

Corona, Eduardo Ivan Palavicini

Conference Paper

Assessing LED from below in Mexican municipalities: A quantitative analysis for the period 1990-2005

50th Congress of the European Regional Science Association: "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Corona, Eduardo Ivan Palavicini (2010) : Assessing LED from below in Mexican municipalities: A quantitative analysis for the period 1990-2005, 50th Congress of the European Regional Science Association: "Sustainable Regional Growth and Development in the Creative Knowledge Economy", 19-23 August 2010, Jönköping, Sweden, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/118800>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Assessing LED from below in Mexican municipalities: a quantitative analysis for the period 1990-2005

Iván Palavicini Corona¹

1. Introduction

The aim of this paper is to examine quantitatively if bottom-up local economic development (LED) strategies have had a significant effect on the development of Mexican localities. This is because bottom-up policy actions towards the economic development of places have been recommended by scholars and multilateral organisations, and accepted by NGO's and local actors around the world since 1990.² Despite the numerous success cases documented by academics and practitioners, the impact of bottom-up LED strategies on the development of places has not been sufficiently assessed in general,³ and in Mexico, in particular. Almost two decades ago Hughes, J.⁴ and Teitz, M.⁵ recommended to encourage better analyses and evaluations of the processes and outcomes of LED policies, and the OECD ten years later was still highlighting the lack of analyses of LED strategies that could inform if they actually make a difference and at what extent.⁶ This is precisely the main purpose of the analysis of the Mexican localities undertaken here.

Impact evaluation exercises commonly consider particular targeted programmes to be assessed in order to find out their net outcomes and compare them with programmes' goals. This helps to advice on the continuity of policies and the design of further strategies.⁷ The case of LED in Mexican municipalities is different because LED from below in Mexico has not been pervasive as a comprehensive strategy. For example, in the case of Jalisco LED has been a state level actors' prerogative from which some municipalities have benefited but LED strategies have not been municipal in origin, focus and leadership. In other cases such as the

¹ PhD student, London School of Economics and Political Science.

² Pike, A., Rodriguez-Pose, A. and Tomaney, J., 2006. *Local and regional development*. New York: Routledge; Potter, J., Walsh, J., De Varine, H. and Barreiro, F. 1999. *Best Practices in Local Development*. Paris: Local Employment and Economic Development Programme, OECD-TDS.

³ Gordon, I. and Low, M. 1998. 'Community, locality and urban research', *European Planning Studies*, 6, 1, p. 5-16

⁴ Hughes, J. (1991). 'Evaluation of local economic development: a challenge for policy research', *Urban Studies*, 28, 909-918.

⁵ Teitz, Michael. (1994). 'Changes in Economic Development Theory and Practice'. *International Regional Science Review*, Vol. 16, Nos. 1 and 2, pp.101-106.

⁶ OECD, (2003). *Entrepreneurship and local economic development: programme and policy recommendations*. Paris: Organisation for Economic Cooperation and Development. OECD (2004). *Fostering Entrepreneurship and Firm Creation as a Driver of Growth in a Global Economy*. Organisation for Economic Cooperation and Development, Paris.

⁷ Melvin, M. et al. (2000). *Evaluation: An integrated framework for understanding, guiding, and improving policies and programs*. Jossey-Bass Pub., San Francisco, CA, U.S.

municipality of Chihuahua LED strategies have been promoted but this is far from being the generality in the whole country. In other words, the bottom-up approach in the period of analysis was not recognised as such at the municipal level in the majority of Mexican municipalities even when some of its policies were undertaken or the presence of some of its key elements was identified. The analysis proposed here does not intend to evaluate the results of a particular municipal experience nor advice on its further developments but to identify the concrete effects of the different LED key elements when they have been considered in municipal development strategies in Mexico.

My hypothesis is that bottom-up LED policy actions have played a significant role in the development of the Mexican localities where these policies have been implemented. To test it, a quantitative analysis is proposed and carried out to estimate the potential effect of the implementation of LED strategies at the municipal level in Mexico during the period 1990-2005. The main limitation in proposing a model specification to study the effects of the bottom-up LED strategies in Mexico is the scarcity of information on these strategies, and of relevant databases at the municipal level for the control variables. In addition, the dependent variable cannot be the change in GDP or income per capita which is more widely used to study the economic performance of places. Instead, a municipal development index (MDI) is calculated and used as dependent variable.

The first section briefly introduces the LED from below perspective towards the development of places and relates it to the human development concept and main calculation; the second provides detailed insights into the proposed model specification alongside with an explanation of some data issues and model diagnostics. In a further section, the model results are unveiled and commented. Some conclusions and lessons are presented in the final section. In the remaining of this document references to the bottom-up perspective will be mentioned solely as LED strategies or the LED approach unless specifying other thing.

2. The bottom-up strategy towards local economic development: Rationale, fundamental elements, and the link between the LED approach and human development.

This section is devoted to clarify what the LED approach is and involves alongside with its relation to the human development ideals.

2.1 A brief introduction to local economic development: Background and main features

Local economic development can be stimulated or influenced by both national governments' interventions and by regional or local ones. However, since the start of the 1990s local and regional design and implementation of development strategies have been increasingly adopted and, in general, governments are no longer either the sole or predominant actors in the development process.⁸ Academics have found that top-down approaches have had fundamental limitations. For example, some studies have presented evidence in the direction of negative impacts of top-down or centre-down approaches to economic development when lagging behind countries, regions or localities are concerned.⁹ Cases range from the large amount of transfers from rich regions to impoverished ones in countries as different as Italy and Mexico, to sectoral approaches within the import-substitution strategy in Latin American countries.¹⁰

The following lines from an OECD document on LED best practices set the main characteristics of the approach and give further insights on its rationale:¹¹

Local development is a wide ranging concept that can best be seen as a process through which a certain number of institutions and/or local people mobilise themselves in a given locality in order to create, reinforce and stabilise activities using as best as possible the resources of the territory. It can be seen as a bottom-up attempt by local actors to improve incomes, employment opportunities and quality of life in their localities in response to the failure of markets and national government policies to provide what is required, particularly in underdeveloped areas and areas undergoing structural adjustment. Local development policies also contribute towards the goal of strengthening local participation and democracy... There are many different public and social actors involved in local development policies. The public actors comprise local and regional authorities and offices of central government. The social actors include employers, community and voluntary organisations, trade unions, co-operatives, development agencies,

⁸ Pike et al. op.cit.

⁹ Boisier, S. (1999). 'Desarrollo Local: ¿De qué estamos hablando?'. Cámara de Comercio de Manizales, Colombia; Crescenzi, R. and Rodríguez-Pose, A. (2008). 'Infrastructure endowment and investment as determinants of regional growth' in the European Union'. *EIB Papers*, 13, 2, pp. 61-101; Gramlich, E., 1994. 'Infrastructure Investment: a review essay', *Journal of Economic Literature*, 32, 1176-96; Puga, D. (2002). 'European regional policies in light of recent location theories'. *Journal of Economic Geography*, 2, pp.373-406.

¹⁰ Loddo, S. 2004. 'Old and new intervention policy: a survey of empirical studies for the Mezzogiorno', Centre for North South Economic Research, University of Cagliari and Sassari; Pike et al. op.cit.

¹¹ Potter et al. op.cit., pp. 21

universities and so on. The mix of actors involved and their relative influence varies from country to country and from area to area. However, the involvement of networks of local people and agencies is a key defining feature of local development approaches.

Ten years later Vázquez-Barquero¹² sees the LED approach as an alternative to effectively face the global economic crisis. He emphasises the notion of economic development in terms of a broad and structural process with both qualitative and quantitative impacts and not purely economic growth effects. LED experts coincide in that this approach involves a process with a long term perspective and they highlight the importance for its success of taking into account economic and social local dynamics, as well as interactions between local actors and among them and external ones.¹³ Thereby, a LED strategy demands designing a strategic development plan which considers a deep diagnosis of the local economic, socio-economic and organisational situation and prospects. This contributes to inform on the specific LED policy toolkit that is necessary to achieve the agreed LED goals.¹⁴

Finally, another factor that adds relevance and pertinence to the LED approach is the changing role of central or national governments as a result of the adjustments that have been put in place around the world to face the challenges and opportunities of the globalisation process.¹⁵ Local authorities have been seen as main actors in local economic development processes and public services' delivery.¹⁶ The public choice theory supports this trend by suggesting that devolution can improve the well-being of local people by increasing the efficiency in resources allocation towards satisfying their needs and wishes according to their preferences.¹⁷ In addition, in Latin American countries, in general, and Mexico, in particular,

¹² Vázquez Barquero, A., 2009. Desarrollo Local, una estrategia para tiempos de crisis'. *V Seminario Internacional de la Red de Desarrollo Económico Territorial y Empleo para América Latina y el Caribe*. Rafaela, Argentina. http://www.dete-alc.org/docs/1243445697_docs.pdf (accessed January 12, 2010).

¹³ Helmsing B. (2001). *Partnerships, Meso-institutions and Learning. New local and regional economic development initiatives in Latin America*. Institute of Social Studies, The Hague, Netherlands; Pike et al. op cit; Ibid.

