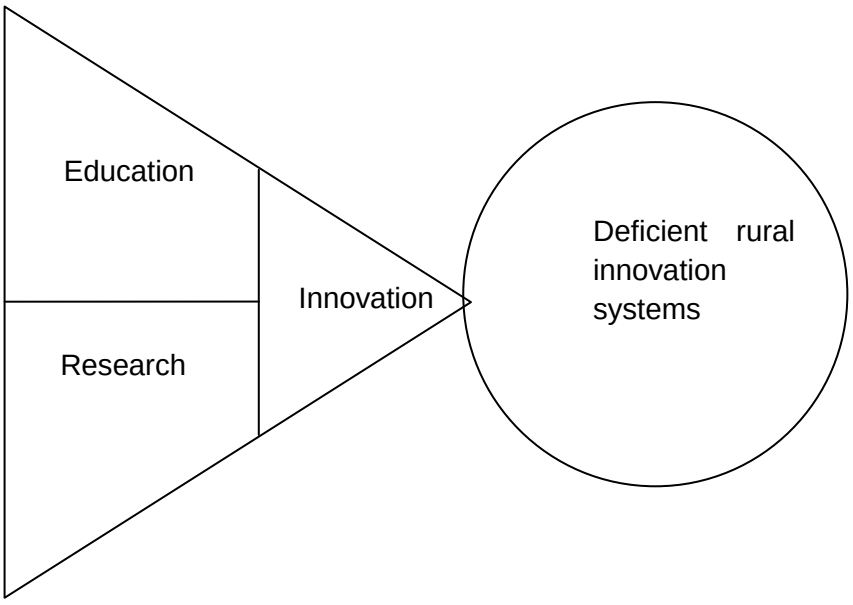


Figure 3-4 Rural-SI vs University

The relationship between Rural-SI and University can be treated under a demand and supply perspective. The demand side involves the functions necessary for the generation and development of the innovation network. The specification of the requirements of the Rural-SI is based on the functional analysis and the associative regional scheme described in Section 2.2.3. The universities are requested to fulfil the training and research roles (Figure 2-1), and to develop additional activities that contribute to innovation promotion. Figure 3-5 presents the model for mapping the functions of universities for Rural-SI engagement.

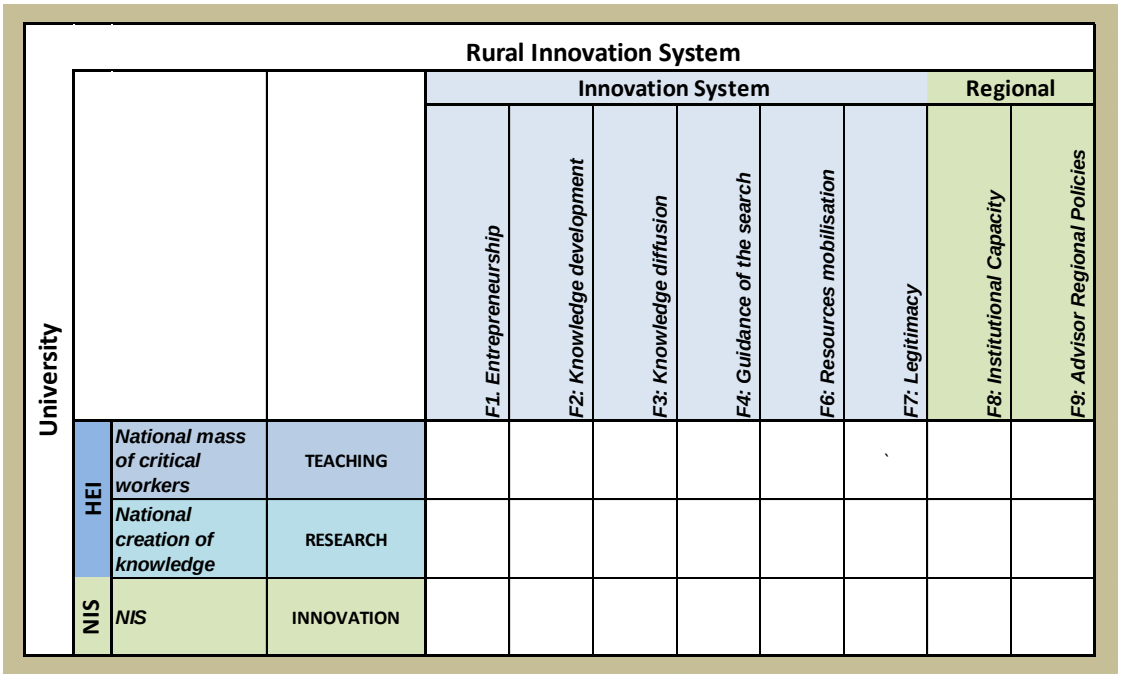


Figure 3-5 Mapping University functions within a Rural Innovation System

From the above portrayed model arise a number of questions. Are the Rural-SI functions entirely fulfilled within a specific university function? Could the execution of an innovation activity fulfil more than one function simultaneously? What external factors support or restrict the fulfilment of those functions? What are the university outcomes for HEI and NSI? These questions will be explored through the case study of the Interdisciplinary Research Programme for Human Development PIIDHC developed by the Autonomous Metropolitan University in Mexico.

3.4 Conclusions

In summary, this chapter presented a theoretical construction for universities' engagement with rural innovation. As mentioned in the conclusion of chapter 2, the framework of System of Innovation was used to further develop the secondary research questions Q_2 and Q_4 (*What are the characteristics and requirements of rural*

innovation in Latin America?; *What functions are universities able to develop for enhancing rural innovation?).*

The characteristics and requirements of rural innovation were condensed for the proposition of a Rural System of Innovation framework, namely Rural-SI. The Rural-SI exhibits a hybrid nature between regional and sectoral (agriculture) perspectives. Its characteristics depend on current approaches on sustainability and new rurality. Furthermore, the goals and methods should include a close connection between social, individual, economic and environmental factors.

The functions of universities within the Rural-SI are proposed on the basis of innovation activity requirements, but also communities' capacity building and regional government support. Although literature warns about the difficulties of defining SIs functions due to its constant evolving character, these are propositions to guide universities as organisations within Rural-SI.

The secondary research question Q_5 (*What is the influence of universities' education and research capabilities for rural innovation engagement?*) was also addressed. University's challenges on support innovation are based on literature from Regional Systems of Innovation. Two main guidelines are considered to build up innovation capacity. Firstly, universities could use the already developed capabilities of training and research to support its innovation mission. And secondly, those innovation activities should balance generative and developmental components. The chapter finalises with the proposition of a theoretical model that aims to map the functions of universities within Rural-IS, categorised in three components, namely education, research and innovation. The empirical validation of these hypotheses is developed throughout the following three chapters.

Chapter 4 Methodology

Throughout the first section of this report, the theoretical components of the problem of university engagement with rural innovation in Latin America were addressed. Chapters 4, 5 and 6 dealt with the empirical validation of the propositions in the first part.

The nature of this research is basic research (Babbie, 2007), applied to the topic of universities' engagement with rural innovation in Latin America. Characteristics of basic research are expanding knowledge of processes of business and management, resulting in universal principles relating to the process and its relationship to outcomes and finding significance and value for the society. In order to gain significant understanding of the topic, a qualitative method is chosen. In this chapter, the methods of data collection are presented. The different methodological aspects about the research strategy choice are introduced in the upcoming section. Section 4.2 deals with the structure of the empirical part of the report. Section 4.3 discusses the sources used in the research. The chapter finalises with a disclosure of the main limitations during the data collection.

4.1 Case study choice

The main research question (Q_0: *Why and how can universities guide the rural innovation processes and outcomes in the context of Latin America?*), by the explicit statement of the question words *why* and *how* suggest the need for an exploratory case study to test the theoretical constructions discussed in the first part (Babbie, 2007). The choice of case study follows three main criteria (Yin, 1993): firstly the topic of universities' engagement for rural innovation was defined in a broad sense; secondly, the relevance of the contextual conditions, namely rural and university institutions in Latin America; and thirdly the requirement for multiple sources of evidence to answers the different secondary research questions.

The case used for exploring the problem of university strategies for rural innovation is the Programme of Interdisciplinary Research for Human Development in Chiapas (PIIDHC), carried out by the Autonomous Metropolitan University (UAM)[5] in Mexico City. The case study was selected from a list of good practices of Higher Education and Society commitment developed by the Universities and Social Commitment Observatory at the Global University Network for Innovation (GUNI). The observatory promotes innovation and knowledge exchange in society and higher education institutions by identifying and disseminating global, regional and local

[5] Universidad Autónoma Metropolitana (UAM) www.uam.mx

higher education good practices (GUNI, 2009). PIIDHC was recognised under the category of cooperation in community and local development in 2005.

The choice of this case is based on the fact that PIIDHC represents a critical case for testing the model of university functions within a Rural–IS. There are three main arguments in considering this as an exceptional case (Yin, 1994, p. 39). The first reason is the spontaneous character of the program, which developed out of the initiative of a group of professors with little guidance from the university directives and almost no support from governmental institutions. The second is the simultaneous urgency and the complexity of the situation in Chiapas, which includes environmental, health, human rights and productive factors. And finally, the indigenous character of the rural population which poses interesting challenges to the traditional western institutions. All these factors make the PIIDHC case an interesting scenario to confirm, challenge or even extend the model of university engagement with Rural-IS.

4.2 Structure

By means of the case study, the research aims at deepening understanding on why and how the programme developed. Chapter 5 aims at answering the question *why the programme developed*, by referring to the historic and attitudinal issues that shaped the programme according to the national, regional and institutional environment. This explicitly refers to the research question Q_3 (*How university engagement with rural innovation is influenced by national, regional and institutional factors?*). The context complexity leads to an embedded strategy to conduct the case study. Three units of analysis are defined, corresponding to the Mexican higher education system; Chiapas as a direct region of program's influence; and the UAM as the hosting institution. Besides the third research questions, the chapter provides relevant information to complement the first, second and fifth research questions.

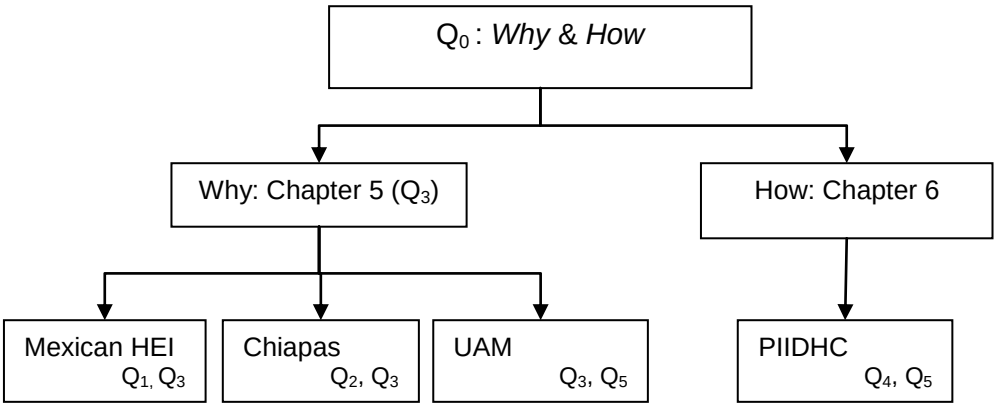


Figure 4-1 Structure of Empirical Validation

The second goal of the case study, to describe how the problem developed is outlined in Chapter 6. To do so, the research defines PIIDHC as the fourth element of analysis, and a holistic perspective for exploring the global nature of the program. The main purpose is to present the elements and structure of PIIDHC, showing how those relate to the external environment and the mission of the programme itself. This refer to the fourth (Q_4: *What functions are universities able to develop for enhancing rural innovation?*) and fifth (Q_5: *What is the influence of universities' education and research capabilities for rural innovation engagement?*) research questions. Figure 4-1 presents a guideline to relate the units of analysis and research questions.

4.3 Sources

The empirical validation relies mainly in secondary data. However, the utilisation of it depends on the chapter. The secondary data used for national, regional and institutional analysis in Chapter 5 includes academic reports, books, official reports, and specialised reports from specialised research groups. The access to a broad coverage of topics constitutes the main advantage of the desk-based review strategy. However, its main disadvantage is the reporting bias of some of the sources especially when referring to sensitive issues (section 5.1.2 and 5.2.1). To minimise this problem and therefore ensure research validity, data triangulation strategy was used to verify major arguments, this by looking at different stakeholders' perspectives. In addition, the research also uses theory triangulation for analyzing the problems under different academic fields, namely economics and sociology (Patton, 1987, p. 60).

For analysing the programme PIIDHC, a desk research is again used. The documentation was reviewed in a hierarchic manner. The main source of evaluation was the self evaluation reports and official documents of the program; in addition discussions with the programme leader were necessary to establish a cohesive structure out of the documents and increase the construct validity (Shadish, Cook, & Campbell, 2007, p. 72). Although the official documents provide the largest narrative about the program, they suppose a potential bias due to over-positivity. Therefore a second set of documentation for the desk research was used, as a mean of validation strategy of the official perspective. These include the reports elaborated by participating students, websites from the participating organisations and reports from tertiary parts. Despite the fact, most of these secondary data were suggested by the programme leader; still those constitute the best strategy to ensure the internal validity of this research (Shadish, Cook, & Campbell, 2007, p. 53)

Despite the large reliance on secondary data, there were some few occasions to discuss with the programme leader and one author of the supporting documents. The discussions were carried out via Skype in June 2010. The initial goal was to clarify the self evaluation report (Cortez, 2010) and master thesis document (Gonzales, 2010). These discussions also contributed to capture attitudes and behaviours not included in the documentation (Section 6.5.4).

4.4 Limitations

Despite the efforts to ensure internal and construct validity by means of a desk research, the restrictions regarding access to information and to the programme participants imposes important limitations to the execution of this research. Therefore it became difficult to confront the official perspective, and to estimate the influence of the programme in the region. Logistics issues also restricted the availability of the reports from PIIDHC, and consequently it was complex to establish a concise timeline of events.

Communication with the responsible personnel of the programme was difficult, either by phone or mail. With the exception of a few Skype conferences, there were insufficient opportunities to develop detailed interviews or discussions. Also it became difficult to access the partner institutions, as contact data was not provided by the PIIDHC responsible. Therefore it was only possible to check their websites, which were either out of date, as in the case of the PIIDHC itself, or did not make specific mentioning of the PIIDHC as supporting partner

As said before, the goal of the case study was to explore the problems of university engagement with rural innovation, and to extract evidence to prove or deny the theoretical propositions presented in the previous chapters. Given the necessary explanations on the methods and restrictions on the empirical method, the next section will be about the case study itself.

