

## **Risks of the increase of the spent in education on the gross value of the Huetano Municipality product; An analysis of the input-product**

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The fundamental aim of this paper is model the effect that would have an increase of the expense in education on the productive activity of the municipality or Huetamo, Michoacán, using the Input – Output (I-P) table analysis. Although this technique presents limitations as all models, it allows showing the general effects on the productive sector of the municipality; it shows the little entail of the educational sector with the productive activities of the principal "cluster" detected in the municipality. The result allows supposing that the educational sector is not orientated or presents few entail with the agricultural and cattle sectors of the region.

### **Education expense, productive system, Input-Output table, clusters**

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**Introduction**

The state of Michoacan is between the federative entities with biggest budget in the field of public education. In the higher level, the University of Michoacan de San Nicolas de Hidalgo (UMSNH) is the second educative institution which get the biggest percentage of this spend, after the Education Secretary of the State.

In the last years the decentralization of the UMSNH has been promoting in many cities of Michoacan, between them, the Unidad Profesional del Balsas de Huetamo (UNIP) with the finality to offer license programs, specialty and postgrad that take advantage of the sustainable regional development. The hypothesis that the present essay manage is that increasing the public spending in the educative sector in the municipality, will impact in the increase of the gross domestic value of the production of other economic sectors.

The ahead is made using a projection technic with Income Matrix-Product and the result are compared with the cluster that exist in the economic activity.

In the headland two is exposed an historic analysis of the spending in education in Mexico, as well, the comparison of the same with other countries; after that in the headland three addressed the education in Michoacan and the educative spending in the state is exposed; in the fourth section the composition of the productive system of the Huetano municipality and the education coverture are exposed.

The fifth headland describes the methodology applied for the elaboration of the present research, identifying the impact of the education spending in the productive system of the municipality; in the section six and seven are exposed the obtained results of the modeling of the public spending impact in education, considering the percentage recommended by the UNESCO; and finally with final conclusion and consideration.

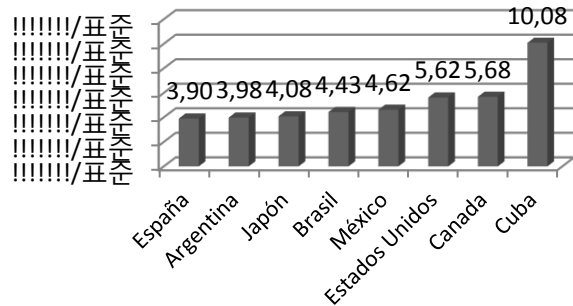
**Education and Economy**

Part of the public spending destined to the educative sector in Mexico, has as finality between others, create new higher educative institutions.

Cohen (2000, p.7) conceptualize the education as: "The axle that articulates the economic growth and the social development. Provide the knowledge and skills that aloe to increase the productivity of the work and face the challenges of the competitively. As well, is one of the basic springs in the process of social integration". However, in Mexico has bet little to the spending in education as tool for the social economic development.

The graphic 1 result from the average of the public spending as percentage of the PIB, for the period 1980-2008 of 8 countries; Mexico is under the 8% recommended by the United Nations Educational, Scientific and Cultural Organization (UNESCO). While Cuba outperforms to Mexico in this field with more than the double.

Percentage of the public spending in education respect the PIB, many years

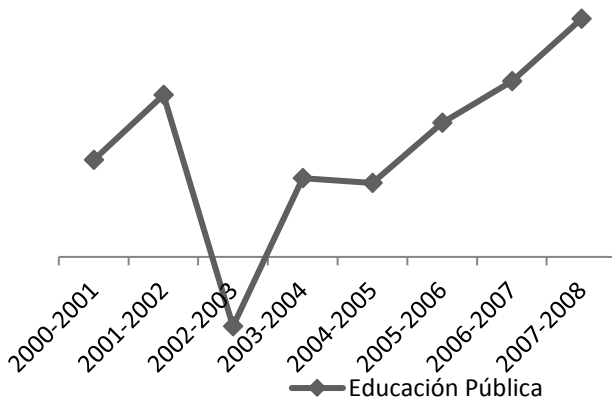


Graphic 1

Source: Own elaboration in base of facts of the Statistics Institute of the UNESCO

In the other hand, for 2001 we observe that in Mexico the evolution of the public spending in the field 11 (Public Education) grow in a 4.2% respect to 2000, for 2002 increase in 7% after is appreciable a fall for 2003 with -3% and only for 2007 approach a similar level that had in 2002, see graphic 2.