¹⁴ Cities Alliance, (2006). *Understanding your local economy: A resource guide for cities*. The Cities Alliance, Washington; CLAEH-ALOP (2002). *La construcción del desarrollo local en América Latina: análisis de experiencias*. Programa Alianzas Estratégicas para el Desarrollo Local en América Latina, Centro Latinoamericano de Economía Humana y Asociación Latinoamericana de Organizaciones de Promoción, Montevideo; Potter et al. op. cit; Pike et al. op.cit.

¹⁵ Cooke, P., 1989. *Back to the future: modernity, postmodernity and locality*. Unwin Hyman, London; Stöhr, W., 1990. *Global challenge and local response*. Mansell, London.

¹⁶ This has been manifested in different fora and publications of international organisations such as the Inter-American Development Bank (IADB), the OCDE, the World Bank, and the United Nations.

¹⁷ Gil, C., Pascual, P. and Rapún, M. (2004). 'Regional Economic Disparities and Decentralisation'. *Urban Studies*, Vol. 41, No. 1, pp. 71–94.

democratisation processes have favoured decentralisation efforts with the implication of giving more responsibilities and resources to sub-national governments.¹⁸

2.2 A development index for Mexican municipalities (MDI)

A prerequisite to suggest a municipal development index based on the United Nations Development Programme's (UNDP) Human Development Index (HDI) as a dependent variable is to know what is behind this measure and its main criticisms. The main message of the literature on the HDI is that despite of some methodological weaknesses it could be seen as an alternative or complementary measure to evaluate and compare the development of places.¹⁹ The use of a development index here obeys to the lack of comparable information on GDP per capita for Mexican localities for the years analysed. As one of the indicators of the HDI is income per capita, the development index proposed here (MDI) is slightly different to the one computed by the UNDP. This subsection presents its components and details of its calculation.

For Streeten the main advantage of the concept of human development is its focus on individuals considered alone and as a group.²⁰ This author emphasises that human development is both a means to higher productivity and an end in itself because, for example, there is evidence that higher incomes caused by higher productive capacity are not always closely related to improvements in human development dimensions such as education and health.

The idea of human beings as ends of development processes is supported by Anand and Sen who see on it an 'emphasis placed on what people get from development, not only what they put into it'.²¹ In other words, human development considers more than just economic development.²² Therefore, human development encompasses essential aspects for the quality of people's life such as being educated and socially integrated, avoiding diseases and getting

¹⁸ Enríquez Villacorta A. (2006). 'Desarrollo Local y Descentralización del Estado, Retos y Perspectivas en Centroamérica'. *Revista Pueblos y Fronteras Digital*, 1, http://www.pueblosyfronteras.unam.mx/index_n1.html (accessed January 12, 2010); Rodríguez-Pose A. and N. Gill (2002). 'The global trend towards devolution and its implications'. *Research papers in environmental and spatial analysis*, No. 72. London School of Economics.

¹⁹ Anand, S. and Amartya Sen (2000a). 'Human Development and Economic Sustainability', *World Development* Vol. 28, No. 12, pp. 2029-2049; Anand, S. and Amartya Sen, (2000b). 'The Income Component of the Human Development Index', *Journal of Human Development*, Vol. 1, No. 1, pp. 83-106; Streeten P. (1994). 'Human Development: Means and Ends', *The American Economic Review*, Vol. 84, No.2, pp.232-237; United Nations, 1993. *Human Development Report*. UNDP, New York

²⁰ Ibid.

²¹ Anand and Sen, 2000a, op cit. p.84.

²² Sagar A. and A. Najam (1998). 'The human development index: a critical review'. *Ecological Economics* 25, pp. 249-264

comfortable housing, among other things. However, Anand and Sen recognise the significance of human development not only as an end but also as a means because it has also been proved that improvements in human capital have contributed to a better economic performance in some cases.²³

Despite the data constraints that do not allow including exactly the same indicators of the HDI, Mexican databases at the municipal level provide information on other indicators related to the same dimensions considered by the UNDP (See figure 1). Instead of life expectancy as an indicator of people’s possibilities to enjoy a healthy life, the percentage of children who survive out of every 100 born alive is considered. Not other indicator as a possible proxy of a long and healthy life was found in municipal Mexican databases for the two years of interest (1990 and 2005). The knowledge component is basically the same except for the inclusion of the average number of approved years of education for people older than fourteen years old instead of the combined primary, secondary and tertiary gross enrolment ratio.

Health	Education	Standard of living
<i>% of children who survived out of every 100 that were born alive.</i>	<ol style="list-style-type: none"> 1. <i>Adult literacy rate.</i> 2. <i>Average number of approved (passed) years of education for people older than 14 years old.</i> 	<ol style="list-style-type: none"> 1. <i>% of houses with sewage, electricity and water inside the building.</i> 2. <i>% of houses with floor other than bare land (cement, wood, tile, etc.)</i>

Figure 1: Components of the development index for Mexican municipalities (MDI).

The HDI considers income per capita as the indicator for having access to the resources needed for a decent standard of living.²⁴ Anand and Sen note that the gain of including it on the HDI is an extension of its coverage ‘to take note of various capabilities that people value intensely and which are not reflected in figures of life expectancy and literacy’.²⁵ For example, some places achieve improvements in health and education but their population might still suffer from low quality consumption of goods and services.²⁶ Due to the impossibility of incorporating income per capita in the development index for Mexican municipalities, the quality of housing is included as an indicator for the standard of living dimension. This approximation does not have the problems of the HDI related with a

²³ Anand and Sen, 2000b op.cit.
²⁴ UNDP, 1993 op.cit.
²⁵ Anand and Sen (2000b) p.100.
²⁶ Crafts N. 1997. ‘The Human Development Index and changes in standards of living: Some historical comparisons’. *European Review of Economic History*, I, pp. 299-322; Ranis, Gustav and Stewart, Frances (2000). ‘Strategies for Success in Human Development’, *Journal of Human Development*, Vol. 1, No. 1, pp. 49-69; UNDP, 1993 op.cit.

diminishing returns adjustment.²⁷ It also avoids the heavily criticised selection of the minimum and maximum income values.²⁸

To give an example of the HDI methodology, the calculation of the MDI for the municipality of Aguascalientes located in the state of the same name in 1990 is done as follows:

1. *% of surviving children: 89.60*
2. *Standard of living:*
 - % of dwellings with all main services: 84.05*
 - % of dwellings with floor other than bare land: 94.93*
3. *Education:*
 - Literacy rate: 94.34*
 - Average years of education: 7.32*

Applying the following general formula.²⁹

$$\text{Index} = \frac{\text{Actual value} - \text{Minimum value}}{\text{Maximum value} - \text{Minimum value}}$$

The indexes for each component are:

1. *Health: **0.89***
2. *Standard of living: **0.89***
3. *Education: **0.78***

Where the minimum and maximum values for each component of the MDI index are:

1. *Health: 0% and 100%, respectively.*
2. *Standard of living:*
 - % of households with all main services: 0% and 100%, respectively.*
 - % of households with floor other than bare land: 0% and 100%, respectively.*
3. *Education:*
 - Literacy rate: 0% and 100%, respectively.*
 - Average years of education: 0 and 12 years, respectively³⁰.*

Then, after summing the three indexes and multiplying the result by one third, Aguascalientes' MDI₁₉₉₀ equals **0.853**.

²⁷ Noorbakhsh F. (1998). 'The human development index: Some technical issues and alternative indices'. *Journal of International Development*, 10, pp. 589-605; Sagar and Najam op. cit.

²⁸ Streeten, op.cit.; UNDP, 1993 op.cit.

²⁹ United Nations, 2000. *Human Development Report*. UNDP, New York.

³⁰ As the highest average years of education in the data for the years analysed are between eleven and twelve years (excluding one locality in Mexico City), is twelve years the number which is considered as the maximum for calculations. The minimum in the whole data set is 0.55 years.

Originally, the UNDP proposed this methodology to calculate country level indexes with the following classification: Middle human development countries were the ones with a HDI between 0.500 and 0.799. The countries considered with a high level of human development had figures higher than 0.799; and the ones with a low level, figures lower than 0.500. Nowadays, the UNDP uses a slightly different classification, including the 'very high human development countries' that are the ones with a HDI above 0.899.³¹ Alternative indices can be calculated using the same information to modify the original index in consideration of a common criticism done to the HDI in the literature on the topic.³² That is, the sum of health, education and income attributes makes them perfect substitutes, meaning that there is a constant rate at which an improvement in any attribute can be exchanged for an improvement in another for all levels of all components.³³ This might not be realistic because as Decancq and Lugo reckon 'the amount of money needed to compensate for a year less of life should be quite different whether the person is in her youth or reaching the end of a normal life'.³⁴

To tackle this problem and reflect more directly the impact of the performance of each component index on the overall one, Sagar and Najam (1998) propose a product of components instead of a sum. This allows the HDI to be more sensitive in low performing dimensions with the advantage that if there is a serious deprivation in one of them, the overall index cannot be high. For example, if one faraway rural municipality has health and education indexes equal to 0.96 due to an excellent provision of these public services, together with a 0.50 for the standard of living component due to low quality housing, the MDI equals 0.81, while the multiplicative option equals 0.46. If, instead, it had 0.81 in each of the component indices the MDI would still be 0.81 while the multiplicative option (MMDI) would equal 0.53. Both alternatives will be considered as possible response variables in this study. In the last case municipalities with a MMDI lower than 0.250 are considered the least developed, in the medium level of development are the localities with a MMDI between 0.250 and 0.500, and a high level of development is indicated by figures above 0.500.