Chapter 5 National, Regional and Institutional Context: National HEI, Chiapas and UAM

Chapter 5 constitutes the second chapter of the empirical part of the report. Once covered the theoretical construction and the methodological design, the current chapter develops the question why of university commitment for rural innovation. The selected case corresponds to the Interdisciplinary Research Programme for Human Development, developed by the Autonomous Metropolitan University UAM, with focus of action in the region of Chiapas, while the university itself is located in Mexico City. The present chapter focuses on the context of the programme by exploring the national, regional and institutional perspectives. Chapter 5 is structured in three sections: the first corresponds to an overview of the Mexican higher education system. The second presents the region main features and priorities of Chiapas. And finally, the antecedents and institutional character of UAM as hosting institution are presented.

5.1 The Mexican Higher Education System

Mexico is the most southern country of North America and the largest Spanish speaking nation. But perhaps Mexico more recognised characteristics are its splendid cultural legacy and biodiversity. In economic terms, the availability of natural resources and a large labour force makes Mexico the 12th largest economy in the world; however other measures such as GDP per capita, Human Development Index (HDI) and Knowledge Economy Index (KEI), offer a glimpse of the country's major challenges.

Figure 5-1. Mexico Map. http://www.lib.utexas.edu/maps/cia10/mexico_sm_2010.gif

Government, industry and society agree that Higher Education constitutes an important tool for the economic[6] and social advance of the country. However the political and socio-economic conditions and the push between society and industry demands, pose several challenges in the coordination of the policies to support the higher education system. The following sections present an overview of the HE system and its role in the fulfilment of Mexico's social and economic gaps.

Feature	Absolute Value	World Ranking
Area	1,972,550 km^2	15^{th}
Population	112,468,855 (2010 est.)	11^{th}
Median Age	26.7 years	
GDP ppp.	$1.482 trillion (2009 est.)	12^{th}
GDP per capita	$13,500 (2009 est.)	83^{rd}
HDI	0.854	53^{rd}
KEI	5.33	67^{th}
Education Investment.	5.5% GDP	50^{th}

Table 5-1. Mexico statistics. Sources (Wold Bank, 2009) (UNDP, 2010) (Kuznetsov & Dahlman, 2008) (OEI, 2010)

5.1.1. **Overview of the Mexican Higher Education System**

Mexico's constitution recognises the access to education as a main fundament of democracy, and highlights the roles of public HEIs for providing advanced human capital, undertaking basic and applied research, and promoting cultural outreach under the concept of *Mexicanidad.* (Senado de la Republica. Mexico, 2004**).** The Mexican higher education system covers around four million students with more than 5000 institutions, divided in public and private institutions (Table 5-2). Public universities account for almost two thirds of the total HEI and can be federal or state-based according to the geographical scope.

The higher education system has experienced an impressive growth in the last decades. According to the National Association of Universities and High Education Institutions ANUIES[7] *"this relates to a public conscience about the need for more education, according to the new characteristics of the labor market that demand more years of*

[6] According to Reich, an economic region's success is directly related to the skill and knowledge that its workers are able to contribute to the global economy. Thus workers are becoming the most vital intangible resource for competitive enterprise webs (Reich, 1992).

[7] Asociacion Nacional de Universidades and Instituciones de Educacion Superior (ANUIES)

study for jobs that previously required a lower knowledge" (From Varela, 2006, p 53). But in the world context, Mexico -as many other Latin American countries- still displays relatively low enrolment and graduation ratios for higher education (UNESCO-UIS, 2009). In conclusion, there are a lot of unfulfilled expectations about the contribution of HEI to the social and economic advance of the country.

Total HEI	**Undergraduate**	**Normal schools**
Students 2 446 8000 Teachers 259 884 Institutions 5 116	Students 2 292 9000 Teachers 226 702 Institutions 3 667	Students 142 300 Teachers 13 361 Institutions 472
		University and technological Students 2 150 000 Teachers 213 341 Institutions 3 195
	Postgraduate Students 153 900 Teachers 33 182 Institutions 1 449	**Specialization** Students 31 700
		Master Students 108 700
		PhD Students 13 500

Table 5-2. Scheme of Higher Education System in Mexico. Source (INEE, 2010)

Lack of government funding cannot be pointed out as the main reason for the unrealised potential of the Mexican higher education expansion since levels of public spending are comparable with those in the United Kingdom, and even far superior to the United States (Kärkkäinen, 2006) . Instead, one of the main flaws identified in the growth has been the lack of equity to all social groups (Varela, 2006), which is a general characteristic of Latin American countries (Murakami & Blom, 2008). One of the main restrictions to bring tertiary options to all regardless of socio-economic status is the existence of large illiteracy levels among adults -known as *rezago educativo*[8]. The basic education lacks limit the construction of lifelong learning skills, and therefore communities' absorptive capacity. These situations imply a serious threat for the communities to participate in productive processes in a knowledge-based

[8] The term rezago educativo is very sensitive for the Mexican context. It refers to the lag (rezago is Spanish word for lag) in primary and secondary education (Suarez, 2004). According to the World Bank more than 36 million Mexicans over the age of 15 are illiterate, have dropped out of primary school, or have not completed their secondary education (Kuznetsov & Dahlman, 2008). This has deep consequences on the efficiency of each individual and collective workforce. This not only imposes restriction for factor driven economies, but also additional restrictions for efficiency driven and innovation driven economies. (Porter & Schab, 2009) In addition, it imposes restrictions for higher education inputs.

economy. The social implications of basic education lags are also very difficult, especially when this happens for the lowest income quintiles and most marginalised segments of the population, therefore it is likely the overlapping of illiteracy with other social problems such as gender, sanitary or ethnicity, leading to complex problems (Kuznetsov & Dahlman, 2008), as the case of Chiapas (Section 5.2).

Geographically, higher education activity concentrates in the main cities, which is a consequence of the little involvement of states in policies and funding of tertiary education. Furthermore, as a consequence of the political polarisation around the Zapatista movement in Chiapas, the communities in opposition of the government are excluded from educational benefits (Section 5.2). Another restricting factor for higher education has to do with education strategy based on fact-learning methodologies rather than lifelong-learning methodologies. That means that students are more challenged to learn by memory rather than analyzing and conceptualizing[9]. The accumulation of academic deficits, coming from lags in the primary and secondary levels, restricts the creation of a mass of "knowledgeable workers" at the tertiary level. In addition, companies make little use of the acquired knowledge taught at the universities, bringing low levels of competitiveness to industries and large unemployment rates for higher educated people (Figure 5-2).

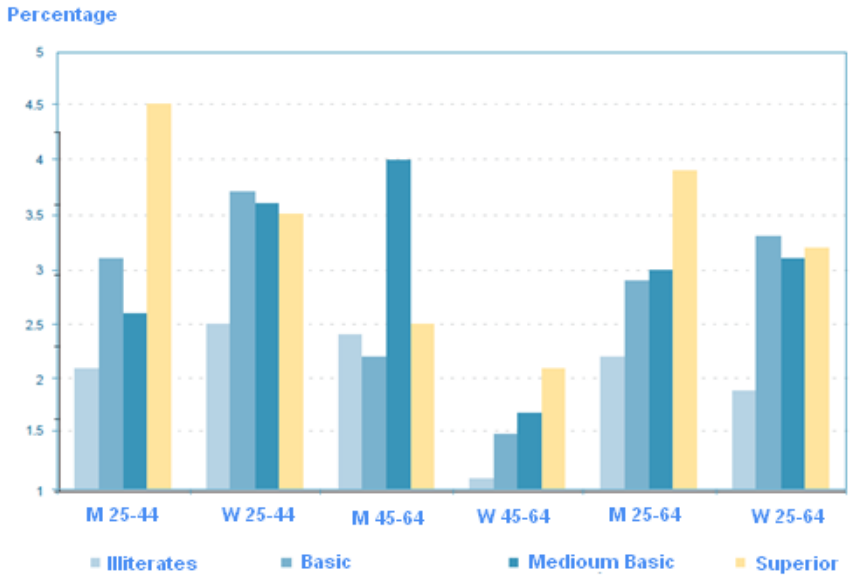


Figure 5-2. Unemployment rate per education level, gender and age group. Modified from INEE (2010)

[9] According to Reich, an economic region's success is directly related to the skill and knowledge that its workers are able to contribute to the global economy. Thus workers are becoming the most vital intangible resource for competitive enterprise webs (Reich, 1992).

5.1.2. **NATFA and the knowledge-based economy**

The Mexican economy experienced a process of liberalisation in the 1990's, following the sign of the North American Trade Free Agreement between Canada, Mexico and United States, which had tough implications beyond commercial aspects. Regarding HEI, NAFTA has proposed a new role for universities as an economic resource: a new role as entrepreneurs and contributors of social and economic development (Thorn & Soo, 2006). Beyond the people directly attending their campuses, universities are asked to become a supportive element of firms in the process of "learn to learn" and in the long term to contribute to national capabilities to generate knowledge and transform it into wealth. (Kuznetsov & Dahlman, 2008).

The Mexican higher education system has already been successful in the support of many pockets of excellence and high productivity associated with multinationals operating in high-tech and with national conglomerates operating in mature industries. In addition, several universities have taken further actions towards stimulation of science parks, promotion of entrepreneurship and special programmes of applied research in cooperation with industry such as the INVITE programme in the northern states of Mexico. (OECD-IMHE, 2010). However, the attention for small firms is still a relevant issue in the Mexican industry, where 98.3 percent of firms are SME's focused in low-intensive knowledge activities and with low levels of competitiveness. (Kuznetsov & Dahlman, 2008)

NAFTA regulations impose that Mexican universities must compete with American and Canadian universities, which are equipped with larger infrastructure and teaching/research capabilities. What at first glance might seem as a major problem for Mexican HEI, can be seen also as a push for Mexican universities to find their own specialties where they can compete and cooperate –and benefit from the FDI- (De los Reyes, 1997). Despite these possibilities, NAFTA also involves some threats for the autonomy of the Mexican higher education system, such as the standardisation of graduates' profile - leading to homogenisation of the professional market- according to tri-national market needs, and the standardisation of research priorities. By ignoring the specific historical path and socio-economic needs of the country, there is a large risk of failure in the connection between the reconfiguration of Mexican universities and their ability to provide employment and social improvement (Leahy, 2007).

5.1.3. **Society engagement**

The concern of linking HEI with the national and regional realities started along with the founding of the first universities during colonial times. In 1954 the government implemented a compulsory social service for all undergraduate students. A related event has been that, in an attempt to diminish the geographical concentration of HE activity in urban areas, several universities have targeted knowledge transference to rural areas. The coincidence of these events position the social service as a valuable tool in the expansion of universities' outputs - highly trained professionals, applied

research and entrepreneurship enhancement- to rural regions. This is achieved with the convenience of very low costs to both communities and government. In reality, the practice of social service has not lived up to these expectations due to simultaneous flaws of government, universities and communities. (Gamboa & Gonzalez, 2010)

In spite of the establishment of a legal framework for the social service, and the creation of some funding programmes and coordination institutions, the government intervention has been criticised for exposing the social service to bureaucratisation and political manipulation. Meanwhile, universities are also blamed for their restricted skills to interact with firms and society, and for not fostering a sensible and proactive character towards national problems among students. In addition, communities' low levels of human capital and social capital restrict the formation of absorptive capacity, necessary for them to take advantage of social service potential (Mungaray, Ocegueda, & Sanchez, 2002).

Basic education lags and low human development can be seen as restrictive factors in the establishment of relationships between university and rural communities due to the communities' lack of absorption capacity to benefit from social service and higher education activity in general. But at the same time, education and human development also can be seen – and certainly communities see it - as the most relevant aspect for universities' assistance.

5.2 Chiapas

Chiapas is perhaps the most challenging Mexican state regarding higher education and innovation, and not even mentioning human development and basic education lags and low human development. The territory of Chiapas is home to indigenous cultures (Schmal, 2004) ranging from groups with solid ethnic identities and large numbers of population to small groups surviving at precarious conditions. The mega diversity of the state in terms of natural resources, landscapes and cultural heritage contrasts with the low human development levels of its inhabitants, stumpy competitiveness of the majority of the economic activities developed there, the continuous degradation of its exuberant but fragile ecosystems, and finally, the complex social and political conflicts that captured the world's attention in 1994 because of the Zapatista upraise. By understanding Chiapas characteristics, universities have better chances to develop programmes for rural engagement and innovation. This will be further discussed in Chapter 8. The following section aims to present Chiapas with its most relevant geographic, demographic and economy characteristics, and the particularities of the indigenous communities.

5.2.1. **Human Development**

Chiapas is the southern state of Mexico at approximately 10.000 kilometres from Mexico City, and represents almost the 4.2% of the population, and 3.7% of the total territory. Despite being surrounded by immense natural wealth, the people of Chiapas are some of the poorest in Latin America. The following table presents a summary of relevant factors in comparing human development in Chiapas to the whole country.

Human Development Indicators for Chiapas and Mexico		
Indicator	Chiapas	Mexico
Population	4 507 177	107 550 697
Population under poverty line	70%	18.2%
Birth rate*	20,99 per thousand.	18,0 per thousand.
Infant mortality rate*	20,23 per thousand.	14,7 per thousand.
PIB per capita*	US$3.302	US$7.495
HDI*	0,693	0,791
Dependency index	60%	40%
Illiteracy*	0,771	0,905
Settlement in rural areas **	52%	24%
Hospital beds per thousand hab**	0.4	1.2

*Table 5-3. Comparison Human Development indicators for Chiapas and Mexico. Sources * (CONAPO, 2010), ** (Delgado & Gonzalez, 2007).*

With these few numbers, the reader can get an insight about the disparity regarding human development, infrastructure and economic advance in Chiapas. Several authors (Collier, 1994; Howard & Homer-Dixon, 1996; Delgado & Gonzalez, 2007) agree in the coincidence between economic marginalisation and indigenous population. This is explained by the accumulation of centuries of abuse by colonisers, complex migration patterns[10], the adoption of economic policies contrary to indigenous' needs, and the governments' incompetence to attend the ongoing problems. The indigenous people claim for more autonomy to decide upon their destiny, and therefore they demand the recognition of their institutions - socially, politically and economically - by the Mexican government and society in general (Collier, 1994). The Zapatista uprising has perhaps been the most relevant event regarding indigenous claims.

[10] Chiapas also displays a complex migrating pattern. The colonization of the rainforest Lacandon corresponds to an internal migration within the state, triggered by the economic pressures from ranchers and landowners over indigenous communities for available land. The second type of migration corresponds to the influx of Guatemalans indigenous from the sixties as refugees from the civil war in Guatemala. And finally, as consequence of the low life standards and social concerns, a many locals decide to immigrate to urban areas, within Mexico but also to the United States. (Duarte & Coello, 2007)

Zapatista Uprising

The origins of the unfortunate situation of indigenous communities in Chiapas started with the hegemony of the landowners and cattle ranchers, who wanted to reclaim land at expenses of the indigenous people rights, all this with the complicity of the local and federal government. As a suppressive tool, the landowners supported paramilitary mercenaries in charge of seizing indigenous land or assassinate peasant or indigenous leaders. The conditions for the Chiapas indigenous people worsened with the implementation of neoliberal economic reforms in the 1980s and 1990s. Finally, the NAFTA 'free-trade' agreement with the US and Canada heightened fears that subsistence farmers would be forced off their lands by a wave of cheap food imports from US agribusiness.