Annual percentage variation of the public spending in education 2000-2008



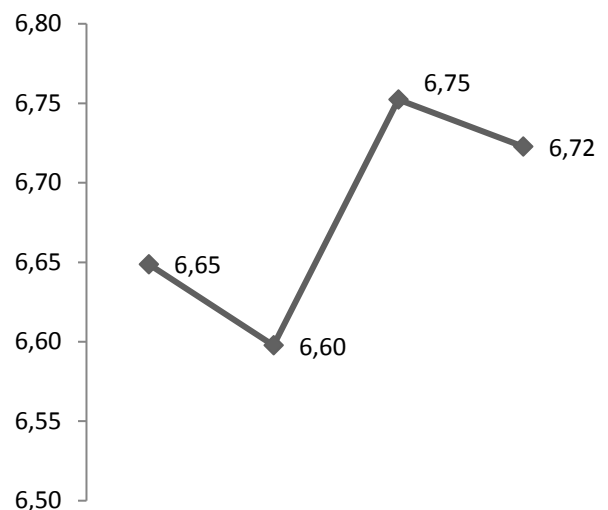
Graphic 2

Source: Own elaboration with facts of the Study Center of Public Finances of the H. Deputies Camera.

In the graphic 3, is presented the percentage of the spending destined to public education for the years, 2007, 2008, 2009 and 2010 respect to the Budget of Expenses of the Federation (PFF) that even if present a little recuperation it does not look to be enough to compensate the big deterioration in the education field that the country has.

In 2007 was approve a budget of expenses of 2,260, 412, 500, 000 pesos, from which the quantity of 151,963, 400, 000 pesos was destined for the public education, representing the 6.65% of the total. The PFE still increasing but it was not the same for the public education which suffers a setback of 0.5% for the 2008. For the 2010 the approved budget was of 3,176, 332, 000, 000 pesos, going to the quantity of 211,186, 159, 110 pesos for the public education, which represented the 6.72% of the budget total.

Percentage of the spending in public education, respect to the total of the Federal Budget in Expenses (PFE)



Graphic 3

Source: Own calculation in base of the facts of the (PFE) 2007-2010

Although the PFE spending has been maintaining practically without real increase, otherwise the public spending destined to those educative programs of agrarian nature and which give support to the creation of the rural sustainable develop program has seen reduce in the last years such as we could see in the next chart.

Approved spending in PFE for the program of rural sustainable develop in national level

	2008	2009	2010
Agrarian Education	4176.7	4,575.00	4,850.20
Rural Educative Program	155.3	55.8	205
Universidad Autónoma Agraria Antonio Narro	525.7	639.2	682.3
Opportunities	15324.4	15,324.40	17,773.60
Skills development	4512.8	5,027.80	4,816.20
Educative field 11 Public Education	28,327.30	25,622.20	24,694.9

**Chart 1**

Source: Own elaboration with facts obtained from the Budgets of Expenses of the Federation, educational aspect in millions of pesos

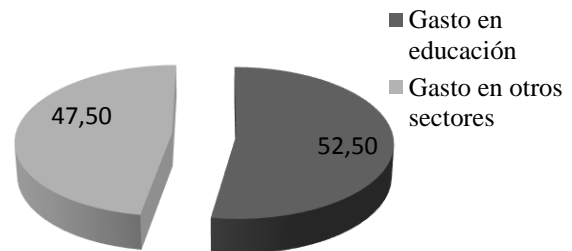
**Education in Michoacan**

The education is for the Government and the Michoacan society a priority subject to achieve the social and economic development, that's why it should be considered as the principal Axle of the public policies (Public Account of the State Treasury, 2004, p.2).

According to the annual informs of the Public Account of the State Treasury that publish each year the Secretary of Finances and Administration in the sector of social development, the state of Michoacan has destined in average near the 50% of the state spending as spending in education, which is not reflected in better education quality, therefore Michoacan is between the states with minor level of exploitation in the country.

For the year 2000, the 54.94% of the total spending was destined to education and the 45.06% for other sectors. In 2001 the spending in education reduced to 52.69% of the total.

Destine of the spending of the Michoacan State. Average of the period 2000-2007



**Graphic 4**

Source: Own elaboration in base of the annual informs of the Public Account of the Michoacan State.

Considering that the UMSNH plays an important role in the economic and social development of the state and neighbor states for its scientific and humanistic character, also which is highly understood with the promotion of the economic and social development have not seen reflected a real increase in the budget.