³¹ United Nations, 2009. *Human Development Report*. UNDP, New York.

³² Neumayer, E. (2001). 'The human development index and sustainability: A constructive proposal', *Ecological Economics* 39, pp. 101–114.

³³ Desai, M. (1991). 'Human development, Concepts and measurement'. *European Economic Review*, 35, pp. 350-357.

³⁴ Decancq, K. and Lugo, M.A. (2009). 'Weights in Multidimensional Indices of Well-Being: An Overview'. *Oxford Poverty and Human Development Initiative (OPHI)*, Working paper 18, p.6.

The following section relates the human development and LED ideals as a prerequisite to use the proposed MDI as a response variable to analyse the impact of LED strategies on the development of Mexico.

2.3 The concept of human development and the LED approach

The literature on LED clearly emphasises that pursuing LED from below entails the embeddedness of the approach through the participation of local agents; a deep diagnosis of the resources and characteristics of the territory; and a strategic perspective to tackle the identified weaknesses, profit from the opportunities and strengths, and face the identified challenges.³⁵ The local control of the development process is, therefore, the result of a continuous interaction between local authorities, civil society and the private sector.

All these imply that the ability of individuals to contribute to the development process becomes crucial for its success. Healthy and educated citizens can more effectively participate in different activities -such as designing, implementing or evaluating local development actions; building or being part of networks with local and external agents; or engaging in innovative productive activities- than citizens with low levels of these basic human dimensions.³⁶ Therefore, the key LED characteristics related with the local management of the process, and with the attitudes and aptitudes that favour participation and entrepreneurship are closely related with the people's well-being ideals of the HDI. More specific links are explained below.

Increasing human (i.e. education's quantity and quality) or social capital (e.g. networking) has been seen as beneficial in monetary and non-monetary terms not only by proponents of the human development concept (the means and ends approach) but also by scholars outside the HDI debate such as Martinos and Humphreys, Silva and Woolcock.³⁷ Thereby, investment in human development has become one of the accompanying actions of development strategies

³⁵ Barreiro Fernando. 2000. 'Desarrollo desde el territorio. A propósito del desarrollo local'. Documento electrónico de la Red de Desarrollo Local (REDEL), Chile: <http://www.fcs.edu.uy/enz/licenciaturas/cicloinicial/problemasdesarrollo/Lectura%20Teorico%2011.pdf> (accessed October 11, 2008); Storper, M. (1995). 'The Resurgence of Regional Economies, Ten Years Later: The Region as a Nexus of Untraded Interdependencies'. *European Urban and Regional Studies*, 2, 3, pp. 191-221; Vázquez Barquero, A. 1999. *Desarrollo, redes e innovación: lecciones sobre desarrollo endógeno*. Ed. Pirámide, Madrid.

³⁶ Barreiro, *ibid*; Camejo, A. and Gallicchio E., (2004). *Desarrollo local y descentralización en América Latina: nuevas alternativas de desarrollo*. Centro Latinoamericano de Economía Humana, Programa de Desarrollo Local, Montevideo; OECD, 2003 *op. cit.*; United Nations, 1990. *Human Development Report*. UNDP, New York

³⁷ Martinos, H. and Humphreys, E. (1994) 'Capacity Building in Urban and Rural Areas in Europe'. In Robert J. Bennett, ed., *Local Government and Market Decentralised, Developing, and Former Eastern Bloc Countries*. Tokyo: United Nations University Press; Silva, Olmo (2008). 'Some remarks on the effectiveness of primary education interventions'. *IZA Policy Paper No.5.*; Woolcock, M. 1998. 'Social capital and economic development: Toward a theoretical synthesis and policy framework', *Theory and Society*, 27, pp. 151-208.

around the world since the outset of the 1990s. A LED strategy aims to enhance individuals' capacity (individually and as a group) to face the challenges and make the best of opportunities in their social and productive lives in a context of economic transformations, environmental consciousness and social inclusion in development processes.³⁸

An aspect shared by the ideals of human development and the LED approach is the preoccupation on sustainability. Improving the health, nutrition and education of people enhances their ability to experience more fulfilling lives with a lasting effect in the future.³⁹ This refers also to both, efficiency gains that allow producing more with the same or less amount of resources, and increasing awareness of the potential environmental implications of economic development in relation to intergenerational equity.

Most of the research analysing LED related case studies reveal that people's positive attitudes towards risk taking, change and innovation together with a combination of skills and knowledge are essential for undertaking successfully participatory, networking and economic activities.⁴⁰ The policy actions used in LED strategies to stimulate an active and effective role of local agents in the development process are capacity building, empowerment and entrepreneurship promotion tools, together with the creation of participation and networking mechanisms.

Creating and improving the mechanisms for the general public, social and private sector participation in local development processes refer to actions that have an impact in the institutional framework such as:⁴¹

- a. Making legal and regulatory changes to allow local organisations and agencies in all sectors and the public in general to participate actively in the development process in a regular basis.
- b. The proliferation of pro-participation activities and mechanisms such as the distribution of brochures to raise awareness and give information on participatory

³⁸ Pike et al. op.cit.

³⁹ Anand and Sen 2000a op.cit.

⁴⁰ Albuquerque, Francisco; Llorens Juan y Del Castillo Jaime (2002). *Estudio de casos de desarrollo económico local en América Latina*. Banco Interamericano de Desarrollo, Departamento de Desarrollo Sostenible, Washington D.C.; Chari, Sharad (2004). 'Provincialising Capital: The Work of an Agrarian Past in South Indian History'. *Society for Comparative Study of Society and History*, 4, p- 760-785; Cooke op.cit.; CLAEH-ALOP op.cit; Potter, et al. op.cit; OECD, 2003 op.cit.

⁴¹ Dreier Peter (1996). 'Community Empowerment Strategies'. *Cityscape: A Journal of Policy Development and Research*, Volume 2, Number 2, 122-159; Eade Deborah (1997). *Capacity-building: an approach to people-centred development*. Oxfam UK, Oxford; Gaventa J. and Valderrama C. (1999). 'Participation, citizenship and local governance in developing countries'. Unpublished paper presented in the workshop on Strengthening participation in local governance, Institute of Development Studies. Available URL: <http://www.uv.es/~fernandm/Gaventa,%20Valderrama.pdf> (accessed January 10, 2010); English Local Government Association (2007). An Action Plan for Community Empowerment: Building on success. Communities and Local Government, London.

events, the organisation of public budget consultations, neighbourhood or local forums or meetings open to the public, and network building events, among others.

The concepts of entrepreneurship, capacity building and empowerment are very close to each other because, as it has been explained, people's involvement in the local economic development process requires both willingness to participate actively and capacity to do it effectively. Capacity building and empowerment strategies can be designed and implemented by the public, social and/or private sectors and refer to any actions that have an impact on the following.⁴²

- a. *Human resource development.* This is a process that has the goal of equipping individuals with the understanding and access to information, knowledge and training that enable them to perform effectively (i.e. healthcare and nutrition guidelines, basic education skills, workforce skills workshops, leadership workshops, courses for civil servants, and education for entrepreneurship, among others). In addition, the empowerment approach focuses on mobilizing the self-help efforts of the population rather than providing them only with social welfare (e.g. the empowering of disadvantaged sections of the population such as indigenous groups). In this sense, empowerment strategies include both aptitudes' and attitudes' contents such as improving literacy with activities that encourage people to reflect on their circumstances in order to find ways to improve them.
- b. *Organizational development.* This refers to the design and implementation of management structures and processes within organizations, and the creation and management of relationships between members or representatives of different organizations and sectors. An example of actions that encourage this is: organisational capacity workshops within governmental institutions, workers or peasant unions, business associations, communities' representations and so on.

As far as entrepreneurship promotion is concerned, two of the deterrents to start a business are the 'fear of failure' and a passive attitude towards enterprise (i.e. the thought that there is no reason to complicate one's life, it is easier to be an employee).⁴³ Although the reason of such a fear might be personal, social or cultural; education systems can improve people's aptitudes

⁴² Bennett, R.J. and McCoshan, A. (1993). *Enterprise and Human Resource Development: Local Capacity Building*. Paul Chapman; Dreier op.cit.; Eade op.cit.; Food and Agriculture Organisation of the United Nations (FAO) Website: www.fao.org/capacitybuilding/?lang=es (accessed January 11, 2010); English Local Government Association, op.cit; World Bank Website.

⁴³ OECD, 2004 op.cit. p. 23

and, as a consequence, help them to build more confidence.⁴⁴ The second deterrent, also originated by personal or social factors, might be reduced by actions taken very early in the educational system.⁴⁵

The existence of an environment favourable or attractive for investing and living in a locality is also stressed in the LED literature. For example, according to local characteristics, a balanced provision of the three kinds of infrastructure (i.e. basic, productive and social) could improve the perceived economic potential and quality of life of territories, and, therefore, their attractiveness for local, national and foreign direct investment.⁴⁶ Once again, the link with the HDI dimensions is evident. The health dimension is linked to social infrastructure, the education one with productive and social infrastructure, and the standard of living dimension with basic and social infrastructure.