On January 1st 1994, the day NAFTA was due to be implemented, a guerrilla force calling itself the *Ejército Zapatista de Liberación Nacional* (the EZLN, or 'Zapatistas'), stormed five towns in Chiapas, including the former state capital, San Cristobal del las Casas. The Zapatista demands were for indigenous rights, land, housing, food security, and the rights of the indigenous people to have political autonomy, and to control their own health and education systems. On top of this, they aimed at democratising Mexico through the empowerment of 'civil society', a term for those social groupings devoted neither to making private profit nor wielding governmental power. Unlike previous revolutionary movements, the Zapatistas werenot trying to overthrow the government and wield state power themselves.

For several years, the dialogue between the Zapatist movement and the government has been costly, traumatic and inefficient for solving the human rights crisis of indigenous communities. Zapatist reaction has been to declare autonomous communities, where decisions are made at village assemblies, and every adult villager is allowed to participate and vote. This system gives ordinary people in the autonomous communities far more say over the running of their community than they had before.

*Taken from **Edinburgh Chiapas Solidarity Group*** (Edinchiapas, 2010). *Edinburgh Chiapas Solidarity Group is one of the many groups across the world which supports the Zapatistas in their struggle.*

Textbox 5-1 Zapatista uprising in Chiapas

5.2.2. **Environment**

In terms of natural resources, Chiapas is one of the richest states in Mexico. The impressive biological diversity of Chiapas can be explained by the coincidence of the tropical rain belt and the local orography with three independent mountain systems, valleys and plains. The large range of temperatures and humidity favours the variations in the soil cover -layer. As a result, Chiapas constitutes nearly a Mexican flora and 80% of species of tropical trees (Travel Chiapas, 2010).

Figure 5-3 Map of Chiapas. Source: http://travelamap.com/mexico/chiapas_I.htm

The exuberance of Chiapas' diversity contrasts with its fragility, especially against the land degradation and exhaustion as consequence of forest removal, unsustainable agricultural practices, and overgrazing by cattle, sheep, and goats. This obeys to a process of *ecological marginalisation* that occurs when poor people are forced to migrate to ecologically fragile areas. As the migrants' population increases, the negative impact to the local ecosystem – and therefore the resources degradation- increases as well. As consequence the poverty cycle is strengthened. (Howard & Homer-Dixon, 1996)

5.2.3. **Economic activities**

Regarding local economy, Chiapas displays four main characteristics. First, the abundance of natural resources provides the energy sector with 55% of hydroelectric power, 21% oil, and 47% natural gas of the national production. Secondly, agriculture -as a main economic activity- is not able to provide the expected economic and social returns to the communities due to the pre-industrial production schemes in use (familiar labour force, low capital composition, limited linkages with the exterior, etc) (Delgado & Gonzalez, 2007). The third factor relates to the sparse and poorly organised industry and trading sector, displaying low levels of professionalization and network activity. Finally, fair trade production (OCA, 2002), and non-traditional crops, indigenous handicraft and tourism (Chiapas.com, 2010) are devised as relevant growth sectors for the local economy.

5.2.4. **Education**

Chiapas presents the highest illiterate population of all the country, which concentrate in poor indigenous communities that rarely have benefited from improvements in the educational system and continue to face a future of extreme poverty. Most of this subgroup is over 45 years old and female, creating overlapping problems of gender, age, and ethnicity biases (SIPAZ, 2010). Notwithstanding government efforts for education improvements such as scholarships for attainment, school dinners, and teacher's qualifications (Goverment of Chiapas, 2010), there are several trust issues regarding the objectives of education. For some, education has traditionally been an instrument of policies which seek to "acculturate" and assimilate indigenous peoples into Mexico's national culture, thus suppressing the expression or development of their own culture (McCaa & Mills, 1998).

Following the trend as in other human development indicators and as consequence of the basic education lags, Chiapas also displays very low levels of tertiary education. The state has nine universities and technological schools located in the main urban centres. Remarkable however, is the presence of universities with an approach to the local characteristics, such as the University of the Rainforest[11] and the Intercultural University of Chiapas[12]. The low graduate population also limits the availability of social service providers, which constitutes an irony in the state with the most demand for academic assistance.

5.3 Universidad Autonoma Metropolitana UAM

After looking at the national higher education system, and the regional demands, one more element is necessary before introducing the PIIDHC: the UAM as hosting institution where the programme was created. The following section discusses the origins, structure and relevance of UAM, as a means to understand the academic and organisational preconditions of the PIIDHC.

5.3.1. **Origins**

The UAM was founded in 1974 as a federal autonomous public university with the authority to conduct research and culture diffusion according to the principles of academic freedom, and with the goals to provide a solution for the HE demand, and the promotion of an innovative and constantly evolving educational proposition. The status of autonomy in public university guarantees the independence of education institution from the politic interests. Ideally, autonomous institutions enjoy the academic freedom to teach without interference from the government (Rolwing, 2006).

[11] Universidad de la Selva www.utselva.edu.mx
[12] Universidad Intercultural de Chiapas www.unich.edu.mx

The social character of the university is strongly influenced by the social and student movements that claimed a stronger role of HEI towards the country problems in the late sixties[13] (UAM-IZT, 2000). Despite UAM direct influence area focuses on the metropolitan area[14], the federal status allows it to deploy its academic activity with a national scope (UAM, 2010).

Universidad Autonoma Metropolitana UAM	
Foundation year	1974
Students	45.000 aprox.
Geographical scope	Metropolitan area of Mexico City. However UAM is a federal university with scope throughout the whole nation
Campus	3 at the foundation Iztapalapa, Xochimilco and Azcapotzalco Recently Cuajimalpa and Lerma
Academic Divisions	(CBI) Basic Sciences and Engineering, (CSH) Social Sciences and Humanities, (CBS) Biological Sciences and Health, (CyAD) Science and Arts for Design, (CCD) Communication Sciences and Design, (CNI) Natural Sciences and Engineering
Undergradutate programmes	70
Postgraduate programmes	72
Research lines	170
Cultural outreach	150 cultural functions per month.

Table 5-4 Facts about UAM

The UAM is born as an experiment of the HEI authorities to develop an academic alternative that seeks for social relevance and academic excellence. Under this approach, UAM has implemented a mixed profile researcher-teacher in order to keep programmes with an updated and scientific perspective. The university ensures academic update by constant curricula reviewing implementing new formulas for traditional courses, and non-traditional courses with different specialties and directions.

[13] The movement of 68' is referred to the group of students from 70 universities and preparatory schools in Mexico that coordinated protests that promoted social, educational, and political reforms. The Tlatelolco massacre was a government massacre of student and civilian protesters and bystanders that took place during the afternoon and night of October 2, 1968, in the Plaza de las Tres Culturas in the Tlatelolco section of Mexico City. The violence occurred ten days before the 1968 Summer Olympics celebrations in Mexico City. Source (Wikipedia, 2010).

[14] Metropolitan study is one of the most important research lines of UAM, oriented to the study and comprehension of the metropolitan phenomena, in the support of cities in topics like planning, local policy and sustainable development. (Estudios Metropolitanos, 2010)

Throughout its academic history, UAM has positioned itself as a main institution for interdisciplinary education and applied research. The outcomes of the university are widely received by industry and society; as well its academic excellence is recognised among Mexican HEI.

Position	Participation National System Researchers	Published Articles in ISI 2007	Postgraduate Quality	Teaching improvement
1	UNAM	UNAM	UNAM	U-Guadalajara
2	UAM	IPN	UAM	UAM
3	IPN	UAM	IPN	U-Guerrero

Table 5-5 Top Mexican Universities. Source (UNAM, 2009)

Table 5-5 shows the high appreciation of UAM in a national ranking for HEI. If the size of universities is considered, UAM would score even higher since UAM *only* hosts 45.000 students compared to the other top universities - UNAM[15] (250.000 students), IPN[16] (153.000 students) and Universidad de Guadalajara (195.000 students).

5.3.2. **UAM-Xochimilco**

Since its foundation, the UAM has sought that each campus would develop under its own priorities. This means the autonomy to define its academic programmes[17], research lines and methodologies. For example the campus Xochimilco UAM-X has developed its own academic model based on modules in which no courses are taught in isolation, but rather in a compact group –module- each quarter. The modular strategy involves a first interdivisional module common to all programmes, aiming at students becoming familiar with group-working methodologies and to analyse the role of the university and their particular profession in society, The second and third quartile the students gather by the academic division, and the later nine quartiles the students focus on the main subjects of their professions.

The modular scheme also involves an interdisciplinary approach, where students are part of an educational process that allows them to integrate knowledge from different

[15] Universidad Nacional Autonoma de Mexico (UNAM)
[16] Instituto Politecnico Nacional (IPN)
[17] A proof of the independence of each unit is the offer of basic programmes such as administration, biology, or sociology by different units under the same title but with different structure. For example, the programme administration is offered by each of the four different units, but each unit offers a different structure of courses, number of credits, methodology and requisites to graduate. (UAM, 2009)

disciplines around actual issues. In this scheme, the teacher's role is to coordinate the group work while promoting critical, creative and participatory approach (Gamboa & Gonzalez, 2010). Despite the achievements, the modular methodology is criticised for its difficulties to establish evaluation scheme comparable to the traditional institutions' (Villamil, 2009).

Social component

UAM-X has understood the social service as an opportunity for students and professors to relate the academic disciplines within the communitarian environment; therefore it has defined the execution of social practices according to the following principles:

- Integrate the social service in the teaching process of the UAM-X.
- Train professionals to join the emerging practices in their field, working with new alternatives and participation in the processes of solving socially relevant problems.
- Integrate the community UAM-X in the role of social transformation by means of placing university work on communities, the generation of social knowledge respect to the communities problems and the development of action programmes along other institutions.

The strategy of UAM-X has been to include all actors in the design and implementation of social service programmes. This promotes the intercultural character since the programme has emphasised in understanding with communities, industries and organisations.

UAM-X has designed training options for people without opportunity to continue their tertiary studies. As an example, the university has prepared short courses called Diplomas for people without the required schooling but who have the necessary background to acquire a university education and enrich their work experience.

Innovation activities

The involvement of UAM-X in innovation has been mainly in the academic field. In the fields of Economics and Management of Innovation, the campus offers a master programme since 1992 and a doctoral programme since 2008. The origin of such programmes obeys to the technological change and industrial development of the country. Additionally UAM-X is involved in the Global Network for Economics of Learning, Innovation and Competence Building System (GLOBELICS) participating in seminars.

5.4 Conclusions

In response to the third research question (Q_3: *How university engagement with rural innovation is influenced by national, regional and institutional factors?),* the discussion on the preceding chapter provides valuable elements to understand the problem of universities' social engagement as a demand and supply schema. Nations and regions demand for highly skilled professionals and knowledge development and transference, among others. Universities act as supply agents for the national and regional levels.

In the analysed case the *Mexican Higher Education System* demands the construction of a knowledge-based economy able to participate in a global scenario. Yet there are major fears about the formation of professionals better fitted to external labour markets than internal requirements and the failure on the construction of a strong national research system. At the regional level, the push for competiveness still holds, but fit to local environment is also asked. Also the formation of professionals with orientation for societal engagement becomes more relevant in regional scenarios. Programmes such as the compulsory social service, highlight the social role of higher education for regions beyond market needs.

In spite of this apparent contradiction between international and regional focus, these national and regional claims are not contradicting but complementary. From a global perspective, competitive work force is enhanced by problem solving skills in what Reich (1992) would consider as symbolic analysts formation. On the other hand, regions ask for more social character on the students to look at the national characteristics and demands.

Chiapas displays important barriers for traditional models of university engagement as described in literature for western cases (Nilsson, 2006). All the problems of illiteracy, and lack of linkages between universities and firms, are accented in this state. In addition, the human development problem constitutes a major concern, and the low intensity war introduces mistrust among the actors.

The economic dimension also offers significant challenges for innovation. The absence of larger companies and the relatively low HEI presence, limit the construction of technological and organisational capabilities in the state. The remaining economic sectors – agriculture, industry and commerce - are characterised by larger number of undeveloped units within underdeveloped networks.

The environmental dimension also supposes challenges for innovation activity. Innovation is usually related to being something new, while environment protection is associated with protecting something existing. The inclusion of environment for innovation discourses is critical, not only due to extraordinary and at the same time

fragile ecosystems, but the opportunity for boosting economic development through sustainable industries such as organic production and ecotourism.

The profile of *UAM* was also reviewed. In traditional literature for university roles in regional development, the university archetype corresponds to a regional university with strong roots in the historic and economic development of the region. In the analysed case, UAM is a federal university without such strong regional presence in a particular region except for the metropolitan area. This presupposes two implications in the aim to relate with rural communities. The first one is a possible asymmetry in the power level among the three sectors – university, government and industry (Gunasekara, 2006, p. 730). The second factor is a more psychological one, and refers to the difficulties for the university to position its image as a player in the regional development process.

UAM is considered an important institution in the Mexican HEI. Its emphasis on developing endogenous strategies for the education and research programmes has delivered important results[18]. Through the implementation of mixed roles of teaching and research, UAM has been able to develop methodological strategies at undergraduate level, and has positioned itself as a high quality research institution. Regarding its social compromise, UAM has also been successful in the attention of metropolitan needs. However, the remaining question is whether UAM is successful to expand its academic and social commitment with regions beyond Mexico City.

[18] The need for developing endogenous strategies is mentioned in Varela's article (p. 60). However, this statement could be biased since Varela belongs to UAM, even though Varela does not refer to the UAM case in particular.

Chapter 6 Interdisciplinary Research Programme on Human Development

This chapter develops the university-society engagement example of the Interdisciplinary Research Programme for Human Development in Chiapas PIIDHC. This case constitutes a proposition for integral support to rural communities, in a region of extraordinary cultural and environmental relevance, where both government and market where insufficient to provide conditions for human, social and economic development. The main bibliographic reference for this chapter is the self-evaluation report of the PIIDHC presented in the report *Educación Superior, Colaboración Intercultural y Desarrollo Sostenible / Buen Vivir: Experiencias en America Latina.* (IESALC, 2009).

The chapter focus on the following key arguments. Chiapas, despite of the unfavourable circumstances described on section 5.2, exhibits important innovation assets, namely strong social capital among indigenous communities and the presence of NGO's. The PIIDHC has played the role of *knowledge coordinator,* by joining the innovation assets up to produce "human development outcomes". This role has been fulfilled due to the coordination of several university propositions, i.e. the social service practices, the involvement of master and doctorate students, and the execution of methodologies developed at the university. Although the effectiveness of the programme to impact the regional situation is conditioned to many external factors, there are some symptoms of profound changes in the solution of the problems. Additionally, the participating students benefit from the learning experience at the PIIDHC. The programme is highly recognised locally and among the academic community, what has enabled valuable inputs for it. The need to mobilise financial and academic resources through networking has made possible the continuity of the programme despite being undercut by government hostility, short-term financing and the need for participants to get grants.