Article  
**RISKS**

Practically it have been maintaining stagnant in the last years with respect to the total of the spending destined to education in the state (see chart 2), but if we compared it with the total public spending, it has destined a 30% less to the UMSNH in the period of 2000-2010.

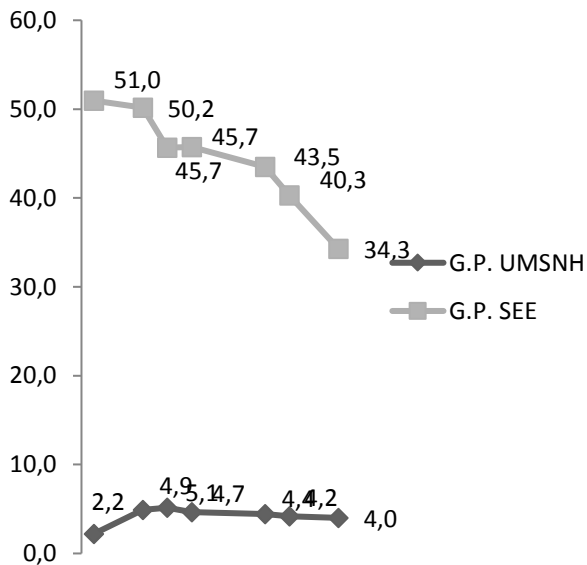
Percentage of spending destined to the SEE and to the UMSNH respect to the total educative spending

	2000	2001	2002	2003	2004	2005	2006	2007
State Secretary of Education	88.0 2	87.0 6	86.2 6	83.5 3	82.8 7	81.9 5	84.3 5	83.5 0
UMSNH	9.78	10.1 9	10.3 4	9.87	10.0 0	10.8 4	9.62	10.5 1

**Chart 2**

Source: Own elaboration in base of the annual informs of the Public Account of the Michoacan State.

Percentage of the spending in SEE and UMNSH respect the total



**Graphic 5**

Source: Own elaboration with facts if the Fiscal Budgets of the Michoacan State, many years.

**Huetamo**

**Coverture of the education**

In the Huetamo municipality, the medium higher education is formed by 2 high schools, in school of Bachelors and a school. In the level of higher education it has the Higher Technologic Institute of Huetamo (founded in 2001).

This institute offers the careers of Engineer in Alimentary Industries, Business Management, Industrial Engineer and Computational systems.

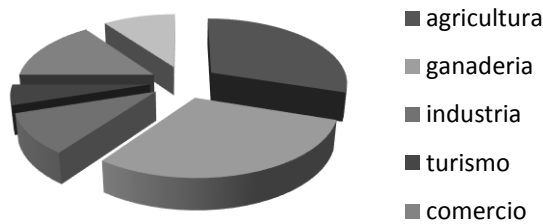
And, since 2004, it counts with the Professional Unit of Balsas, with Degree in Law and Social Sciences, Accounting and Informatics Administrative through a node of distance education created in 2006, which for the type of career do not have a direct impact in the agriculture and animal husbandry, because they focus principally in the formation for the services. These educative institutions in higher level attend a population of 7,637 people (Population and Housing Counting, 2005).

**Economic aspects**

According to the preliminary results of the Population and Housing Census 2010 of INEGI, live 42,000 people in the municipality, composed by 48.96% men and 51.03% women with a density of 20.4 people per square kilometer.

In the municipality the agrarian sector is preponderant; the agriculture represent the 30% of the total, the animal husbandry 30%, the industry 10%, the tourism 5%, the commerce 15% and the services sector 10% (State Center of Municipality Develop, 2000).

Percentage distribution of the economic activities for 2000

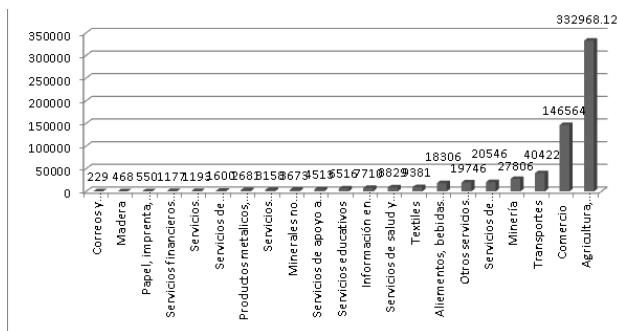


Graphic 6

Source: Own elaboration in base of the State Center of Municipality Develop, 2000.