It is important to note that the endogenous nature of LED strategies allows them to be applied to face the development challenges and pursue the development goals of places with different levels of development. Countries with a high proportion of their population living with an income close to the poverty line show low levels of some or all the indicators for the dimensions considered by the HDI.⁴⁷ According to the World Bank,⁴⁸ more than half the population of Mexico lived in poverty in 1994 and some gains have been achieved after the 1994-1995 economic crisis. This implies that if LED strategies were implemented at some point during the period 1990-2005 and have had some impact on the development of Mexican municipalities, it could be captured by analysing their effect on the MDI. The same in the case of more developed localities where the success of policies pursuing the improvement of people's skills or capabilities could, for example, attract investment from outside or simply increase local productivity.⁴⁹ In the end, not only the knowledge dimension could be positively affected by those policies but also the command over resources needed for improvements in other aspects of individuals' quality of life such as the quality of housing.

⁴⁴ Ibid. and OECD, 2005. *Perspectives de l'OCDE sur les PME et l'entrepreneuriat*. Paris: Organisation for Economic Cooperation and Development (version préliminaire).

⁴⁵ European Commission (2002). *Education and Training for Entrepreneurship*. Brussels: Final Report of the Expert Group under the Best Procedure Project, Commission of the European Communities; OECD, 2005 *ibid*.

⁴⁶ Pike et al. *op.cit*

⁴⁷ UNDP, 1990; 1993 *op.cit*.

⁴⁸ World Bank (2004a). *Poverty in Mexico: An Assessment of Conditions, Trends and Government Strategy*. Poverty Reduction and Economic Management Division, Washington, D.C.; World Bank (2004b) 'Spotlight on Progresa: Conditional Cash Transfers Reduce Poverty in Mexico'. *World Development Report 2004: Making Services Work for Poor People*, Washington, pp. 30-31.

⁴⁹ Noorbakhsh, F. and A. Paloni, 2001. 'Human Capital and FDI Inflows to Developing Countries: New Empirical Evidence', *World Development*, 29, No. 9, pp. 1593-1610.

As it has been explained, the standard of living dimension is being analysed in the MDI by computing indicators on the housing characteristics of municipalities. As it is well known in the real estate literature,⁵⁰ areas with better housing characteristics are more expensive than low quality housing neighbourhoods and, consequently, lower levels of housing characteristics' indicators are observed for the places where high proportions of low income earners or unemployed live.⁵¹ On that ground, if LED strategies have been successful in favourably affecting the standard of living dimension of municipal residents, this could also be captured by studying their effect on the change of the MDI between 1990 and 2005.

Another relevant and useful way to link the LED approach to human development measures in Mexico is that children from impoverished households commonly help their parents to support the family by working in the informal sector after school or instead of attending school.⁵² If LED strategies have had a positive impact on the employment and income of adults, it can be expected an improvement on the MDI for 2005 as a result of an increase in the average years of education in comparison to 1990.⁵³

Ranis and Frances (2000) find that achievements in human development in developing countries are positively related to well prioritised expenditures and female participation in development or anti-poverty programmes. A fundamental element of the LED approach is the identification of challenges and opportunities through a deep diagnosis of weaknesses and strengths in light of local needs, aspirations and resources. All this constitute a prerequisite to define the development goals and, consequently, the concrete strategy towards them. The LED approach does not explicitly encourage gender equality or a higher role of women in development processes but promotes a higher involvement of all people.

I have argued that higher levels of health, knowledge and standard of living indicators could be seen as both means and ends in both approaches (LED and human development). Therefore, both approaches see individuals as active agents rather than only passive subjects. From all the above, it seems that those three basic dimensions could be enhanced by a

⁵⁰ Englund, P. (1998). 'Improved price indexes for real estate: measuring the course of housing prices'. *Journal of Urban Economics*, 44, 2, pp.171-196; Gouriéroux, C. and A. Laferrere (2009). 'Managing Hedonic Housing Price Indexes: The French Experience'. *Journal of Housing Economics*, 18, pp. 206-213; Grether, D. and P. Mieszkowski (1974). 'Determinants of Real Estate Values'. *Journal of Urban Economics*, 1, 2, pp. 127-146; Sheppard, S. (1999). 'Hedonic analysis of housing markets'. In P. Cheshire, Editor, *Handbook of Urban and Regional Economics*, Elsevier Science.

⁵¹ Anand and Sen, 2000b op.cit.

⁵² Edmonds, E. and N. Pavcnik (2005). 'Child labour in the Global Economy'. *Journal of Economic Perspectives*, 19, 1, pp. 199-220; Levison, D. and K. Moe (2001). 'Youth Education and Work in Mexico'. *World Development*, 29, 1, pp. 167-188.

⁵³ There is a need to consider in the model the effect of a federal government programme called 'Progresa' which gives transfers to households conditional to children's school enrolment.

combination of empowerment, capacity building and entrepreneurial related policies, together with the design of networking and participatory mechanisms and the provision of infrastructure and other traditional incentives and policies within a local strategic framework.

3. Model and data

The proposed empirical model takes the following general form:

$$\text{DifferenceMDI}_{it-t0} = \alpha + \beta * \text{Led}_{it} + \gamma * \mathbf{x}_{it} + \varepsilon_{it}$$

The difference in the development index calculated for Mexican municipalities (MDI) between time t (2005) and time 0 (1990) in municipality i is a factor of a) whether bottom-up LED strategies have been implemented (Led), b) a vector of control variables (x), and c) the error term (ε).

As noted in the previous section, two possibilities for using the municipal development index (MDI) could be used in the proposed model as response variable. That is the MDI calculated with the UNDP's human development index (HDI) methodology or a multiplicative version of it (MMDI). All Mexican localities except nine improved their MDI through the years 1990 and 2005 (99.6%); while in the multiplicative version a vast majority of Mexican localities did (96.2%). Using the additive version of the MDI, only a small percentage of the observed variation in its difference between 2005 and 1990 is explained by the variation in the municipalities' independent variables, while for the MMDI is much higher. For example, when including all independent variables in the regression, 15.2% of the variation in the MDI difference between 2005 and 1990 is explained by the explanatory variables while this figure is 68% for the MMDI difference. As a result, only the findings of the model computations using the MMDI as a response variable will be the focus of attention in this report.

The explanatory variables considered here have a close relationship with the LED characteristics and main toolkit exposed in the previous sections. As it was noted before, the main limitation in proposing a model to study the effects of the LED approach in Mexico is the lack of information, in general, and on its strategies, in particular. Hence, a questionnaire was designed with the aim to obtain the data that could be useful to test quantitatively my research hypothesis. The LED explanatory variables have been suggested also considering the expected amount of time that participants would need to answer the questionnaire. As the amount of information that is needed to cover the main aspects of LED strategies is not small

and considering that individuals would participate for good will without getting any economic retribution, the questions had to be designed the easiest and quickest as possible to be answered. Therefore, only categorical and semi-categorical variables are considered alongside with some of their relevant interactions.

The first two LED variables refer to the endogenous and sustainable character of the LED approach with a strategic focus. The third and fourth variables relate to policies implemented to foster entrepreneurship, empower citizens and build capacity. Closely related to the endogenous aspect of the strategy are the mechanisms for the public, social and private sector involvement in the development process considered in the fifth LED explanatory variable. The sixth LED variable is a semi-categorical variable that is intended to capture the degree of local collaborative links or networking within and outside the locality. Finally, the seventh variable is not entirely related to the LED approach because only tries to capture the effect of low or high dependence of the local development process on external initiatives (national and state level interventions with impact in the municipality). Table 1 gives details on the LED variables' rationales and expected results.

Table 1: LED related variables

<i>Variable</i>	<i>Rationale</i>	<i>Expected impact on the MMDI difference</i>
1. Dummy variable with 1 for a municipality that elaborated a LED plan with a long term perspective and its base was a diagnosis of the local economy (Development plan)	A strategic plan built on the basis of a diagnosis of the local economy guides the implementation and evaluation of development actions increasing the possibility of success.	Positive, indicating that municipalities with a LED plan improved more than the ones without it during the period of analysis.
2. Dummy variable with 1 for a municipality that incorporated sustainable development and environmental considerations in LED policies and public services' delivery (Sustainability)	Environmental considerations in development policies and public services' delivery are intended to increase the quality of people's life and keep resources and the environment in good condition for future generations.	Positive, meaning that municipalities that incorporated sustainability in their actions did it better than the ones which did not.
3. Dummy variable with 1 for a municipality that introduced local policies or development actions to foster entrepreneurship (Entrepreneurship)	Increasing self-employment by promoting the creation of innovative start-ups is seen as an alternative for stimulating economic development.	Positive, meaning that municipalities that considered the promotion of entrepreneurship in their policies did it better than the ones that did not.
4. Dummy variable with 1 for a municipality that introduced local capacity building or empowerment actions (Capacity building)	Empowering local actors and the provision of capacity building is considered to increase their productivity and effective participation in the development process.	Positive, indicating that municipalities which implemented empowerment tools and capacity building policies did it better than the ones which did not.
5. Dummy variable with 1 for a municipality that introduced or where specific channels or mechanisms for the general public, third or private sectors participation in development processes existed (Participation mechanisms)	An institutional framework that allows for local actors participation is considered to better capture local needs and wishes, and to improve accountability and the chances of continuity of the development strategy in case of diverse vicissitudes such as political.	Positive, meaning that municipalities with participation mechanisms or channels did it better than the ones without them.
6. Semi-categorical variable referring to municipalities that introduced or where specific links between local agents and also between them and agents located outside the locality existed (Development links)	Internal and external links have been seen as means of cooperation, as well as information and knowledge exchange towards better outcomes in LED.	Positive, meaning that the higher the degree of integration of local agents into internal and external networks, the higher their improvement in the development indicator.
7. Semi-categorical variable indicating the degree of independence of LED strategies on states or federal initiatives. (Autonomy)	Municipal dependence on state and national level interventions in LED is an indication of the predominance of a top-down approach instead of bottom-up.	Positive, indicating that the higher the independence from other levels of intervention the better the LED outcomes reflected in the change in the MMDI.
Interactions (Int): 1+4, 1+3, 3+4, 4+5, 1+6	The inclusion of some interactions allows analysing the possible complementarity of different LED policy actions.	In all cases positive (see below).