6.1 Origins, Objectives and Structure

The presence of UAM-X in Chiapas started in 1982 with medicine and health related social practices. At the moment of the Zapatista uprising in 1994, the professor Carlos Cortez Ruiz started an initiative for an academic instrument that would address the claims of indigenous people from a cohesive response from academy in the resolution to immediate and long-term problems. In 1997, this proposition received official recognition as the "*Interdisciplinary research programme for human development in Chiapas"*.

The research character of the PIIDHC is based on the acknowledgment that the current problems of indigenous communities derive from complex historical, social and economical processes at the national and regional level. Such acknowledgment demands a constant enquiring character from the program, but also enables the answering of these questions through an interdisciplinary and intercultural approach with the aim of finding solutions that meet the community's expectations. By the acceptance of these principles, the PIIDHC has defined the following objectives:

- *Contribute to the understanding of and solution for national and regional problems*
- *Establish new schemes for the university-society relationship*
- *Develop new models for teaching*

To support the consecution of these objectives, the programme is structured through three main keystones *human development*, *intercultural* and *interdisciplinary(* Figure 6-1).

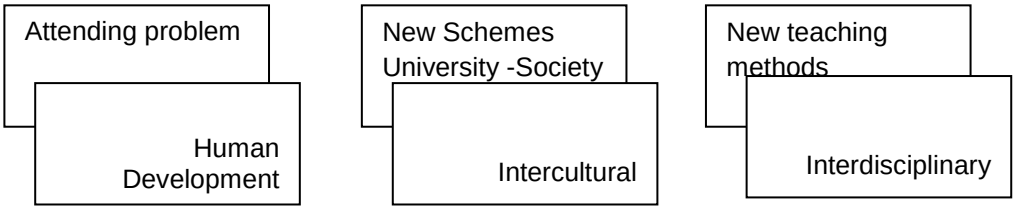


Figure 6-1 Correspondence PIIDHC objective and keystones

The first keystone is *human development* (Textbox 6-1), which is essential for establishing human rights, since those are essential to enable human development. The *intercultural* approach refers to the context for relational models with the actors, which imposes a challenge in establishing and maintaining inquiry lines that seek, not only to diagnose problems or to understand the determinants of the complex situation of the excluded communities, but also to establish a partnership based on trust, tolerance and dialogue.

> Human development is a process of enlarging people's choices by expanding human capabilities and functioning. At all levels of development the three essential capabilities for human development are for people to lead long and healthy lives, to be knowledgeable and to have a decent standard of living. But the realm of human development goes further: essential areas of choice, highly valued by people, range from political, economic and social opportunities for being creative and productive to enjoying self-respect, empowerment and a sense of belonging to a community. (UNDP, 2009)

Textbox 6-1 Human Development definition

The *interdisciplinary* keystone is seen as the main criterion to establish a research *methodology* by the coincidence of different academic disciplines and the redefinition of the research process itself based on the existing institutions.

6.2 Research-Service lines

The social service in medicine has become a successful example of UAM-community cooperation, not only because of its results through nearly 30 years of presence in different municipalities in Chiapas, but also for becoming an entry mechanism for working with communities and an access door for other disciplines. The PIIDHC has defined four research lines around which articulate the participation of different disciplines. These are *Health, Nutrition and Life Quality* (H-N-LQ), *Production, Technology and Environment* (P-T-E) *Culture, Education and Human Rights* (C-E-HR) and *Social Strategies, Public Policy and Power Relations* (SS-PP-PW).

6.2.1. **Health, Nutrition and Life Quality (H-N-LQ)**

The main objective is to develop health models and strategies that corresponds to the local characteristics and that guarantee the minimum levels of health care. Given the urgent health problems[19], this line has been well received not only among the community as the primary users of assistance, but also among local government institutions as partner in the diagnosis, design and implementation of programmes with long term scope. The range of activities carried out within the research line H-N-LQ exhibit different purposes, among these it is possible to highlight the elaboration to morbidity profiles, epidemic surveillance, training of local health promoters, participation in health campaigns, design of pedagogic tools for training and physiotherapy, among others.

6.2.2. **Production, Technology and Environment (P-T-E)**

According to the PIIDHC, the low human development has one of its most urgent expressions in the productive dimension. This issue is related to the critical dietary and nutritional status of the population, as well as significant deterioration of natural resources. The main goal of the programme is to search for technological and productive alternatives to contribute to food security, sustainable production, fair trade and income generation. The main challenge of working alongside the producers is the integration the modern with the traditional knowledge endogenous of the rural population.

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[19] Chiapas has the highest morbidity and mortality rates in all of Mexico for the main infectious diseases: in 1992, the malaria rate was eight times higher than other malarial areas of Mexico, while prevalence of tuberculosis was three times higher (SSA,1993a); mortality rates from diarrheal infections for children under five years of age were also three times higher (CAE, 1991; SSA, 1993b). (Ochoa-Díaz, Sánchez-Pérez, Ruíz-Flores, & Fuller, 1999)

Some examples of the type of activities developed in P-T-E include the diagnosis of the technical-productive conditions with emphasis on fragile ecosystems (Chimal, 2000), consultancy in environmental management, and assistance in production processes. An important example of interdisciplinary collaboration and inclusion of traditional knowledge has been the design of equipment to support production processes such as, solar dryers for coffee, handicrafts packing, among others.

Coffee is one of the main agricultural crops in Chiapas. However, due to limited technological capacity and inadequate farming techniques and marketing, the traditional production of coffee does not provide sufficient benefits for the indigenous producers. Amidst this situation, the organic coffee emerges as a promising alternative due to the fair trade commercialization and sustainable basis. However, the indigenous communities - and especially those who are in Zapatista autonomous territories - lack of effective government support to develop these products.

Given the expectations towards organic coffee, the indigenous communities from the municipality of Ocosigno accepted the participation of PIIDCH through an agronomy student for the social service practice. This project consisted in the foundation and promotion of a cooperative for production, collection and marketing of organic coffee. The objectives of the programme were the diagnosis of the production system, the cooperative conformation, and the development of trainings for organic production.

The implemented methodology corresponds to action-research framework established by PIIDCH, elaborated with interviews, participation in workshops, field notes and literature review in the diagnosis phase. For the working with communities, the student used participatory assessment and strategic planning methodologies. Finally, the systematization of the information was carried out in cooperation with other social service providers, teachers-researchers from PIIDHC and external organizations.

In addition to the initial objectives, the student pointed out the need for other activities to contribute with other areas besides the productive. Those were the promotion of a women's collective organisation for organic vegetable production, and the participation in organizing the celebration of mother earth as recovery and strengthening of indigenous agro ecological rituals.

Taken from Final report of Social Service. Agronomy. (Hernandez, 2003)

Textbox 6-2 Example of social service report at the research line P-T-E

6.2.3. **Culture, Education and Human Rights (C-E-HR)**

The focus of this line is to approach to the knowledge of the indigenous world and the values that guide their culture. The research activity is been perceived as an instrument to approach the problems of education and human rights within the context of indigenous culture and society. From this perspective, investigations of autonomic processes applied to social organisation, education and justice have been conducted. Some of the activities carried out include among others seminars in the topics of values, indigenous worldview and social organisation, values training for teachers, bilingual and bicultural education. In addition, the line C-E-HR has been support for other lines, for example to the P-T-E line in the understanding of ecosystem management indigenous practices.

6.2.4. **Social Strategies, Public Policy and Power Relations (SS-PP-PW)**

This area reflects works in the development and strengthening of social initiatives around the productive, environment, health and social dimensions. Its role is to support the communities to shape organisations with strategic perspective. The experiences discussed are oriented to the understanding of the dynamics of socialisation, leadership and participation within the indigenous associations that seek for advancing in the main problems of the communities. In addition, the programme has taken part in the analysis and monitoring of public policies directed to communities with lower levels of human development. For example, in the early years of the program, there were conducted several studies on the agrarian question, including those that triggered the Zapatista uprising.

6.3 Methodologies

The research character of the PIIDCH is conceived as a mean to understand reality, but also to develop awareness of the ability to act upon that reality. The programme includes a number of strategies that focus on local problem analysis based on interaction with stakeholders, which enable actors to express their priorities and to engage in different activities in the fulfilment of their needs. The methodologies used by the programme can be classified as *action-research*, *university diploma*, *interdisciplinary design* and *government programmes and policies evaluation*.

6.3.1. **Action-Research**

Action-research is defined as the inquiry in the context of focused efforts to improve the quality of an organisation and its performance. In the case of PIIDHC, the action-research contributes to build up a learning community through collective reflection in a systematic way, and to dismantle the so-called boundaries between traditional and scientific knowledge. The practices used include dialogue, interviews, and group discussions that were the participants were able to duplicate in their own communities. Carlos Cortez defines the influence of action research in the experience of PIIDHC as:

"…*Action-research led to the confluence of different actors with different worries, perspectives and even ideas of time. It opened up not just the possibility of creating a space for interaction between different knowledge ('popular' and 'scientific' knowledge), but also the scope to develop different actions. As action-oriented researchers we tried to learn from the process and to develop the capacity to act, including the social capacity of acting to change some relations (from technical to political)... Often the social scientists tended to assume that they had all the right questions and answers… Just because people do not speak, it doesn't mean that they do not know."* (Mehta, 2008)

6.3.2. **University Diploma**

University diploma corresponds to a interdisciplinary research structure that address problems from different perspectives such as education, medicine, biology, law, communication, etc, by means of a systematic and direct interaction with people from different regions of work. The diploma methodology, similar to the extension proposition discussed in section 5.3.2, becomes a space for collaboration between universities, government institutions, NGO's and social organisations for human resources training.

The university has organised four different types of diplomas programme such as *Promotion of Communitarian Health, Intercultural approach to Mayan language, Communitarian Education for Sustainable Human Development* and *Social action for Human Rights Defence.* For example the diploma *Sustainable Human Development* aims at strength communitarian leaders' capabilities for the management of civil organisations for the sustainable management of natural resources. This diploma is directed to popular leaders and local practitioners who discuss every session around a particular topic, and during the interval between sessions they reproduce this discussion with their own community, and share the discussion outcomes at the next diploma session. This methodology enables each problem or development action to be understood from a medium- to long-term perspective, and to identify possible collaborative actions with the collaboration of the PIIDHC students. (Cortez, 2003)

6.3.3. **Interdisciplinary Design**

Design is the areas least acknowledged as capable of proving solutions for poor people's needs. However the PIIDHC, trough the interaction with different actors, has recognised that in many cases the problems have a technological dimension. Several students have been working with local organisations and NGO's to develop small-scale technologies around production problems, handicrafts and health-assistance devices (Cortez, 2003). For example, in cooperation with a NGO, a group of students worked on the design of a pregnancy and childbirth simulator for midwives training (Meza, 1999) and the design of low cost devices treating children with muscular problems living in isolated areas. (SEDESOL, 2003)

Rehabilitation device for children with Cerebral palsy
The attention to children with cerebral palsy in marginalized rural communities presents numerous challenges. First, due to the long distances, either the child or the therapist is obliged to translate where the other is, and the scarse economic resources restrict the capacity of rehabilitation centres. In response to this problematic, the PIIDHC proposed a project to design low budget rehabilitation devices to be donated to the children's families for their use. The project was developed in conjunction with the NGO CCESC which provided assistance in the rehabilitation topics.

The design criteria included low price, possibility to treat children from 3 to 10 years, easy assembly and repairs (so parents could do by themselves), comfortable for the patient and for the person who provides the therapy. The design process included several activities such as meeting with CCESC for the problem definition, field visits for measurements, development of prototypes, and supervision of the production process, among others. The outcomes of the project included 10 devices which satisfied the expectations of the therapists and direct users, and the elaboration of a user manual for the therapies execution, assembly and minor repairs by the parents.

The main success factor in the realization of this project was the commitment of students. For the field visit, the students needed to walk an entire day per child and interact with the families, so they could get more input for both, design and therapy. Also, after delivering the final design, the students remained in the area to supervise the production of the 10 units to donate, assuming by themselves all the staying costs. In recognition to their efforts and achievements, the students were awarded by Secretary for Social Development SEDESOL as the best social service practice in 2002.

Textbox 6-3 Example of Interdisciplinary design (SEDESOL, 2003)

6.3.4. **Interdisciplinary Design Government programmes and policies evaluation**

In a context of low-intensity war and social exclusion, PIIDHC has acted as consultant for government policies and private initiatives towards programmes of human development in Chiapas using the concepts of citizenship, participation and accountability. In 2002 the state government asked PIIDHC as external auditor to evaluate, over five years, the effectiveness of state programmes of rainforest management (IDSMAC, 1998). There have been no major concrete advancements in the problems; nonetheless there has been a marked improvement in accountability and transparency in the way programmes are managed. (Wheeler, 2007)

6.4 Academic Programmes: Social Service and Postgraduate studies

The research activities are covered at different levels, from master and doctorate thesis in social sciences, up to short courses and workshops in the frame of social service. At all levels, the goal is to address the problems with multidisciplinary perspective and close cooperation with the communities.

6.4.1. **Social Service for undergraduates**

The social service in medicine constituted the entry for the UAM-X in Chiapas, which was well received not only due to the improvement in health services delivery, but because the participation in the creation of health agenda by coordinating all actors' priorities and responsibilities. (Gamboa & Gonzalez, 2010). This success gave a good impression on the potential of the UAM-X social service in the attention of the human development problems, and since then it has become one of the most relevant mechanisms to approach specific problems of the communities. The range of projects carried out under the PIIDHC is large, with the aim that students engage with diagnosis, training, research or design, etc and work directly with communities or through NGO's or other civil organisations. The quality of the projects and the commitment of students are well recognised by local, regional and national institutions.

Coffee dryer by solar energy

Despite the economic relevance of coffee production for small farmers in Chiapas, the lack regarding public services and infrastructure imposes several treats to the quality and efficiency of this product. In response to this situation, the PIIDHC participated in the redesign for coffee dryer as a solution for small producers. The condition of the producers and the region posed several criteria in the design, such as low cost, easy to use without specialized training, easy to transport and making use of available energy sources for the communities, in this case solar energy.

After a year of prototypes and testing, the students returned to the community to check the system, and redesign under new needs and failures. By combining modern technology with traditional knowledge, the drying system was accepted by the producers who found it an innovative alternative, economical accessible and simple, requiring only sun and a flat place to dry up to 36 kilos of coffee or other product, with the additional advantage that grains were isolate from the open environment and animal pests. As recognition for this work, the student was awarded with the national prize for social service in 2001.

Textbox 6-4 Example of design in cooperation with local NGO's

6.4.2. **Post grade "Rural Studies"**

The UAM-X offers the postgraduate study in Rural Studies with the objective to train researchers and high level professionals in the area of rural development by means of analysis upon rural development, interdisciplinary approach and close correlation between theory and practice. The portfolio of postgraduate studies in rural development offered includes specialisation, master and doctoral level, and it is open to students from the whole country, and with special emphasis to PIIDHC partner organisations.