In the graphic 7 came to reinforce in desegregate form, by sectors of weight that have the agrarian, animal husbandry activities and forest exploitation, follow by the commerce, transport and mining sectors. The chart highlights the lightweight that the educative sector represents with respect to the gross value of the production.

Production gross value per sectors of Huetamo



Graphic 7

Source: Own elaboration with facts of the SCIAN 2003, about sectors of the MIP of Huetamo.

**Matrix of input-product and clusters identification**

The Matrix of Input-Product (MIP) offers important tools for the regional analysis and planning. This methodology allows placing the industries that articulate with strong relations of interchange with the group of the regional economy of the state and fields that are enhancer in the chains to backwards and forwards, in other words providers and buyers of the production of an important sector or field<sup>20</sup>.

The matrix structure of the transaction at the same that the real dynamic of the productive system through interdependency relationships, it shows the articulation of the economy sectors through the offer and demand, in other words, in the site of the shopping and sales

En It also could be used as tool of impacts measurement of the changes in the final demand or in the availability of non-intermeddle inputs about the gross production of the economy, from the linkages of production that the model manage, the could be derived coefficients and multipliers that register the articulations associate to the sectorial interdependencies that establish through other variables of the economic system (Aron Fuentes, 2005), such as: occupation, capital stocks, importations, exportations, aggregated value and remunerations to the factorial services, between others.

Mariña (1993), points that the multipliers of production express direct and indirect effects in the production level of a sector in the group of them, front changes in the final demand.

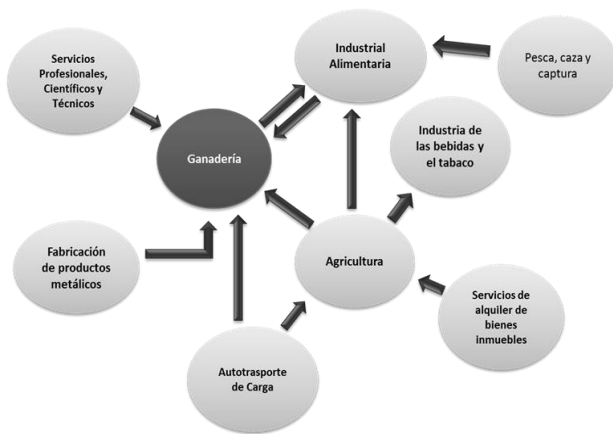
<sup>20</sup> Para conocer más sobre la estructura, construcción y aplicaciones de la Matriz de Insumo-Producto se recomienda revisar los documentos de Mariña (1993).

In the understanding that the double articulation of the sectors, being as production offer of production or applicant of it, is opened the possibility to estimate the production multipliers to forwards and backwards, therefore of buy and sell respectively.

Tapia, Salazar & Zamora (2009), do the detailed study about multipliers methodology and equally present the results about the most important sectors of the Huetamo, resulting the clusters and chains between fields and sectors of the municipality economy.

In this work were found four clusters, but highlight for its importance in the generation of production gross values, the agriculture and animal husbandry sectors.<sup>21</sup>

The cluster of agriculture and animal husbandry in Huetamo, Michoacan



Graphic 8

Source: Own elaboration with facts of the MIP of Huetamo to 40 sectors.

<sup>21</sup> Include the animal husbandry sectors (2) as the key sector and that will turn on the agriculture (1), professional and scientific services (61), alimentary industry (14), transport (39), fabrication of metallic products (28), industries of drinks and tobacco (15).

**Impact of an increase in the education spending about the gross production value (VBP)**

The explained multipliers, as planning tools and modeling of the economic activity allow seeing the direct and indirect effects that over a field has a variation of the final demand (DF).

We do the matrix operation (1) and (2), we obtain the values of a new Gross production value (VBP) generating with the projection of an increase in the DF. It uses the multiplication of the technic coefficients<sup>22</sup> of the MIP inverse with the DF of each one of the sectors:

$$(a_{11} * Y_1) + (a_{12} * Y_2) + \dots + \sum_{n=1}^{\infty} a_{1nj} * Y_n \tag{1}$$

$$(a_{21} * Y_1) + (a_{22} * Y_2) + \dots + \sum_{n=1}^{\infty} a_{2n} * Y_n \tag{2}$$

Where:

- a<sub>11</sub>= the technic coefficient of the produce by the sector 1 and which is used by the same.
- a<sub>12</sub>= the technic coefficient of the produced by the sector 1 and which is used by sector2.
- a<sub>21</sub>= the technic coefficient of the produced by the sector 2 and which is sued by the sector 1.
- a<sub>22</sub>= Tte technic coefficient of the produced by the sector 2 and which is used by the same.
- Y<sub>1</sub>= The final demand of the sectors 1.
- Y<sub>2</sub>= The final demand of the sectors 2.