For the semi-categorical variable 'Development links' the detailed categorisation is as follows:

3: Strong presence of external and internal links or networks (i.e. clusters of firms exporting part of their output; firms benefited from state, national or international programmes; and coordination or cooperation between different levels of government, as well as between private and/or social organisations).

2: Low presence of external and internal links or networks (i.e. some of the above linkages).

1: None external or internal links or networks.

While for 'Autonomy' is:

5: Only locally generated LED strategies

4: Low degree of dependence (mainly locally generated LED strategies)

3: Medium (balance between state and/or federal and locally originated LED strategies).

2: High degree of dependence (one or few locally originated LED strategies)

1: Total dependence (not locally generated LED strategies)

The following lines offer details on the suggested interactions between the main LED explanatory variables:

- ❖ Int₁₊₄: Interaction between D₁ and D₄ indicating that capacity building and empowerment policies might have a greater impact depending on the identification of local weaknesses and economic opportunities and strengths during the diagnostic effort.
- ❖ Int₁₊₃: Interaction between D₁ and D₃ implying that policies to promote entrepreneurship could have a higher effect if there is a diagnosis of the locality and a strategic perspective.
- ❖ Int₄₊₅: Interaction between D₄ and D₅ testing if the existence of mechanisms for local agents' participation could have a greater effect in the development of places where capacity building and empowerment policies are implemented than in the ones where not.
- ❖ Int₃₊₄: Interaction between D₃ and D₄ indicating mainly that empowerment and capacity building policies could increase the effectiveness of pro-entrepreneurial actions.
- ❖ Int₆₊₁: Interaction between I_{SC6} and D₁ suggesting that a strategic development plan could have a greater impact the more links the local agents have among themselves and between them and agents located outside the locality.

The rest of independent variables are briefed in table 2. They refer mainly to the socioeconomic situation prevalent in Mexican municipalities in 1990. Their data source is the National Census of Population and Housing 1990.⁵⁴ The rationale of the control variables is based on the idea that the general situation of municipalities in 1990 needs to be included in the analysis to better understand the impact of policies that could have been carried out from then onwards. For example, *ceteris paribus*, richer municipalities in terms of income per capita or localities with communications' infrastructure within their territory such as airports

⁵⁴ Instituto Nacional de Estadística y Geografía (INEGI's Website), *Censos y Conteos de Población y Vivienda*: <http://www.inegi.org.mx/est/contenidos/Proyectos/ccpv/default.aspx> (accessed October 12 2008).

or maritime ports are expected to perform better; while places with high children mortality in 1990 are expected to perform worse.

Table 2: Control variables

<i>Variable</i>	<i>Rationale</i>	<i>Expected impact on the MDI difference</i>
Income per capita (Ln Income per capita)	Income per capita provides an indication of the economic strength of the municipalities. Economically strong localities tend to have better access to services and infrastructure.	Positive, indicating that those municipalities with higher income per capita in 1990 achieved a higher improvement in the MDI between 1990 and 2005.
Percentage of surviving children out of every 100 that were born alive (% Children)	This is an indicator of health, the healthier the population, the more able is to make the best of their daily lives.	Positive, meaning that the higher the proportion of surviving children, the higher the improvement in the MDI.
Literacy rate (% Literacy rate)	This is an indicator of fundamental skills. The higher the proportion of people with reading and writing skills the more capable are to make the best of their daily lives.	Positive, meaning that municipalities with higher proportion of literates did it better than others.
Average number of approved years of education for people older than 14 years old (Average education)	This is an indicator of people's capacity. The higher the number of approved years in school, the higher the chances of a better life.	Positive, meaning that the higher the average years of schooling, the higher the improvement in the MDI.
% of households with sewage, electricity and drinkable water inside the building (% Services)	This is an indicator of the standard of living. The higher the standard of living, the better people's context or environment for further improvements.	Positive, indicating that the higher the share of households with all these services in 1990, the higher the improvement in the MDI.
% of dwellings with floor other than bare land (% Floor material)	The higher the standard of living, the better people's context or environment for further improvements.	Positive, indicating that the higher the share of dwellings with floor other than bare land in a municipality, the higher the improvement in its MDI.
% Indigenous households	Indigenous groups in Mexico have historically been excluded from the rest of Mexican mainstream social and economic flows.	Negative, meaning that the higher the percentage of municipal households where the head of the household spoke an indigenous tongue in 1990, the lower the improvement in the MDI.
Share of people employed in services from the total of employment in the municipality (Tertiary sector)	Tertiary economic activities have increased their share of GDP and total employment in both developed and developing countries in the new era of globalisation.	Positive, the higher the share of employment in the tertiary sector, the higher the improvement in the MDI.
Share of people working in primary economic activities from the total of working people (Primary sector)	A strong dependence in the primary sector is associated with low economic performance in developing countries.	Negative, the higher the share of employment in the primary sector, the lower the improvement in the MDI.
% of migrants in the total municipal population according to people's place of birth (Migrants)	In Mexico migration has been characterised by low skilled immigrants and has caused an inefficient delivery of public services and provision of infrastructure.	Negative, the higher the share of migrants of the total municipal population the lower the improvement in the MDI.
Categorical variable indicating if the municipality was urban or not (Dummy Urban)	Urban-rural economic differences have been growing in favour of urban areas for centuries.	Positive, indicating that urban municipalities did it better than rural ones.
Dummy indicating the existence of a port or airport (Port or airport)	Communications infrastructure facilitates economic activity impacting favourably the people's standard of living.	Positive, municipalities with an airport or port are expected to improve more than the ones without any of them.

Two pairs of variables deserve special attention, firstly the average years of education and the literacy rate could be highly correlated. The reason to include both is that, taking into account

the HDI literature, the former is considered more as a means indicator and the latter as an ends one. The same case for the indicators of standard of living related with housing characteristics. Although common sense might indicate that the higher the standard of living the better all the dwellings conditions and characteristics, in 1990s Mexico (and even nowadays), in some areas people could build or rent homes with any kind of floor and ceiling material but without access to services such as electricity or clean water, while in other areas they could be able to secure a place with provision of some public services but still being poor enough for building or renting a proper house. This might impact differently in the development of places as access to fundamental services as a starting point characteristic might have a higher impact in further development outcomes than just better housing characteristics in terms of house materials.

As far as the LED variables data collection is concerned, LED strategies are expected to have an impact mainly in the medium and long runs. However, the data collection design considered policies implemented at any moment between 1990 and 2005 as policy actions carried out close to 2005 might also have had a short run effect. The questionnaire was integrated with punctual questions about the existence of bottom-up LED policies and mechanisms during the period of analysis. There was a preference to invite scholars to participate answering it because regional (state) universities are well established around Mexico with relatively easy electronic access to information about their faculties and their work. Members of non-governmental organisations were a second possibility but when contacted never answered.

From 280 individuals that were contacted, only 7.5% sent the requested information. When notified that a scholar that had agreed could not answer the questionnaire there was the possibility of looking for someone else. However, when I did not receive any indication of withdrawal after sending the material and further communications, there was not any reason to think that I would not receive the requested information. This is because participants were kindly asked to inform if for some reason they could not continue and even to tell me for which municipalities they would not be able to answer the questions. This gave me the opportunity in some cases to look for other people to answer the questionnaire for some or all of the missing localities. In the end, I obtained information about all the municipalities only from 15 of the 31 states. As Map 1 below illustrates I did not receive the data required for any of the municipalities for 10 states.



As a result, the LED dataset for the whole municipalities that existed in 1990 was not possible to build but only a database of a sample of 898 municipalities. Therefore, regression calculations could not be done with information about the whole population of municipalities but with a sample that might not be strictly ideal for statistical inference about Mexican municipalities. However, it is thought that the representativeness of the sample is not far from the population's one as the sample's LED database is integrated by a similar share of municipalities in the categories of the MMDI's classification than the respective share in the whole set of them considering the MMDI calculated for 1990 and excluding Mexico's City localities.⁵⁵ Mexico City's localities, called delegations, were excluded as a result of the concentration of the federal government in this jurisdiction which has a strong impact on its economy.