The empirical component is very important for the programmes. This is why students are required prior experience and to carry field work during the program. The methodology used for the field work assimilates to the diplomas, since the students are requested to participate in intensive theoretical sessions, and then reflect upon those in their own organisations, and finally share the experiences in the next session. With this

approach, students are challenged to explore broader and alternative ways of dealing with rural development within their specific organisations.

6.5 Actors

Addressing the complex problem of human development from a holistic and sustainable perspective requires the efforts of various social actors who feel that they can contribute (See Appendix). Hence the interaction with communities, social organisations, NGO's, investors, entrepreneurs and private sector organisations, and of course, different levels of government is very important (Figure 6-2). In that regard, the identification of social actors is a central aspect of PIIDHC, since they define the priorities and are able to deploy the necessary actions to cope. Next to the need to involve all the interested actors, there appears a main challenge regarding the coordination, due to the fact that the rhythms of the participating institutions not necessarily coincide. This means that the problem of involving actors becomes the problem of then how to stimulate and coordinate participation.

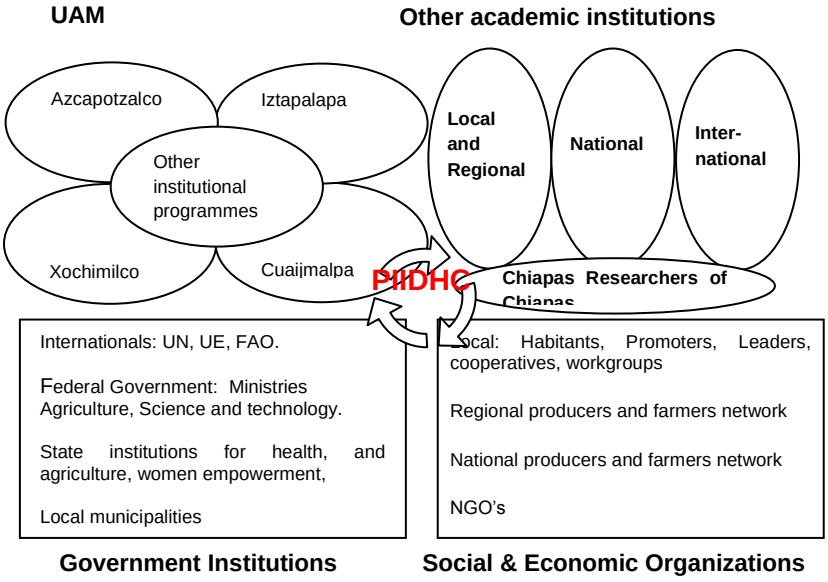


Figure 6-2 Actors Scheme around the PIIDHC

6.5.1. Government perspective

The initiative of the Mexican government for promoting social participation is shown several public policies, particularly in the topics of sustainable rural development, water management and reduction of poverty, while at the state level there was an additional emphasis in the development of the Lacandon area *"Comprehensive Programme for the Development of the Lacandon Jungle"*. However according to the evaluation of PIIDHC, despite the defined policy and programmes at federal and state

level, in practice the involvement of civil population in the definition of government programmes is still very limited. (Calderón, Cortez, Hernández, & Sosa, 2005).

> The government propositions for stimulate Coffee production in Chiapas constitutes an example of inappropriate definition of public policies. In 1995 the federal proposed the goal to increase coffee productivity from 300Kg to 2 Ton within an eight years period. To this end, the government proposed to give farmers with less than 10 hectares with assistance for renewing the coffee crops by means of donating plants, credit packages, and technical assistance. According to the institution Chorlavi, an intensive production of coffee in the scale the government is proposing would represent a threat for the food security of the small and indigenous farmers. In addition, the lack of counter cyclic policies and subsidies determine a large risk component for acquiring credits. Finally, the producers feel less motivated to invest, while the current trading structures the need for intermediaries who do not share any risk. (Hernández Navarro, 2010)

Textbox 6-5 Example of flaws on public policies proposition

6.5.2. **Communities**

The complex situation in Chiapas has become an important trigger for development of social capital, awareness consultation and participatory planning among indigenous communities[20]. Another important factor to consider is the role of traditions for indigenous communities, especially among those with affiliation to the Zapatist movement, by defining the rules and laws that govern the behaviour of the communities and the individuals that conform them. (Alcorta & Peres, 1998). The understanding of these institutions is vital in the correct appreciation of the development potential of the communities, and therefore the establishment of programmes to support their problems. Urdapilleta Carrasco describes the importance of traditions in the management of resources: "*due to deforestation, some communities have disposed to several activities such as the construction of barriers to prevent avalanches, and offering prays to ensure the availability of water. The community is autonomous to deny the use of water for families who do not cooperate in such common practices"* (2010).

6.5.3. **Social organizations, NGO's and government institutions**

While it is undeniable that the presence of organisations looking for a place as agents of change constitutes an advance of civil society in participatory process, coordination problems among those for an effective participation remain present. In the case of Chiapas, after the Zapatista uprising the region concentrated attention from several NGO's with different origins, nature, structure and goals. The threats of an undeveloped network include overlap of activities, contradictory approaches in the

[20] *List of indigenous associations in Chiapas (RED INDIGENA, 2010)*

methodologies, and even opportunistic organisations taking advantage of the complex situation.

The support of PIIDHC to civil organisations, NGO's and other institutions is oriented under three approaches: organisational, human resources and methodology. At the institutional level, the programme has sought to build upon the already existing capabilities –consolidated organisations- but at the same time tried to avoid overlap between all actors' efforts. Once selected the organisations to work with, the postgraduate programmes in rural development constitute a cohesive alternative to strengthening the organisations' personnel; other possibility is that organisations hire former PIIDHC participating students for absorbing university knowledge. At the methodological perspective, the PIIDHC has influenced several NGO's in their organisational structure and participatory methodologies. (See box bellow)

> SADEC is a non-profit organisation dedicated to human resource training in health, medical care, and to the creation of sanitary strategies and health structures, all this in coordination with the communities.
>
> SADEC understands the social service as one way to link professionals with society, and contribute to finding solutions to social problems. For this reason, it has established a very close relationship with the UAM-X through PIIDHC for the participation of social service providers in the different regions in which it operates. To carry out the social service in a responsible and professional way, SADEC acts in the frame of service, research and training. As foundations of its activities, the action of SADEC is rooted in the health as human right, autonomy and gender.

Textbox 6-6 Influence of PIIDHC in local institutions' methodologies. (SADEC, 2010)

The strategic advantage of establishing partnerships with external entities lies in the access to infrastructure, support networks, and financial resources to support university work without interruption. It would have been hard to develop the different programmes and activities if the programme would only have relied on the university founding (Gamboa & Gonzalez, 2010).

6.5.4. **Students, graduates and teachers from UAM**

One of the most important challenges is enabling students to recognise the communities' priorities and people's capabilities to base their work on this. (Cortez, 2003). In Skype conference with the author on June 30th, 2010, Cristina Gonzales discusses about her perceptions about the participating students attitudes: *"In general, all the practitioners go through an evolutionary process when joining PIIDHC. First the students come with many expectations about their contribution to the problems in Chiapas, but once starting to work with communities they feel frustration due to the lack of infrastructure and economic restrictions to develop their projects. Then comes a humble phase when they learn how to accept the conditions and decide to learn from the methods and institutions in place. In the end, most of them get a boost in their*

professional confidence by realizing that despite the restrictions they were able to develop a professional experience in a real context". (Gonzales, 2010)

The political sympathies with regional groups and the importance of the problems pose a threat to conceive the programme as assistance or philanthropy, rather than an academic exercise. In Skype conference with the author on June 6th, 2010, Carlos Cortez reflected upon the nature of the programme: "S*everal times I have received messages from colleagues asking me what way they could help with the Chiapas situation. My answer is that PIIDHC is not about providing assistance, but a research programme around a socio-economic problem. That is the initial agreement before committing to the program".* (Cortez, 2010)

6.6 Outcomes

The largest contribution of PIIDHC to the UAM has been shown university's potential for the solution of complex social problems of global concern. However, from the academic perspective, the PIIDHC has also derived into many positive outcomes for the students and university in general.

From the undergraduate student's perspective, the participation in PIIDHC thought social service signifies a valuable opportunity to test the acquired knowledge in a concrete case, and participate actively in the definition and solution of the problem (See box bellow). Following the job classification proposed by Robert Reich (Reich, 1992), the PIIDHC experience fosters the students' potential to become symbolic analysts: once they are asked to match the roles of problem identifier, problem solver, and an innovator. The coincidence of the modular type methodology implemented by UAM-X and the practical experience at PIIDHC provides favourable conditions for the promotion of symbolic analysts, since they demand have a high level of education, both in the classroom and on the job experience[21].

[21] According to Reich, knowledge, unlike wealth, is an inexhaustible resource. Therefore, human capital does not operate by the laws of diminishing returns. In fact,"...human capital operates according to a different principle. Because people learn through practice, the value of what they do usually increases as they gain experience." These aforementioned factors will determine which workers will succeed in the prevailing global market and those that will be relegated to the lower categories of the international labour market (Reich, 1992)

The following are the testimonials of the participating students in the project Embalarte for designing packing for handicrafts produced by indigenous women (UAM-X, 2003).

Alejandra: *Through the project for handicraft packing design, I have learnt not only about mass production and the advance processes and materials in industrial design, but how to understand the existing problems and try to solve them, instead of creating the problems themselves.*

Minerva: *It is not the same to implement an idea than to propose an idea to satisfy a need. Especially because we have to bear in mind not only the final user but with the* artisan as well, so we must consider additional factor such as available materials.

Miguel Angel: The *conclusions of the practice are very similar to the conclusions of the whole PIIDHC, by zooming in from the problematic of the whole region, to the specifics of the municipality and then to the artisan women. Out of this synthesis process the specs of the product are better understood. Several criteria are taken into consideration such as cultural factors, available materials, processes quality, economic capacity and others. The goal is to obtain an optimum design for the artisan women, but of course also for the university and ourselves.*

Jesus: *The tzeltal women require assistance for packing their products in the way their products can be highlighted and protected. We understood about the need for protection by talking with someone from Amatenango, who told us that in an occasion the artisans wanted to export some handicrafts to Italy, those broke on the road between Amatenango and San Cristobal de las Casas because of the lack of proper protection.*

Textbox 6-7 Impressions from students about the relevance of their projects within PIIDHC

The coincidence of several institutions around the Chiapas situation has allowed the PIIDHC to establish relationship with national and international academic institutions. One example of this is the diploma "Sustainable Human Development" which has been carried out in coordination with the group for social research from the UNAM and the centre for Citizenship, Participation and Accountability from the Institute for Development studies at the University of Sussex- UK.

On both sides, academic and social components of the programme have been widely recognized. Both master and doctorate programmes are included in the National System of Postgraduate Studies (PNP) for the category "High Level". Several institutions have awarded different social service projects in the categories of basic research and communitarian research.

6.6.1. **Challenges**

The inclusion of human development within academia imposes additional challenges from the theoretical perspective, as the dilemma between the priorities and the pace of academic research (predominance of the logic of knowledge) and the priorities and pace of social groups (predominance of the logic of action). This imposes a practical restriction in the execution of social service, since the students are supposed to carry out their practice in a timeframe of six months, and typically the discussion, execution and funds allocation at the communities usually take longer.

Right after the Zapatista uprising the group had its biggest size, consisting of about 20 professors and over one hundred undergraduate and graduate students. Later on the participation has declined, up to the point that the group reached a stable size of about five teachers and twenty students. Later the programme was extended to the state of Guerrero.

In regard to practical obstacles, the programme has been constrained by different issues related to the university institutional environment, but also the inherent problems of working in a troubled region with various social and political actors. Not only the government institutions lack of response to the social demands, but the low intensity war and political pressures have affected the academic work. The period between 1994 and 2000 was the most critical for the programme due to both, the pressure exerted against the Zapatista communities and the university work itself. According to Cortez, as part of the government control strategy, it was asked to the UAM to suspend its work in Chiapas, especially those in the area of health that were in cooperation with the communities in resistance. Although some university authorities agreed not to pursue in the state, the support from the highest decision levels and especially the daily commitment of teachers and students allowed the work be maintained during this difficult period.

What the political pressure could not achieve, the financial pressure did. The fact that the programme only received financial support during the first three official years (1997-1999) and since then by fundraising has limited the scope and continuity of the program. Furthermore, the restrictions for students to obtain grants for their social service limit the mobilisation between Mexico City and Chiapas, and therefore the presence at the communities.

Regarding technological innovation, there is an additional limitation in the development of technologies and machines for the local requirements. In many cases the design process ends in the prototype stage and not with the functioning machine, due to lack of funding and little incentives for patenting. The main reason in the university ownership over the property rights does not motivate particulars for investing in those developments, at the same time that the university does not invest either.

Chapter 7 Analysis Case Study

Chapter 7 and 8 develop an analysis part of the theoretical and empirical components developed in chapters 1-6. This chapter aims to validate the research framework role of universities within Rural-SI by means of the empirical evidence. Table 7-1 presents the correspondence between the research questions Q_2, Q_4, and Q_5 with the theoretical propositions in Chapter 3.

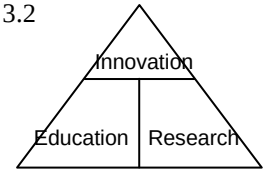
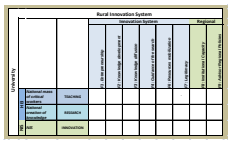
Q_2: *What are the characteristics and requirements of rural innovation in Latin America?*	Sect 3.1 Rural-SI	Sec 7.1 Chiapas as Rural-SI
Q_5: *What is the influence of universities' education and research capabilities for rural innovation engagement?*).	Sec 3.2 	Sec 7.2 PIIDHC Education, Research and Innovation Components
Q_4: *What functions are universities able to develop for enhancing rural innovation?),*	Sec 3.3 	Sec 7.3 Functions PIIDHC role within Chiapas Rural-SI

Table 7-1. Correspondence Chapter 3 and Chapter 7.

The chapter is written in a format to allow for comparisons with the research questions and research framework. The first part presents Chiapas as a rural system of innovation, by identifying the components within it. Through its overview, it becomes clear that the role of PIIDHC extends beyond the provision of education and research to a knowledge network coordinator. The second part describes the different elements of the PIIDHC intervention within the Chiapas Rural-SI by decomposing the programme in education and training, research and innovation components. The last part provides a functional analysis of the PIIDHC activities according to the Rural-SI requisites. The model for mapping university functions introduced in section 3.3 is listed with the PIIDHC characteristics.

7.1 Chiapas as a Rural System of Innovation

The PIIDHC constitutes an academic exercise from a federal university to address the socio-economic situation of the state. PIIDHC has not only addressed the urgent problems, but has strived for some more developmental goals such as communities'

empowerment and institutional capacity building. Even thought the PIIDHC actors suspected that such a programme would require a special engagement scheme from the university different from the traditional roles of training and research, the word innovation has never been explicitly mentioned. Yet there are several features of the Chiapas case that relate it to an innovation system: the characteristics of the network, the mechanisms through which the actors interact among each other and the outcomes of those interactions. All of these facts support the case of Chiapas as a Rural Innovation System.