<sup>22</sup> The technic coefficients represent the percentage of the inputs that the industry j buys to the industry i in order to implement the production.

In this form is used the information of the Matrix Input-Product of the Huetamo municipality 2003<sup>23</sup> to 21 sectors where estimate the new production values of the economy sectors of the municipality to simulate the application of the 8%<sup>24</sup> in education spending, recommended by the UNESCO, being applied like increase in the DF of the educative sector belonging of the public spending, with the intention to observe the increases that generate in the VBP of the different fields of the municipality economy.

This increase could be generated through the increase of the public spending to incentive the economic growth of the municipality.

The results (see annexes chart 1) determinate that this increase of the DF in the educative sector impact in a more directly form (generating a growth) in the VBP of the sector like the commerce, professional services, scientific and commerce, as well the services of business support, management of rights and services of remediation, it is not like that for the agrarian sector, which makes think about the little link that it has (or that does not achieve permeate) with this sector. Though that the sectors with biggest weight in economy are in the agriculture, animal husbandry, forest exploitation, fishing and hunting; the effect over them is despicable, which reinforce the idea of the necessity to reorient the educative policies with the productive sphere.

In the other hand the sector Commerce, Professional services, Business support services, Management of remediation right and services and Host services are the activities that achieve positive effects with the increment of the Final Demand; Having on account, also, that an increase of 8% of the PIB in the educative sector spending would not be enough to compensate the lack of attention in previous years; In any case, the result of this research, leads us to further deepen in this topic<sup>25</sup>.

### **Drag effect in the education in comparison with other sectors**

#### **Multiplier of production**

The educative sector does not produce high productive chains inside the economic activity of Huetamo. Mariña (1993, p. 228) mention that the multiplier are useful as indicators of the direct or indirect inter-sectorial relations established by the offer and demand of intermeddle inputs. In the graphic 8 we could see that the multiplier of production (drag impact over the other activities) in the shopping side, in the educative sector is of 1.02 well below the state average (1.38). This means that the production in a direct and indirect form poorly responds to increases of the public spending of the education in important form of the final demand.

Therefore, highlight the big effort that should be done in the municipality in education field.

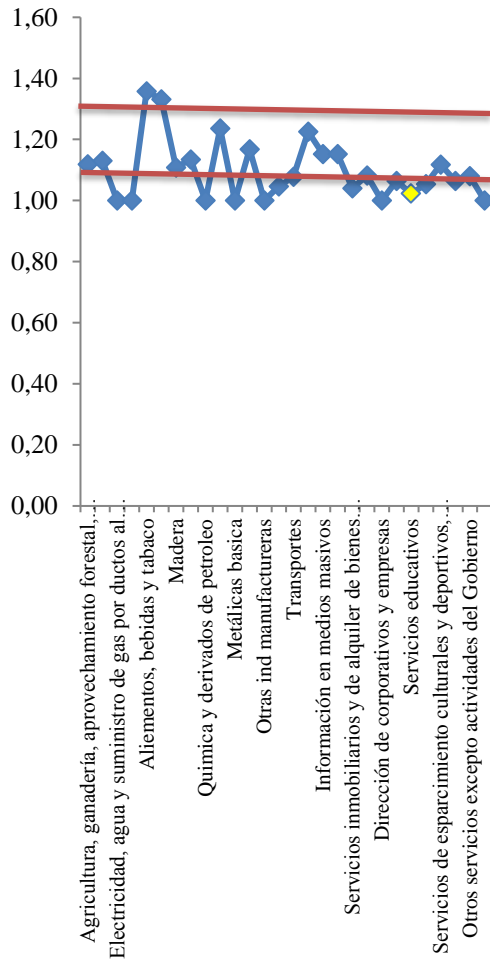
<sup>23</sup> See to Gabriel Tapia, Ismael Salazar et al. Construcción de la Matriz de Insumo-producto para Michoacán 2003, en prensa.

<sup>24</sup> This increase represents a quantity in monetary terms, of 520.75 thousand of pesos of 2003.