From map 1 the North of Mexico could seem to be underrepresented. However, Northern states in 1990 despite large territories had only 453 municipalities in total, while Central and

⁵⁵For the whole set of Mexican municipalities in 1990 the shares are 94.3, 5.2 and 0.5 percent for municipalities with low, medium and high levels of human development, respectively; while for my sample the shares are 92.5, 6.9 and 0.6 percent.

Southern states had 975 and 944, respectively.⁵⁶ Furthermore, looking at the proportions of inhabitants, the share of the municipalities' population in my sample is similar to the share of all the municipalities' population in 1990 considering the mentioned geographical division of Mexico in North, Centre and South.⁵⁷ An aspect probably germane to this discussion is that municipalities in Mexican states are commonly heterogeneous in economic, cultural, socioeconomic, and sometimes even in geographical aspects within the same state; however, some of these municipal differences are similar among states.⁵⁸

As far as model diagnostics are concerned, correlations between independent variables are not a problem if they are not highly associated because a multiple linear regression model is precisely designed to allow and adjust for them.⁵⁹ In the case of multicollinearity (i.e. high linear association confirmed by significant correlation factors higher than 0.79) the estimated model presents large standard errors and low precision for the parameters of the correlated variables. However, it can be fixed easily by removing one of them.⁶⁰ Correlation matrices were calculated between all independent variables with five main aspects observed. Firstly, as expected, average education is highly correlated with the literacy rate; second, there is a high correlation between average education and both the share of the tertiary sector in municipal employment, and the income per capita; third, there is a strong correlation between the shares of employment in the tertiary and primary sectors in total municipal employment; fourth, as expected, correlations between LED interactions are high; and finally, the rest of the variables show a weak correlation. As a result, average education and tertiary sector were removed from the calculations and LED interactions are included in the model one at a time.

To be sure that the results were valid for statistical inference, two further tests were performed (See Annex). Firstly, variance inflation factor (VIF) values were computed for each predictor to confirm the non-presence of multicollinearity after omitting average education and tertiary sector.⁶¹ No indication of multicollinearity was observed. Secondly, I tested for

⁵⁶ The share of municipalities in 1990 in the North of Mexico is 19.1% of the total, while in my sample is 18%. In the Centre and South the shares are 41.1% and 39.8%; respectively, while in my sample are 49.6% and 32.4%. Northern states: Aguascalientes, Baja California, Baja California Sur, Chihuahua, Coahuila, Durango, Nuevo León, San Luis Potosí, Sinaloa, Sonora, Tamaulipas and Zacatecas; Central states: Colima, Estado de México, Guanajuato, Hidalgo, Jalisco, Morelos, Puebla, Tlaxcala, Querétaro, Michoacán, Nayarit and the Northern part of Veracruz (151); Southern states: Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Yucatán and the Southern part of Veracruz (55).

⁵⁷ For the total population in 1990 the shares are 28.9, 50.9 and 20.2 percent for the North, Centre and South, respectively; while for my sample the proportions are 20.6%, 59.7% and 19.7%, respectively.

⁵⁸ Silva-Ochoa, E. (2009). 'Institutions and the provision of local services in Mexico'. *Environment and Planning C: Government and Policy*, 27, pp. 141-158.

⁵⁹ Agresti, A. and B. Finlay (2009). *Statistical Methods for the Social Sciences*. Prentice Hall.

⁶⁰ Wooldridge, J. (2008). *Introductory Econometrics, a Modern Approach*. South-Western College Publishing. Ohio, U.S.

⁶¹ The VIF is the result of dividing 1 by the so called tolerance. The tolerance is an indicator of the percent of variance in the parameter that cannot be accounted for by the other parameters, thereby very small values (i.e. values less than 0.10) mean that the variable associated with

heteroscedasticity (i.e. non-constant variance) by plotting studentised residuals for the model.⁶² If homoscedasticity is found the validity of a multiple regression model is not violated. This means, in terms of the mentioned plot that its points form a band of roughly even width instead of an evident increasing or decreasing pattern.⁶³ This test showed the presence of mild heteroscedasticity as there is a decreasing shape for the response variable's fitted values close to zero. A viable solution in this case is the calculation of the model coefficients using weighted least squares.⁶⁴ After computing regressions using different weights (i.e. different variables were used as the source of the weight), although most of the time the variation in the MMDI difference between 2005 and 1990 explained by the explanatory variables slightly increased, no substantial difference was observed in the effects of the independent variables on the dependent one (i.e. parameters kept signs and significance levels).

The last preoccupation in terms of model diagnostics is the possible presence of endogeneity. This is because it can produce biased and inconsistent parameter estimates in regression calculations. Endogeneity in a model specification refers to the correlation between independent variables and the error term. This could be caused by three situations: reverse causality between a response and an explanatory variable; simultaneity originated by any of the independent variables being explained by a specification that includes the dependent variable; or a problem of omitted variables where the omitted variable is correlated with any of the independent ones.⁶⁵ The main concern with the proposed specification in relation to endogeneity could be that the components of the MMDI for 1990 are included as independent variables and, at the same time, the dependent variable is constructed by subtracting the values of the MMDI in 1990 from the MMDI values in 2005. However, reverse causality and simultaneity do not make sense in this case as they would mean that the municipal development index in 1990 was caused, influenced or partly originated by what happened after this year. As far as omitted variables are concerned, not other relevant variables to a great extent different from the already considered in the proposed model were identified at the municipal level, being the variables selection after multicollinearity correction and the rest of tests performed the most appropriate considering also the availability of information.

a parameter is redundant and, as a rule of thumb, a coefficient whose VIF value is greater than 10 may indicate the presence of multicollinearity (Chen, X., Ender, P., Mitchell, M. and Wells, C. (2003). *Regression with SPSS*, Web book, UCLA: Academic Technology Services, Statistical Consulting Group. Website: <http://www.ats.ucla.edu/stat/spss/webbooks/reg/default.htm> (accessed April 1, 2010)).

⁶² Agresti and Finlay op.cit.

⁶³ Wooldridge op.cit.

⁶⁴ Greene, W. (2003). *Econometric Analysis*, Pearson Education, New Jersey, U.S.

⁶⁵ Ibid.; Wooldridge op.cit.

4. Findings

To investigate to the fullest the impact of LED strategies in the development of places, different perspectives were taken into account when the computations were carried out. Firstly, the impact of the number of LED elements was assessed; secondly, the specific effect of particular LED policies and characteristics was analysed; and finally, the impact of interactions was considered. To maximise the precision with which the effects of interest can be estimated and in search of parsimony (i.e. models without unnecessary control variables are simpler and therefore easier to explain), not significant independent variables not related to the LED bottom-up approach were left out of the final calculations (Agresti and Finlay, 2009).

As noted previously, two possibilities of the municipal development index could be used in the proposed model as response variable. That is an additive version (MDI) and a multiplicative one (MMDI). Almost all Mexican localities improved their municipal index through the years 1990 and 2005 according to the MDI (99.6%); while for the MMDI a vast majority of Mexican localities did (96.2%). A small percentage of the observed variation in the difference of the MDI between 2005 and 1990 is explained by the variation in the municipalities' independent variables, while for the multiplicative version is much higher. For example, when including all independent variables in the regression, 15.2% of the variation in the MDI difference between 2005 and 1990 is explained by the explanatory variables while this figure is 68% for the MMDI difference. As a result, only the findings of the model computations using the MMDI as a response variable will be the focus of attention. Despite LED variables account for only a small percentage of the observed variation in the MMDI difference between 2005 and 1990, relevant and statistically significant effects were found.

Models considering the number of LED criteria

First, the situation when none LED policy actions or characteristics were present in municipal strategies was computed. The results show that the estimated parameter for non-considering any LED element has the expected sign and is statistically significant (model 1 in table 3). The expected MMDI difference between 1990 and 2005 is 1.161 units lower for the municipalities that did not incorporate any LED criteria than for the ones that considered any

number of them controlling for the rest of the proposed independent variables. This indicates that the localities where LED elements were not found did it worse in terms of MMDI improvements than the municipalities where at least one was identified during the period of analysis.

Model 2 analyses the situation when the maximum number of LED criteria was contemplated in municipal development strategies against the consideration of less than this number as the reference category. The results show the expected positive relationship but statistically non-significant. Finally, all the number of LED elements considered by municipalities are computed leaving the non-presence of LED elements as the reference category. This shows that from 1 to 6 LED criteria, controlling for the rest in each case, all have a positive effect on the MMDI difference, confirming that the expected improvement in the MMDI between 1990 and 2005 is higher for the municipalities that included any of the LED elements than for the ones that did not. Most of the coefficients are statistically significant.