Figure *7-1* presents an illustration of Chiapas as Innovation Systems as described in section 2.2.1.

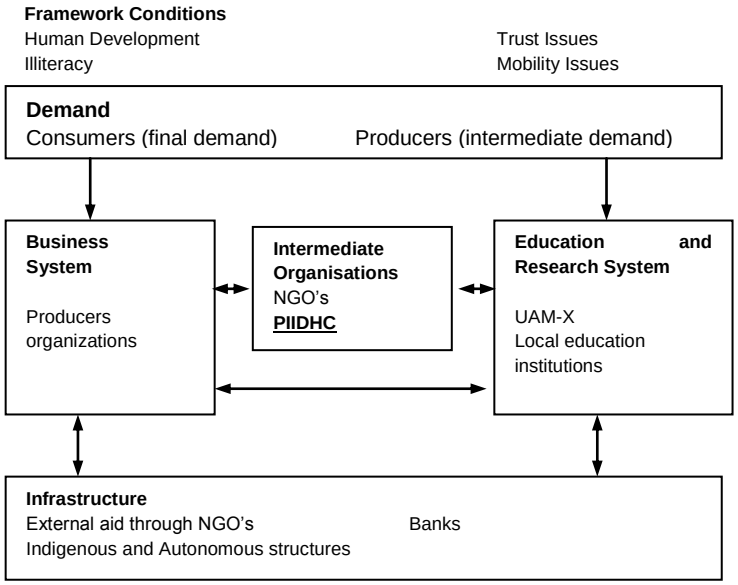


Figure 7-1 Chiapas as Rural-SI

Table 7-2 summarises the components of Chiapas as Rural-SI according to the Lundvall's proposition (1992). From the table becomes clear that the influence of PIIDHC to Chiapas goes beyond its roles as training provider or research promoter. The programme balances generative outcomes, such as product and process innovation, with developmental outcomes, as in supporting knowledgeable local promoters and strengthening of civil organisations and NGO's. The active creation and diffusion of knowledge by interrelation among Chiapas actors (Figure 6-2), provides PIIDCH the title of *knowledge network coordinator*.

Another remarkable outcome of PIIDHC is the establishment of *interdisciplinary participation* as an institution within the Rural-SI. The partner organisations are introduced to the use of consultative and participatory approaches as a prerequisite to join PIIDHC activities. But some of the organisations adopt those approaches in their own methodologies as in the case of SADEC (Section 6.5.3). The national and institutional policies influencing UAM are also reflected in Chiapas, as in the case of

social service practices. But along with the policies, limitations of the university are also reflected in Chiapas e.g. property rights obstacles.

Table 7-2. Components Chiapas as Rural-SI

CHIAPAS Rural Innovation System Components	
Actors	• Demand: Organisations beneficiaries of design devices (Product innovation); Producers Organisations (Process innovation); NGO's and civil associations (Organisation innovation); • Business Systems: Producers, commercializing agents. • Intermediate Organisations: NGO's, PIIDHC • Education and Research System: National and International education institutions. • Infrastructure: Government agencies. Banks. Indigenous and Autonomous structures.
Policies Elements to provide direction and coordination to IS.	• Insufficient policies for promoting social capital and infrastructure. • Restrictive conditions for local communities to participate in local policies.
Institutions rules, laws, common habits, and routines	• (Government) Weak laws and policies for supporting knowledge sharing and networking. • (Government-Universities) Property rights laws, and ownership from universities. • (Universities) Methodologies of interdisciplinary participation • (Communities) Indigenous government structures and symbolic capital
Intangibles Knowledge accumulation, adequate management support systems and Network support	• Knowledge accumulation: documentation of projects, videos, manuals, etc. • Empowerment of communities. • Trust among actors. • Raising awareness among students towards national reality, • Multicultural approach.

Other remarkable outcome of PIIDHC is the establishment of *interdisciplinary participation* as an institution within the Rural-SI. The partner organisations are introduced to the use consultative and participatory approaches as prerequisite to join PIIDHC activities. But some of the organisations adopt those approached in their own methodologies as in the case of SADEC (Section 6.5.3). The national and institutional policies influencing UAM are also reflected in Chiapas, as in the case of social service practices. But along the policies, limitations of the university are also reflected in Chiapas as in the obstacles in regarding property rights.

The contribution of PIIDHC in the construction of intangibles is also a strong point of the programme. The actions of the line social strategies (SS-PP-PW) aiming at communities empowerment, and the participants' commitment to establish trustworthy relations despite external factors constitute main ingredients for Chiapas network development. The multicultural approach and Awareness raising component set also

an example of university - society engagement. The next two sections explain in more detail the components and functions of the PIIDHC.

7.2 PIIDHC education, research and innovation components

PIIDHC is born out of an initiative within the UAM, therefore before analyzing the programme under an innovation perspective, we will summarise the main missions of the university. In Mexico the law usually sets three main tasks for the public HEIs: teaching, research and cultural outreach. But recently, Latin American universities have been invited to include innovation as an additional mission. Figure 7 2 highlights UAM roles.

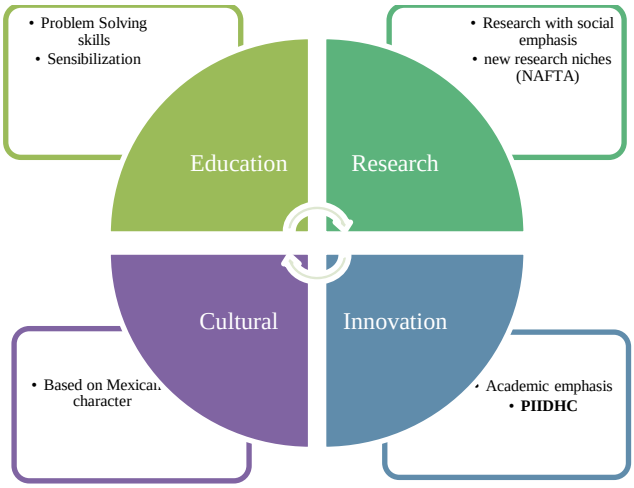


Figure 7-2 Highlights UAM roles

Figure 7-2 recalls the main features of the UAM regarding these roles. Innovation has been included even though there is not a strong institutional commitment for it beyond academy scope. PIIDHC has is also mentioned as an UAM innovation component. This follows the logic that with Chiapas as a Rural-SI, and PIICHC as a major player of this Rural-SI, then PIIDHC constitutes a concrete attempt at innovation engagement. In the remainder of this chapter we will focus the discussion on PIIDHC as an incipient step for innovation capacity building.

7.2.1. **Education- Providing human capital**

The initial scenario for Chiapas was a blend of problems such as low levels of human development in terms of life expectancy, poverty and illiteracy, severe gender and health problems, insufficient infrastructure, strong migratory patterns and generalised mistrust of communities against governmental institutions and some NGO's.

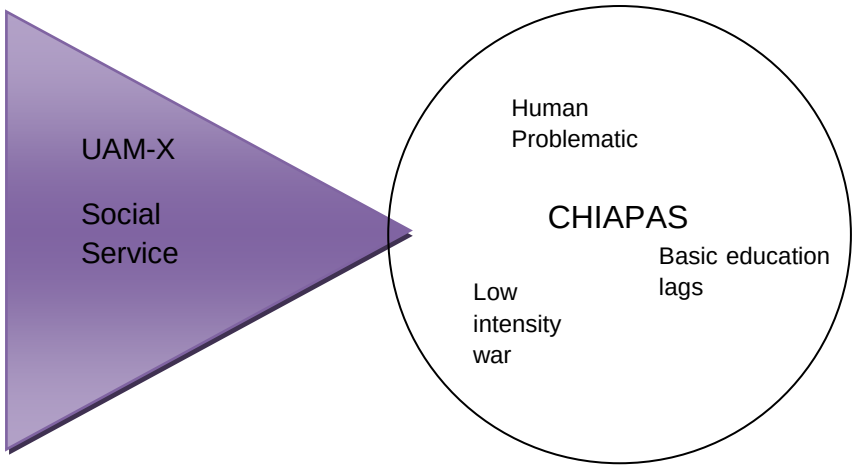


Figure 7-3 Initial scenario for PIIDHC

The arrival of UAM to Chiapas through social service sets the start point of the university commitment for contributing to the human development situation from an educational perspective. Medicine practices constitute the entry mechanism for further disciplines to place social service practices in the area. Later, the undergraduate practices expanded to postgraduate. Until this point the education role had developed with students as their main user. However by developing teaching schemes for communities such as diplomas, the university acquires an indirect role, by reaching community leaders using the students as intermediaries.

The outcomes of this educational component benefit both university and communities. The participating students experience a situation where they can exercise as a problem identifier, problem solver, and an innovator, which are *symbolic analyst's skills*. On the communities and participating organisations side, local promoters become more knowledgeable and the educational material remains under their property. In addition, by hiring participating graduates after their graduation, the organisations also increase their human capital. Knowledge diffusion is enhanced by the local leaders and local promoters as spread agents.

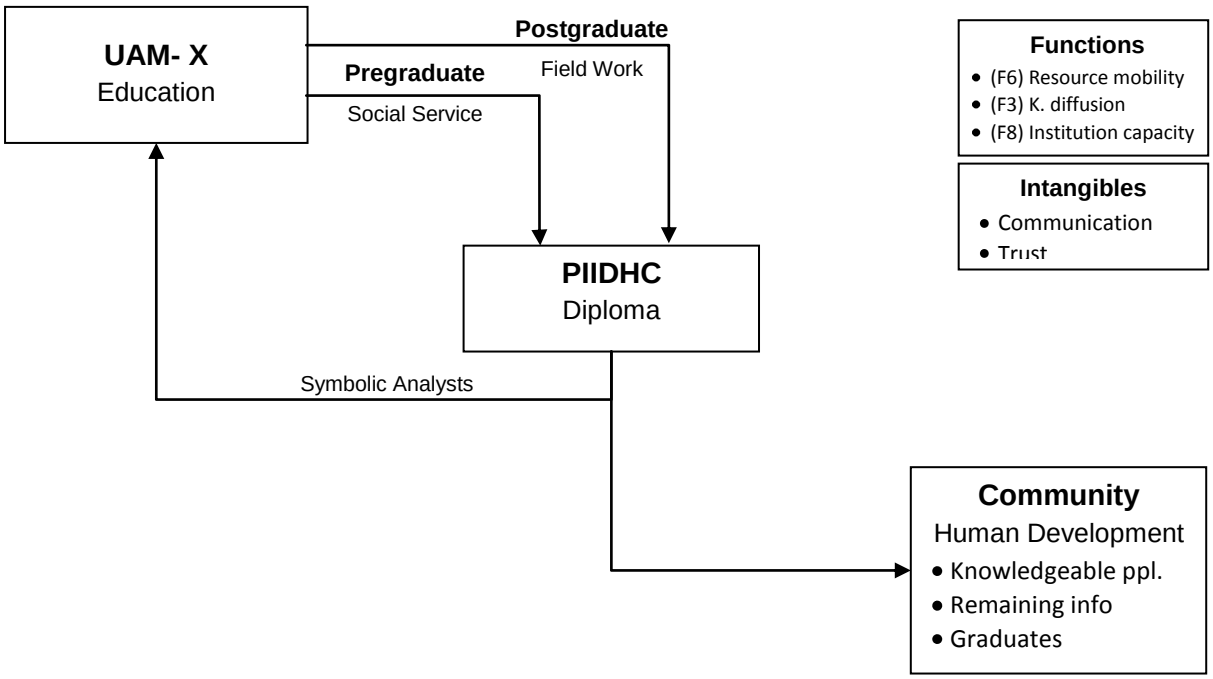


Figure 7-4 *Education Component*

Construction of communication

The educational stage involves several challenges. The first challenges for the programme is the establishment of dialogue conditions that enable communication between university and society, i.e the academic language versus the everyday language. That the academy can understand the everyday language and that communities can understand academic language require two different processes.

The first process requires that the members of the university get closer to the community, and have a disposition to learn from it. Students, researchers and professors must "understand" the community dynamics, and interact respectfully with its institutions. In the case of PIIDHC, this is achieved partially by methodologies that promote intercultural approach, such as the diploma entitled 'Sustainable Human Development'.

The second process requires that the community should also be able to understand the academy, and that means having the ability and trust to participate in the discussions about community's problems. Such abilities are built upon the transference of knowledge and skills from the university. In the case of Chiapas, this refers to the organisation of diplomas and training courses with the assistance of the communities in the areas of health, environment, production, and governance.

Trust

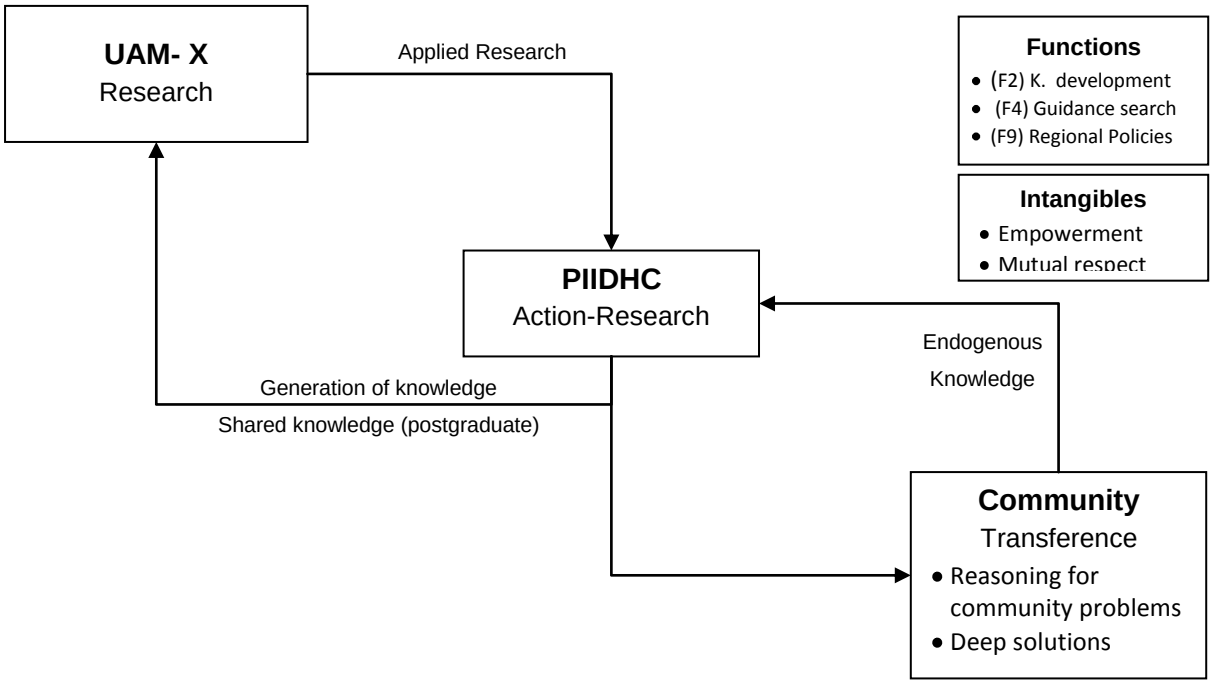
The construction of trust is perhaps a more challenging task. This is particularly true in the case of Chiapas, where the communities display high levels of scepticism and mistrust toward government and some NGO's. The strategy implemented by PIIDHC to win the trust of the communities is *continuity.* The university needed to show its commitment towards the existing problems, and slowly the communities were becoming more open to accept universities' propositions. Nevertheless it is worth to mention that the compromise with the communities did not necessarily imply agreement with communities' political views.