Table 3. Model with the number of LED criteria

<i>Dependent variable:</i> <i>MMDI difference 2005-1990</i>	(1)	(2)	(3)
Ln Income per capita	0.163 (.518)	0.382 (.512)	0.302 (.526)
LED0	-1.161** (.476)		
LED1			0.718 (.663)
LED2			1.889*** (.652)
LED3			1.433* (.753)
LED4			1.810*** (.660)
LED5			0.594 (.549)
LED6		0.295 (.695)	1.375* (.821)
% Literacy rate	0.058** (.028)	0.063** (.028)	0.050* (.028)
% Services	0.175*** (.014)	0.177*** (.014)	0.174*** (.014)
% Floor material	0.087*** (.014)	0.081*** (.014)	0.089*** (.014)
% Indigenous households	-0.012* (.006)	-0.016*** (.006)	-0.013** (.007)
Primary sector	-0.039*** (.012)	-0.038*** (.012)	-0.037*** (.012)
Migrants	0.068*** (.021)	0.070*** (.021)	0.065*** (.021)
Dummy Urban	-2.188*** (.679)	-2.217*** (.682)	-2.081*** (.682)
n = 898	R2=.674, df=888	R2=.672, df=888	R2=.677, df=883

Note: *** Significant at 1 percent level; ** at 5 percent level; and * at 10 percent level
Results after correcting for multicollinearity and leaving out non-significant control

Models considering the LED variables

Firstly, the LED variables were included one at a time to analyse their effect separately together with the control variables. In this case, designing a strategic development plan, implementing empowerment and capacity building policies, and building internal and external links or networks had a statistically significant positive impact on the MMDI difference between the years of study as shown in table 4; meaning that the municipalities which considered these LED elements improved more than the ones which did not. The rest of LED variables had a contrary impact than expected but were not statistically significant. Secondly, all LED variables were incorporated in the computations. Again, designing a strategic development plan, implementing empowerment and capacity building policies, and building internal and external links or networks had a statistically significant positive impact on the

MMDI difference between the years of study controlling for the rest of independent variables (model 9).

Table 4. Model with the main LED variables

<i>Dep. Dif. MMDI 2005-1990</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Ln Income per capita	0.198 (.520)	0.425 (.511)	0.458 (.517)	0.196 (.519)	0.424 (.522)	0.268 (.516)	0.487 (.517)	0.237 (.524)	0.293 (.525)
Development plan	0.726* (.377)							0.975* (.480)	0.793* (.485)
Sustainability		-0.402 (.403)						-0.345 (.410)	-0.420 (.423)
Entrepreneurship			-0.251 (.368)					-0.721 (.460)	-0.763* (.460)
Capacity building				0.740* (.364)				1.049** (.458)	1.113** (.498)
Participation mechanisms					-0.079 (.376)			-0.738 (.524)	-0.719 (.524)
Development links						0.453* (.281)			0.639* (.348)
Autonomy							-0.312 (.303)		-0.753** (.351)
% Literacy rate	0.061** (.028)	0.068** (.028)	0.062** (.028)	0.065** (.028)	0.064** (.028)	0.058** (.028)	0.066** (.028)	0.066** (.028)	0.064** (.028)
% Services	0.173*** (.014)	0.179*** (.014)	0.180*** (.014)	0.178*** (.014)	0.179*** (.014)	0.176*** (.014)	0.180*** (.014)	0.180*** (.014)	0.181*** (.014)
% Floor material	0.085*** (.014)	0.078*** (.014)	0.079*** (.014)	0.083*** (.014)	0.080*** (.014)	0.085*** (.014)	0.080*** (.014)	0.080*** (.014)	0.085*** (.014)
% Indigenous households	-0.016** (.006)	-0.016** (.006)	-0.016*** (.006)	-0.015** (.006)	-0.016*** (.006)	-0.015** (.006)	-0.015** (.006)	-0.015** (.006)	-0.011* (.006)
Primary sector	-0.042*** (.012)	-0.037*** (.012)	-0.037*** (.012)	-0.040*** (.012)	-0.037*** (.012)	-0.038*** (.012)	-0.038*** (.012)	-0.038*** (.012)	-0.038*** (.012)
Migrants	0.067*** (.021)	0.074*** (.021)	0.073*** (.021)	0.065*** (.021)	0.072*** (.021)	0.069*** (.021)	0.075*** (.021)	0.075*** (.021)	0.071*** (.021)
Urban	-2.064*** (.685)	-2.263*** (.683)	-2.169*** (.685)	-2.239*** (.680)	-2.235*** (.686)	-2.265*** (.681)	-2.196*** (.682)	-2.196*** (.682)	-2.118*** (.699)
n = 898, df (M1-M7)= 888	R2=.673	R2=.672	R2=.672	R2=.673	R2=.672	R2=.673	R2=.672	R2=.677	R2=.679

Note: *** Significant at 1 percent level; ** at 5 percent level; and * at 10 percent level.

Results after correcting for multicollinearity and leaving out non-significant controls

Entrepreneurship promotion became statistically significant indicating a negative relation with the MMDI difference. This would suggest that municipalities that considered the promotion of entrepreneurship in their policies did it worse than the ones that did not. According to the literature on the topic, the reasons of this might be that many start-ups failed because whether their economic activities were not properly identified (situation reflected in their products not being innovative enough or demanded at all); firms not benefiting from

local resources as well as local and external productive or commercial networks; lack of financial resources; insufficient business support services; or a combination of them.⁶⁶

The variable indicating the degree of independence of municipal development strategies from states or federal initiatives presents a statistically significant negative coefficient. The regression parameter indicates that the higher the independence from other levels of intervention the worse the impact on the MMDI difference. However, let us recall from the previous section that this variable is not entirely related to the LED approach because only tries to capture the effect of low dependence of the municipal development process on national and state level interventions with impact in the municipality. To illustrate this, from the five possibilities for this semi-categorical variable where 1 indicates total dependence and 5 total independence, the average for the 898 municipalities is 2 with only 2.7% of them experiencing a high degree of autonomy in development strategies (i.e. informants reported numbers higher than 3 only for 24 municipalities). Therefore, what has been captured here is the effect of moving slightly away towards more independence but still within a low degree of municipal autonomy. This might be because state governmental interventions in municipalities have still predominated as the decentralisation process in Mexico has favoured more to states than municipalities.⁶⁷ For example, since 1992 the states have been in charge of the provision of basic education in Mexico.⁶⁸

As far as the rest of independent variables are concerned, income per capita has the expected impact but it is not statistically significant. The coefficients referring to the municipal conditions prevalent in 1990 in relation to literacy, dwellings' floor material and access to services, indicate that the better the conditions the higher the improvement in the MMDI. Also, as expected, the higher the proportion of indigenous households and the higher the people employed in the primary sector in municipalities, the lower the improvements in the MMDI during the period of analysis. Interestingly, migration does not present the anticipated effect taking into account the characteristics of migrants in Mexico (i.e. unskilled population

⁶⁶ Audretsch, David B. (2004) 'Sustaining Innovation and Growth: Public Policy Support for Entrepreneurship', *Industry & Innovation*, 11: 3, pp. 167-191; Fullard, Frank (2002). 'Enhancing the Survival Prospects of Small Business Start-ups'. Mayo County Enterprise Board, Mayo, Ireland; OECD, 2004 op.cit.

⁶⁷ Courchene, T. and A. Díaz-Cayeros. (2000). 'Transfers and the Nature of the Mexican Federation'. In Giugale and Webb (eds.), *Achievements and Challenges of Fiscal Decentralization, Lessons from Mexico*. The World Bank, Washington, D.C.; Giugale, M. et al. (2000). 'Subnational Borrowing and Debt Management'. In Giugale and Webb (eds.), *Achievements and Challenges of Fiscal Decentralization, Lessons from Mexico*. The World Bank, Washington, D.C.; Martínez-Urriarte, J. (2003) 'Relaciones entre los ayuntamientos y los congresos de los estados: un ensayo de sistematización'. En *De la Descentralización al Federalismo, Estudios Comparados sobre el Gobierno Local en México*. Miguel Ángel Porrúa, México.

⁶⁸ Merino, G. (2003) 'La descentralización educativa y las decisiones presupuestales de los estados'. En *De la Descentralización al Federalismo, Estudios Comparados sobre el Gobierno Local en México*. Miguel Ángel Porrúa, México.

putting extra pressure on public services' delivery in recipient municipalities). In other words, the coefficient tells that immigrants contributed to improve the MMDI at a larger extent in municipalities with large proportions of them. This might be because precisely unskilled labour was required in many of the main recipient localities in 1990 such as construction workers, shops' and cleaning staff, waiters or waitresses in touristic and oil producing places, as well as maquila workers (i.e. labour for mass production of final goods normally using imported intermediate materials) in the border with the United States of America.⁶⁹

Lastly, as urban-rural economic differences seem to have been growing in favour of urban areas around the world, urban municipalities were expected to do it better than rural ones. However, a negative coefficient indicates that urban localities did it worse than rural ones during the period of analysis. This might be because highly urbanised municipalities (i.e. municipalities where states' capital cities are located) observed a much higher MMDI in 1990 than rural ones and larger improvements could be achieved in places where the starting point was low or poor in terms of the dimensions included in this index. Another reason could be that a municipality with less than 2500 inhabitants is considered rural according to INEGI and a high proportion of Progresas' benefits were allocated to people living in the most faraway and impoverished communities of Mexico that happen to be located in many of the least populated municipalities.⁷⁰

Models considering possibly relevant LED variables' interactions

Finally, the interactions indicate complementarity between LED key elements (table 5). The consideration of a strategic development plan alongside the presence of links and networks within and outside the municipality is statistically significant. That is, the higher the interactions among local agents themselves and with external actors, the expected MMDI difference between 1990 and 2005 is 0.429 units higher for municipalities that designed a

⁶⁹ By 1990 two types of localities had received most of immigration flows of both skilled and non-skilled workers: the largest cities of Monterrey, Guadalajara, the Federal District and their corresponding conurbanisation areas; and the oil producing areas of Campeche. The rest of migration flows to other parts of Mexico was mainly of low skilled individuals and concentrated in the booming touristic sites of Quintana Roo (Cancun, Cozumel and Isla Mujeres) and in the Mexican-U.S border localities of Ciudad Juarez in Chihuahua and Tijuana in Baja California. In all cases migration exerted serious pressure on their infrastructure including housing and public services' delivery (Rebolledo, N. (2007). *Escolarización interrumpida: migración y bilingüismo indígena en la Ciudad de México*. Universidad Pedagógica Nacional, México; Santibañez, J. et al. (2008). *Cambiando perspectivas: de la gestión de flujos hacia la construcción de políticas de migración con enfoque de desarrollo*. Porrúa, México; Sierra, L. (2009). *Migración, educación y trabajo: entre el Caribe Norte y la FRONTERA SUR DE Quintana Roo*. Plaza y Valdés, México; Vargas, S. (2009). *Migración y políticas públicas en el Caribe Mexicano*. Porrúa, México). For this reason the impact of number of migrants in 1990 might have had a positive impact in future development outcomes in Mexican localities if their strategies responded to infrastructure's short, medium and long term needs.