7.2.2. **Research- Transference**

After delivering knowledge to the communities, the programme sought to assist the communities from another perspective. The PIIDHC authorities saw the need for deeper understanding and long term solutions on the economic, social and environmental causes of situation. This set the starting point of the research stage.

The main objective of the research component is to reach deeper understanding of the different dimensions of the Chiapas problem. The programme leaders intended to develop effective and long term strategies for the resolution of their problems. The main characteristics of this component were: the teacher-researcher scheme in practice for UAM professors; the emphasis in applied social research; and the traditional indigenous knowledge as input for the enquiry process. The research outcomes have also been shared with local government in the analysis of particular cases.

Figure 7-5 *Research Component*



The research approached at the PIIDHC differs from traditional approaches of the researcher as an external observer from the field of study. Instead, the researchers were embedded in the indigenous context and received important inputs regarding the methods and content of study. Traditional knowledge became an important source of information. This promoted more symmetry between traditional knowledge and endogenous knowledge, which constituted a further advance in the construction of *mutual respect* between the actors.

In addition, the close interrelation between actors in the definition of research priorities provides a valuable safeguard against the risk of misleading research. The social capital also provides better ground for orientating innovation interventions as described in the next section.

7.2.3. **Innovation**

The innovation component is characterised by knowledge capitalisation or direct outcomes to the organisation in terms of organisational, product and process innovation. The innovation component has a strong connection with the research component. Despite the benefits of long term focus, communities were unlikely to accept a research component only. The emergency of Chiapas social problems demanded the materialisation of knowledge into concrete tools for regional advancement. The university and communities were willing to work together for strategies with a concise character.

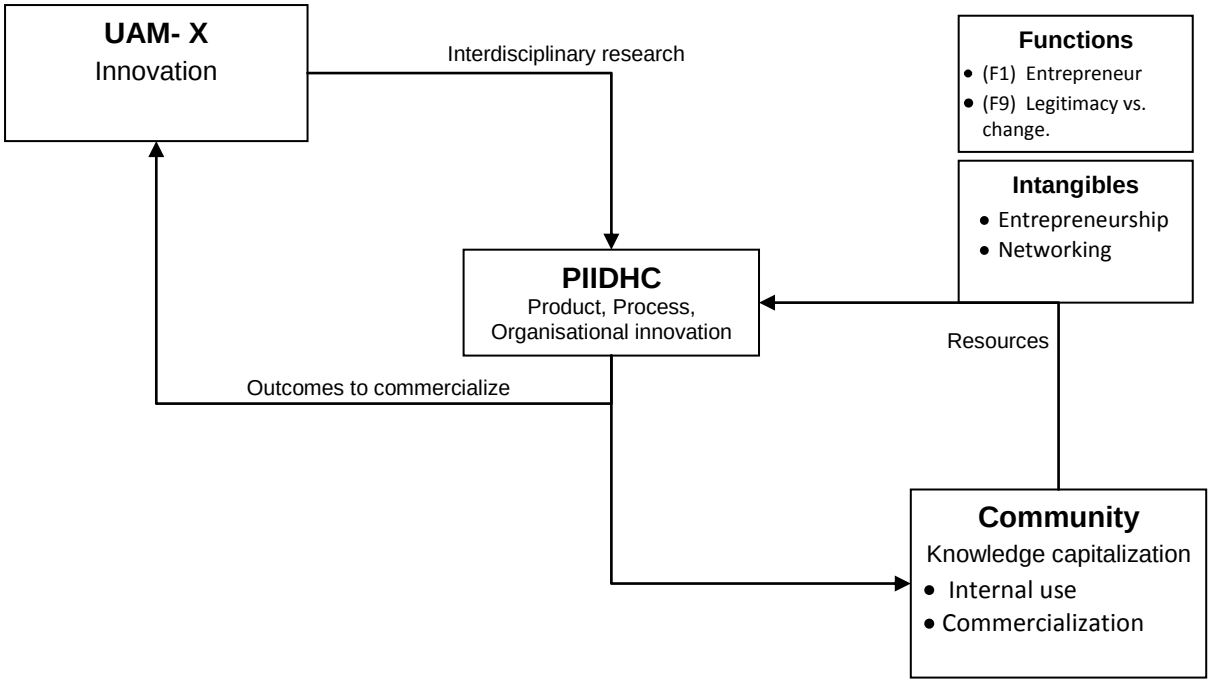


Figure 7-6 Innovation Component

The innovation component focuses on generative practices, where the university is required to develop capabilities different from training or research. Those include the

interdisciplinary design projects, adviser role for civil organisations, NGO's and government institutions, support for new business, and as a powerful institution to lobby for changes at the government level. However, the step towards these types of activities was not slight since it derived from the implementation of action research methodologies.

This apparent dilemma between service and research is not only resolved by stating as research objectives the search for long term solutions, but also by *empowering* communities to become autonomous in the resolution of their own problems. Due to the little financial support by the university to the PIIDHC, the programme leaders were forced to look for additional funding sources through NGO's. The PIIDHC assumes an active *networking* role.

7.3 University fulfilment of Rural-SI functions

The previous section described the education, research and innovation components of the PIIDHC. Each of these components supported the Rural-SI in a particular manner. The following discussion lists the concrete examples of the activities carried under the education (E), research (R) and innovation (I) stages. For the sake of completeness it is necessary to precise that the functions proposed in section 2.2.3 were chosen by the author, and are far from describing the innovation process in rural innovation accurately.

Function 1: Entrepreneurial activities. According to Hekkert et al., (2007) the role of the entrepreneur is to turn the potential of new knowledge, networks, and markets into concrete actions to generate–and take advantage of–new business opportunities. PIIDHC takes part in entrepreneurial activities by analysis of productive processes (I), and the establishment of committees for improvement of productive processes (I).

Function 2: Knowledge development. Knowledge development encompasses learning by searching and learning by doing, or in terms of Lundvall as learning, searching and exploring (Lundvall B.-A. , 1992, p. 11). As a research programme, this is an inherent function of PIIDHC, but it is important to exalt the inclusion of local knowledge as input for the research (R), and the capitalisation of such knowledge by applying action research methodologies (I).

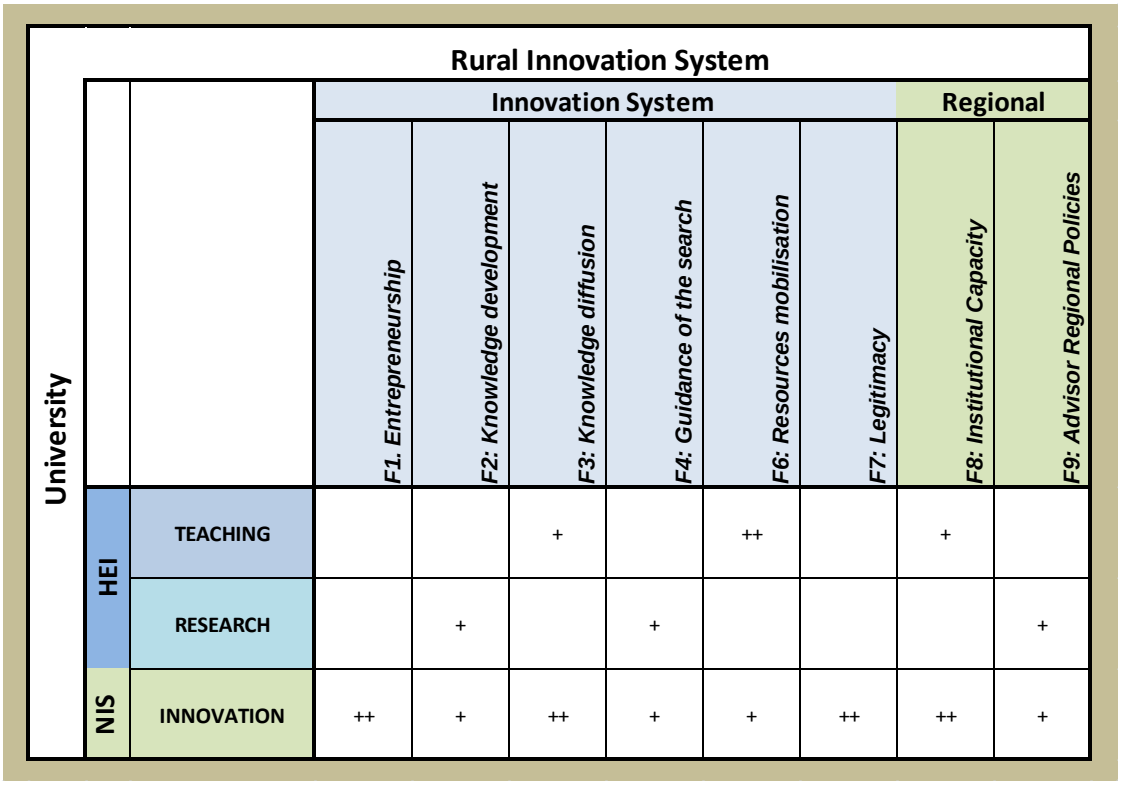


Figure 7-7 Mapping functions of PIIDHC

Function 3: knowledge diffusion through networks. According to Everett Rogers diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion implies a social change that affects the structure and function of a social system, which can occur spontaneously or by planned intervention (Rogers, 1995). Under this definition, it is possible to highlight the efforts of PIIDHC to share knowledge through Diplomas and other methodologies (E). Furthermore the programme has assumed the role of *knowledge network coordinator* by harmonising actions and processes among NGO's (I), and by promoting dialogue between organisations to improve economic transactions (I).

Function 4: guidance of the search. According to Hekkert et al. (2007), this function emphasises that technological change is not autonomous. Changing preferences in society, if strong and visible, can influence R&D priority setting and thus the direction of technological change. In the agricultural environment this is particularly true, and its omission has caused the failure of previous schemes for agricultural technological development (Hall et al., 2006). PIIDHC has approach this issue by defining a long term vision for research that complement the execution of more immediate -generative projects (R), and by using participatory schemes for project definition and project development (I).

Function 6: resources mobilization. Resources, both financial and human capital, are necessary as a basic input to all activities within the innovation system. The UAM has contributed to the human capital transference to Chiapas by providing training for local promoters in health, environment and production topics (E). An unplanned effect has been the *absorption* of participating students to local organisations once graduated (E). The financial limitations of the programme have been overcome by supporting NGO's in the consecution of resources (I).

Function 7: creation of legitimacy/counteract resistance to change. In order to develop well, a new technology has to become part of an incumbent regime, or it even has to overthrow it. This function can be analysed by mapping the rise and growth of interest groups and their lobby actions (Hekkert et al, 2007). Here again the use of participatory schemes for project definition and project development (I) enforces the consensus in the research orientation between the interest groups. Also by strengthening of organisations (I), they develop more advantageous position to lobby and negotiate.

Function 8: Institutional Capacity. As referred by Cooke et al,, (1997) in order to stimulate systemic innovation at regional level, the financial, learning and productive 'cultures' among the SIs actors that must coexist. This function deals with the contribution of PIIDHC to support the coexistence of these cultures among the participating organisations.

PIIDHC makes explicit its commitment with to institutional building through its research line in Social Strategies, Public Policy and Power Relations (SS-PP-PR). In addition, by participation in the university postgraduate programmes, the organisations enhance their human capital (E). Additional functions via consultancy in organisational and methodological issues (I) and the support in the creation of new organisations (I) also contribute to network development.

Function 9: Adviser regional policies. Following a similar motivation as the previous function, universities are called to support local governments in innovation policies. Despite the lack of guidance on the role played by universities in regional governance, the PIIDHC has covered this role also through the research line in Social Strategies, Public Policy and Power Relations (SS-PP-PR). The participation of the programme included activities for the simple provision of information and analysis to support decision-making as in the case of the research of biodiversity (Chimal, 2000) (R), until more complex interventions as in the evaluating of the rainforest programme for the human development advance (I).

7.4 Summary

This chapter presented the validation of the theoretical propositions in Chapter 3. The case study was rewritten in a format more suitable for comparisons with the research framework. The propositions presented in chapter 3 were successfully verified. Firstly that the framework of Rural-IS provides relevant elements to analyse the innovation activity in Chiapas. Secondly, that the actions developed under the PIIHC include education, research and innovation components, and that each stage contributes in a particular way to the construction of the Rural-SI. And finally, that overall PIIDHC contributes to a lesser or greater extent with all the proposed functions for the Rural-SI framework.

Chapter 8 Conclusions and Discussion

Throughout the document the secondary research questions have been developed from theoretical, empirical and analytic perspectives (sections 2.3, 3.4, 5.4 and Chapter 7). The objective of this chapter is to compile these discussions in answering the primary research question.

Q_0: *Why and how can universities guide the rural innovation engagement process in the context of Latin America?*

The discussion has been divided in three main parts. The first part focuses on the *why* of rural innovation engagement: this means the motives for Latin American universities to engage in programmes for rural innovation. The second deals with the *how* or guidelines for universities to consider when developing such processes. Finally, some additional points of discussion are suggested as reflection on the relevance of rural engagement.

8.1 Reasons for university engagement for rural innovation processes in Latin America

Rural innovation appears as a concept for enforcement rural development through innovation. Rural areas are called to participate in knowledge-based economies while overcoming global challenges such as globalisation, natural resources detriment and urbanisation. In order to succeed in such ambitious goals, human capital formation and knowledge development become priorities to enforce Rural System of Innovation. Consequently, universities appear as main players in the promotion of knowledgeable workers and innovation activity.

However, Latin American rural scenario (i.e. reliance on natural resources, generalised underdevelopment, and little concentration of higher education activity) imposes large difficulties in those aims. Therefore, universities must develop clever strategies to deal with such limitations while supporting the rural innovation processes. Although this economic discourse already provided important arguments to justify university engagement for rural innovation, the ideas developed throughout the following discussion provide more concise arguments for such commitments.

8.1.1. **Contribution to National HEI and NSI**

The first set of reasons correspond to the pertinence of universities to the national higher education HE system and national system of innovation NSI. In other words, the universities' commitment for rural areas should not interfere with the contribution to national goals. The inclusion of universities within the national HE and NSI implies

that universities should adjust to the main policies, while making use of the instruments designed at national levels.

By committing themselves to rural innovation, universities should not forget the global scenario, or as in terms of OECD, remain "*globally competitive, locally engaged"* (OECD, 2007). In the analysed case, the federal status of UAM enforces that the local community engagement would transcend towards the national reality, The PIIDHC objectives (section 6.1) go along with the university objectives; namely, to achieve understanding of national problems and to propose new schemes for university-society relationship and models for teaching. These propositions not only comply with the national requirements for Mexican higher education (Varela, 2006), but also for Latin America (Thorn & Soo, 2006). The coincidence between the engagement program with the national priorities implies a recommendation for universities to upscale the developed capabilities for rural innovation to the institutional and, if possible, national scenario.

The social service constitutes an example of the impositions of national frameworks. The low concentration of human capital in rural areas constitutes a goal but also a restriction for universities on the national level. This fact makes it unrealistic to assume that the provision of graduates would be sufficient for transferring human capital to those regions. Consequently, such transference should make use of other national possibilities (see section 8.3), such as the social service practice for the case of Mexico. In the PIIDHC case, the programme not only made use of this national policy for graduates compulsory practices, but devoted important efforts to implement it into a cohesive strategy of local engagement. The proposition of UAM-X regarding rural engagement not only takes elements of the national policies for social service, but furthermore develops a coherent proposition to maximise the benefits of this unexploited instrument.

Regarding knowledge development, by committing with rural communities, universities also face one of the main threats of technologic advancement: *ignoring the user side*. Previous schemes of agricultural technology transference failed due to the little involvement with the rural communities for the definition of priorities and methods. While the SIs approach already proposes dialogue and interaction between actors, still the rural scenario imposes perhaps the most challenging case for establishing *knowledge dialogue* between the universities and communities. Knowledge dialogue refers to the interaction between tacit and codified knowledge, and the balance between university and community priorities. The reason to consider the rural scenario as challenging deal with complex interests linking rural livelihoods, sustainability, and social and cultural factors. Rural scenario provides important possibilities for universities to develop their holistic and networking character, as required for a System of Innovation approach.

8.1.2. **Exercise on SIs approach**

The second set of argument corresponds to the exercise of the characteristics of the SIs approach, namely holistic, interdisciplinary, interdependent and evolutionary in nature as described by Edquist (2005).

Holistic

The demand for a holistic approach regarding rural innovation implies that innovation activity should not only pursue to influence the economic scenario, but to contribute to more holistic schemes for rural advancement. The proposition of a Rural-system of innovation Rural-SI constitutes a framework based on the sustainability and new rurality approaches, and combining a regional and agricultural scenario. What all this means for the universities is, once more, the need to look at rural innovation from a social, environmental and economic perspective, and to make use of social capital and the existing agricultural knowledge institutions.

The PIIDHC proposition for Chiapas aimed at human development rather than human capital only, confirming the need for a holistic approach. Still it is worth to mention that the programme leaders recognised, in the productive dimension, the most critical dimension of the Chiapas situation. The construction of a holistic approach is not exclusive for Latin America, also in western countries several authors (Gunasekara, 2006; Andersson, 2009) draw attention to universities to adopt comprehensive perspectives towards local needs.

Interdependence

The System of Innovation approach implies that beyond the traditional outcomes of the universities namely, knowledgeable graduates and applied research, those are requested to interact actively with the other network actors within the Rural-SI. By interacting, actors are encouraged to search for complementariness that leads to more efficient resource management. In Chiapas this is explicitly noted when the programme leaders admitted that the establishment of partnerships with local institutions had supported the procurement of the financial resources necessary for PIIDHC continuity. The proactive network character is therefore an additional capability that universities are urged to develop in order to penetrate the barriers of rural innovation.

Interdisciplinary

Along holistic and networking, the participation in Rural-SI demands interdisciplinary component. In the case of the PIIDHC there were four clear research lines which interacted in the areas of product, process and organisational innovation. The example of the interdisciplinary design methodology (section 6.3.3) depicts the added value when considering multiple perspectives in the development of innovative propositions. It is likely that PIIDHC success lies in the abilities of UAM-X students to work in multidiscipline groups stimulated by group working methodologies at the institution

(Section 5.3.2). However, traditional teaching schemes in Latin American universities do not emphasise as much as the UAM in promoting an interdisciplinary character.

Evolutionary

The evolutionary character implies that the definition of a strategy for community engagement should be flexible to external circumstances. Those circumstances could be the fluctuation in the available resources, major events referred to the network actors, or simply the evolution of the programme in the fulfilment of Rural-SI functions. However, this does not imply that developing a strategy for rural engagement is pointless; rather that such strategy should aim at constructing innovation capacity despite of possible multiple changes at the environment. The PIIDHC spontaneous character illustrates the evolutionary character of such. The academic propositions have been adapted to the constantly changing environment; nevertheless the main goals and methods of the program remain unchanged.

8.2 How to coordinate university capabilities to fulfil the rural innovation requirements?

The process of university engagement for rural innovation was understood as being composed by two main parts. Firstly, prior to considering the university's role, the understanding of characteristics and requirements of rural innovation should be pursued. This research contributes to the proposition of eight functions in the development of innovation activity in rural environment. The second part uses as starting point the main university functions namely, training and research, as basis for the construction of rural innovation programmes. This research devoted considerable attention to the theoretical justification and empirical validation of these propositions. Therefore, the reader is invited to review chapters two and seven for the detailed review of these discussions. At the end of section 3.3 the author stated some questions related to the fulfilment of the Rural-SI functions in connection with universities' capabilities. This section discusses such questions.

1. Are the Rural-SI functions entirely fulfilled within a specific university function? R/ Depth

The possibility to develop the Rural-SI functions at multiple levels increases the depth in the fulfilment of such functions. For the case of PIIDHC the guidance of the search (function 4) is encouraged by the use of participatory methodologies and developing long term vision projects. Another example is the inclusion of undergraduate and postgraduate students which facilitates the attention to both long term and short term plans. The multiple attention and reinforcement of functions is also mentioned in several cases of western countries, such as the enhancement of entrepreneurship by means of promoting activism among undergraduate students at the University of

Twente (Garlick, Benneworth, Puukka, & Vaessen, 2006), or the inclusion of local industry in the classrooms as in Sweden (Benneworth, Coenen, Moodysson, & Asheim, 2009). In conclusion, universities are free to choose more than one type of activity while fulfilling any of the innovation functions of dealing with dualities. This is referred here as providing a depth dimension to the matrix of university – Rural Innovation engagement.

2. What external factors support or restrict the fulfilment of those functions? R/ University, Governments and Communities power symmetry.

In the discussion about which functions should Rural-SI aim to fulfil, was mentioned the relevance of Regional Innovation System approach as complement for the specifics of innovation activity in the sectoral perspective. Consequently, the definition of functions included the interaction with the other two main players for regional development, i.e. communities and governments (Functions 8 and 9).

Most of the innovation literature has been developed in western countries, where the main three actors of SIs displayed relatively power symmetry. However, this is rarely valid in rural Latin America. Universities willing to engage with rural innovation must acknowledge the power asymmetry with the other two actors. Is the community able to accept universities' propositions? Is it willing? What type of assistance is the local government interested in getting from the university? What mechanisms are in place for enhancing the political power of the universities? Depending on the answer to these questions, universities must plan their strategies for regional engagement.

3. What mechanisms could universities use to build up capabilities necessaries for rural innovation? R/ Institutional learning

The challenges for university engagement in rural innovation are large. The adaptation of new characteristics within the SI approach (i.e. holistic, interdisciplinary, intercultural and evolutionary), the need to support other Rural-SI actors, and moreover, the need to deliver outputs to the national HE system and NSI. All this might appear overwhelming for the traditional universities in Latin America. However, there are strategies for doing so.

Similar to any project, universities could use a SWOT analysis to formulate their strategies. This means to look at the institutional character for identifying the strengths and weaknesses and to critically evaluate the environment. Initial disadvantages could become opportunities to develop new skills. The initial restriction of the geographical separation between the university and Chiapas imposed that the field visits became very efficient. Consequently the assistance visits that required more presence with the communities were slightly replaced by more developmental visits, aiming at promoting capacity building.

Despite of the external challenges, the starting point for UAM has been very valuable. The university has a strong institutional character and well recognised reputation for its research excellence. However, this could be different for the traditional Latin American universities. For most of the Latin American universities the starting point is oriented towards the provision of high quality education. This supports the claim that universities could base their innovation mission on the already developed capabilities in education and research.

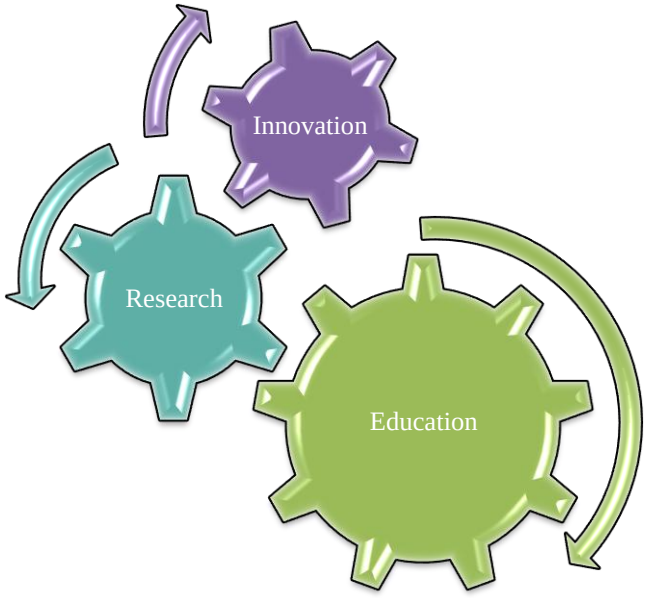


Figure 8-1 Combining Education, Research and Innovation roles

Even in case universities do not establish specific programmes for rural innovation, enhancing innovation capabilities in future graduates is per se a significant contribution to the NSI. In the case of Chiapas, despite the local outcomes, there is no guarantee for entitling PIIDHC as an initiative for rural innovation. However, by interweaving the teaching, research and innovation roles, there have already been significant outcomes in synchronising those roles. The full synergic potential for incorporating innovation in education and research functions are yet to be discovered.

8.3 Further Discussion Points

Next to the discussion of the *why* and *how* of university's engagement in rural innovation, the following paragraphs stress some interesting topics encountered throughout the realisation of this research that caught the authors attention. The reader is invited to reflect on the implications of the mentioned propositions.

Psychological Dimension

Universities must acknowledge the relevance of the psychological factor of innovation (Section 2.2.2). The case of Chiapas highlights the relevance of a cultural fit between universities and indigenous communities. However, the relevance of psychological dimension is not exclusive of rural regions with delicate political circumstances as in the case of Chiapas. Andersson (2009) points out the significant flaws in the policies for enhancing innovation in rural Finland. According to his research, the lack of attention to the social context and the little identification of the communities with the leaders of innovation projects restrict the social interaction component. Universities must acknowledge the relevance of symbolic capital in earning the trust of communities.

Holistic advantage of universities

Most of innovation literature focuses on engagement in innovating the technical and basic science universities. However, there is little mentioning about the contribution of social and artistic perspectives to enhance innovation. The case of Chiapas exposes a coincidence: the multiple dimensions of the regional problems and the wide range of disciplines within the university. Undoubtedly social and health sciences would provide a significant contribution to the enhancement of holistic and interdisciplinary approach necessary for SIs.

The value of learning how to teach

In knowledge-based economies individuals face new sources of knowledge and complex global dynamics everyday. Firms and individuals are challenged to develop mechanisms to learn - and sometimes unlearn – concepts and skills at an accelerated pace. Therefore, the premise that individuals, firms and even communities are challenged to learn how to learn is widely acknowledged. In this context, universities are not only responsible for the learning capabilities, but why not a teaching capabilities. Therefore, it might see valid that universities choose to *teach how to teach* as a contribution to the knowledge society construction.

Strategies for human capital transference.

As mentioned in the discussion on human capital transference for local communities, the social service constitutes a valuable tool for this in rural Latin America (GUNI, 2007). Although the potential benefits of such types of practices are very valuable for underdeveloped regions, the challenges for their coordination impose several limitations for the development of their potential. Its success depends on coordination efforts made among the receiving institutions, universities and the students.

Another possibility is the selective approach for human capital. As in the case of Chiapas, universities can choose to focus training efforts in few special members of the community (i.e. leaders, people with higher levels of education or social role). This special treatment is subjected to the promise that those individuals transfer the received instruction to their communities.

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Appendix A PIIDHC Partner Institutions

The NGO that have had relationship with the PIIDHC are: (in Spanish)

Salud y desarrollo Comunitario A.C.
Casa de Apoyo a la Mujer A.C, Palenque
Centro de Derechos Humanos “Fray Pedro Lorenzo de la Nada”, Ocosingo
Enlace, Educación y Comunicación, Comitán y Ocosingo
SERAPAZ
AMEXTRA
Pastoral de Ocosingo
Promotoras Comunitarias de Centra, Tabasco
Familiares de los Presos del Penal de Ocosingo

Producer organisations (in Spanish):

Almácigos La Concordia S.P.R. de R.L.
Asociación Ganadera local social Pijijiapan
CAMADDS
Comunidades indígenas de la región de Simojovel de allende S.S.S.
Coordinadora de pequeños productores de café de Chiapas A.C.
Financiando el desarrollo de Chiapas S.A. de C.V..
Finca triunfo verde S.S.S..
Organización de productores Agroecológicos S.S.S..
Campesinos ecológicos de la sierra madre de Chiapas S.C.
Centro Ecoturistico Cascadas Brisas "Las Nubes" S.C. de R.L. de C.V.
Comercializadora de productos Agroecológicos S.A. de C.V.
Comercializadora MAS CAFES S.A. de C.V..
Ejido de Chiringuicharo, Maravilla Tenejapa
Flor del cafetal S.S.S.
Ganadera local frontera sur
Indígenas y campesinos de la Sierra Madre de Chiapas, San Isidro Labrador. S.S.S.
Kulaktik S.S.S.
Nubes de oro S.S.S.
OPEZ
Organización de productores Agroecológicos S.SS.
Organización de productores de café de Angel Albino Corzo
Pescadores unidos de Malpaso S.A. de C.V.
Productores agropecuarios de la selva lacandona S.S.S..
Productores de cacao del Alto
Productores orgánicos de la victoria S.C.. de R.L.
Productores orgánico Cholombola
Quesos de la selva S.C. de R.L..
Sistema producto apícola del estado de Chiapas
Unión de ejidos y comunidades cafetaleras beneficio Majomut de R.L. de C.V.

Unión de pequeños productores de zonas marginadas del sureste de México S.P.R de R.I..
Unidad de producción forestal ejidal
Unión de ejidos san Fernándo

Government organisations (in Spanish)
BANCHIAPAS