⁷⁰ IFPRI op.cit.; Levy, S. (2006). *Progress against Poverty: Sustaining Mexico's Progresas-Oportunidades Program*. Brookings Institution Press; Schultz, T. P. (2001). *School subsidies for the poor: Evaluating the Mexican Progresas poverty program* (CDP No. 834). New Haven, Connecticut: Yale University, Economic Growth Centre; World Bank op.cit.

strategic development plan than for the ones that did not do so, controlling for the rest of independent variables. Empowerment and capacity building endeavours had also a statistically significant higher impact when accompanied by the existence of a strategic development plan than when this was not the case. Although less meaningful, all other possible interactions between LED variables were tested obtaining non-statistically significant results. There was no noteworthy change as far as control variables are concern in any of the regressions with interactions.

Table 5. Model with interactions

<i>Dependent variable:</i> <i>MMDI difference 2005-1990</i>	(1)	(2)	(3)	(4)	(5)
Ln Income per capita	0.308 (.523)	0.112 (.523)	0.307 (.522)	0.261 (.525)	0.146 (.522)
Development plan + entrepreneurship	0.165 (.224)				
Development plan + capacity building		0.502** (.216)			
Capacity building + entrepreneurship			0.168 (.211)		
Capacity building + participation mechanisms				0.230 (.213)	
Development plan + development links					0.429** (.199)
% Literacy rate	0.064** (.028)	0.063** (.028)	0.065** (.028)	0.064** (.028)	0.057** (.028)
% Services	0.177*** (.014)	0.175*** (.014)	0.178*** (.014)	0.178*** (.014)	0.173*** (.014)
% Floor material	0.082*** (.014)	0.085*** (.014)	0.081*** (.014)	0.082*** (.014)	0.087*** (.014)
% Indigenous households	-0.016** (.006)	-0.015** (.006)	-0.016** (.006)	-0.015** (.006)	-0.015** (.006)
Primary sector	-0.039*** (.012)	-0.042*** (.012)	-0.039*** (.012)	-0.040*** (.012)	-0.041*** (.012)
Migrants	0.070*** (.021)	0.064*** (.021)	0.070*** (.021)	0.068*** (.021)	0.067*** (.021)
Dummy Urban	-2.211*** (.682)	-2.118*** (.681)	-2.252*** (.683)	-2.174*** (.682)	-2.164*** (.680)
<i>n</i> = 898, <i>df</i> = 888	R2=.671	R2=.673	R2=.671	R2=.672	R2=.673

Note: *** Significant at 1 percent level; ** at 5 percent level; and * at 10 percent level
Results after correcting for multicollinearity and leaving out non-significant controls

5. Concluding remarks

The first section of this paper was devoted to clarify the rationale and main elements of the bottom-up approach towards LED. Despite the growing presence of its strategies around the world since the beginning of the 1990s, there are not studies analyzing the specific effect of their mechanisms, policies or characteristics. The quantitative study carried out here consisted of an econometric analysis of the impact of different particular elements of this approach in

the development of Mexican municipalities between 1990 and 2005. The main constraint found in applying this methodology to the case of Mexico was the lack of information on endogenous municipal strategies towards their development. As a result, the research design also involved building a LED database for Mexican municipalities which implied designing a questionnaire and relying on the participation of experts all around Mexico for its completion.

In the first section I also explained the human development concept and its relation with the LED approach. The similarities in the ideals of the human development and LED approaches were clarified as a prerequisite to use the proposed MDI as a response variable to analyse the impact of LED strategies on the development of Mexico. The proximity of the development goals in both approaches makes the MDI a useful measure for this research endeavour. The main message of the literature on measures of human development was that the HDI has been seen as an alternative or complementary measure to evaluate and compare the development of places. The use of the proposed MDI obeys to this and to the lack of comparable information on GDP per capita for Mexican localities for the years analysed. The MDI includes the same dimensions than the HDI but with some variations on its components due to data unavailability, with the advantage that incorporating housing attributes in the MDI as indicators of the standard of living avoid the largely criticised treatment of income in the HDI. In the end, a multiplicative version of the MDI was considered in the model computations as suggested by some HDI critics.

Five are the main findings of this analysis. Firstly, the initial set of model computations let us to confidently support that the expected improvement in the MMDI between 1990 and 2005 was higher for the municipalities that did implement any of the LED policies or mechanisms than for the ones that did not.⁷¹ Secondly, the second set of regressions provide enough evidence to maintain that the municipalities that designed a strategic development plan, implemented empowerment and capacity building policies, and built internal and external links or networks improved more than the ones that did not.

Thirdly, the rest of LED variables provided contrary than expected coefficients but statistically non-significant. Only entrepreneurship promotion had a statistically significant negative relation with the MMDI difference. These results might demand the use of alternative variables to better measure the corresponding LED elements or deeper analyses to

⁷¹ Controlling for the rest of independent variables in all cases reported in this document.

unveil other possible factors that might be contributing to observe an inverse effect. For example, success in entrepreneurship promotion entails a coordinated and strategic approach beyond the sole provision of finance to start-ups, training to their owners and workers, or access to technology research and development information or facilities.⁷² To increase the chances of building a useful LED database, I tried to avoid that answering the questionnaire would imply a heavy workload to voluntary and not remunerated respondents.⁷³ Hence, the correspondent dummy variable for entrepreneurship took a one in case of a municipality undertaking any action related to its promotion and not a comprehensive set of policies towards it.

Fourth, the third set of computations offered also some conclusive results in relation to the suggested LED variables' interactions. In particular, both, the presence of links and networks within and outside the municipality, and empowerment and capacity building endeavours had a statistically significant higher impact when accompanied by the existence of a strategic development plan than when this was not the case. Lastly, as far as the control variables are concerned, in the three sets of regressions and as expected, the coefficients referring to the municipal conditions in relation to literacy, dwellings' floor material and access to public services, indicated that the better the conditions in 1990 the higher the improvement in the MMDI. In addition, the municipalities with a large proportion of immigrants in 1990 did it better during the period of analysis than less receptive ones. On the contrary, the higher the proportion of indigenous households and the higher the people employed in the primary sector in municipalities, the lower the improvements in their MMDI. In other words, both municipalities with high proportions of indigenous households and the ones with primary economic activities as main sources of employment, improved less than others.

The analysis performed here was a first approximation to identify quantitatively the effects of LED key elements and policies in Mexico. Further studies with a larger timeframe and resources could incorporate the rest of municipalities and even contribute to build databases with interval scale information instead of the categorical and semi-categorical values proposed here for the suggested LED related variables. Moreover, the publication of the results of the National Population and Housing Census 2010 during the first years of the

⁷² OECD, 2004 op.cit.

⁷³ Although participants had the responsibilities of a full time job engaged in what resulted a time consuming task. On average, respondents reported dedicating 43 hours and 53 minutes; and it took them, from the day I provided the material, two months and a half to send the requested information back.

second decade of the 21st century will let to expand the period of analysis to dig deeper on the effects of the bottom-up approach to LED in this Latin American country. The widespread presence of this approach around the world makes relevant the application of similar exercises to test LED related variables not only in other Latin American countries but also in different contexts such as transition economies, African countries or even developed ones. Finally, when possible, the inclusion of other pertinent independent variables is recommended as LED considerations matter but other factors also influence the development of places.

ANNEX

Multicollinearity test (Tolerance and VIF values)

Dependent variable: MMDI difference 2005-1990	β	P-value (t-test)	Tolerance	VIF
Income per capita	.293	.577	.281	3.554
Literacy rate	.064	.025	.248	4.029
% Services	.181	.000	.346	2.894
% Floor material	.085	.000	.268	3.733
% Indigenous households	-.011	.085	.559	1.789
% Primary sector	-.038	.002	.312	3.208
Migration	.071	.001	.600	1.666
Urban	-2.118	.003	.772	1.295
D1	.793	.100	.487	2.053
D2	-.420	.321	.798	1.254
D3	-.763	.097	.550	1.817
D4	1.113	.026	.462	2.166
D5	-.719	.170	.418	2.395
SC6	.639	.066	.509	1.965
SC7	-.753	.036	.541	1.849

Plot of studentised residuals MMDI difference