<sup>25</sup> Doing a simulation of the increase of 20% in the educative spending (see annexes: chart 2), we observe that the effect in the principal sectors of the productive sphere, principally in the fields located in the named cluster, is marginal. The principal observed increase of the Product Domestic Value from this simulation identify in the sectors of transport and services in general.



Multiplier of shopping production 2003, Huetamo, Michoacan



Graphic 9

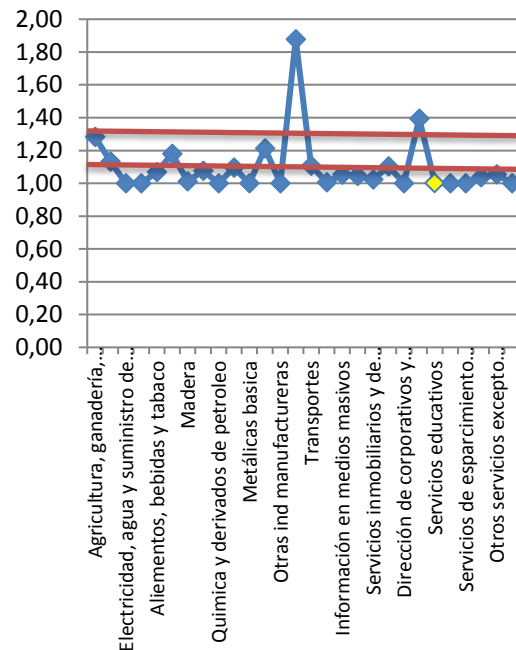
Source: Own elaboration in base of the facts of the MIP Huetammo2003 to 28 sectors.

The obtained multipliers of the Input-Product Matrix of Hutamo to 28 sectors show us what Mariña (1993, p. 176) calls “The total potential effect over the gross production of the *i* sector of a unitary change in the final demand of the *j* sector”<sup>26</sup>.

<sup>26</sup> Taking on account that the model input product help us to represent through a chart of double entry the sell and buy of the fields where the matrix are present as fields *i* and *j*. Mariña uses the equation  $a_{ij} = \gamma VBP / \gamma DF_k$  to demonstrate the potential effect that represent the

In the graphic 9 we observe the multiplier of the production for the shopping site where Huetamo has a multiplier of 1.00, which also is below of the municipality and state average.

Multiplier of shopping production 2003, Huetamo, Michoacan



Graphic 10

Source: Own elaboration in base of facts of the MIP Huetamo 2003 to 28 sectors.

**Final considerations**

In national level have not achieved to accomplish with the recommendations of the UNSECO of destine minimally the 8% as percentage of the PIB for education, which reflect the serious backwardness in education in the country therefore, its poor effect in the productive sector.

variation of the Production Gross Value in the Final Demand.

The productivity is achieved increasing the education spending because this could destine more to the formation in research and development that permeate the different companies of the country.

At state level have been maintaining constant the education spending in the period 2002-2010, but to the UMSNH destines every time less despite to be the principal institution of higher level in Michoacan and generator of scientific research in the state.

The Huetamo municipality is characterized for it economic backwardness, with poor entailment of the educative sector with the productive apparatus, or in any case the group of action for the development, has not prioritized, not even achieve to establish an active entailment of named elements. This is demonstrating for the little drag that the educative sector has over the rest of the public sectors.

As we have been explaining, with the obtained results is demonstrated the direct effect of the public spending in the educative sector, over the rest of the economic sectors; however, the direct and indirect impact is marginal, more than anything in the principal economic activities as part of the cluster which include the agriculture and animal husbandry. The low impact in named cluster could be consider consequence of the poor entailment of the services and advices that the educative sector could offer to named activities, because the educative institutions of professional formation do not offer career that imply and direct link with mention economic activities, but they are more oriented to another type of professional activities.

Consequently, is necessary, reorient the educative offer in function of the regional productive vocations of the municipality with a clearly proposal of social networks formation which include the work of the productive activities and the centers in charge of the research and development, as well as the municipality authorities and the civil society.

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### Annexes

Changes in the VBP in front 8% of the spending in the DF of the educative sector in Huetamo.			
Sector	VBP Original	VBP' Simulate	Difference
Agriculture, animal husbandry, forest exploitation, fishing and hunting	332968	332968.1437	0.02365335
Mining	27806	27806.00354	0.00353823
Food, beverages and snuff	18306	18306.12149	0.12149144
Textiles	9381	9381.046219	0.04621899
Wood	468	468.002407	0.00240702
Paper, printing, publishing	550	550.3371387	0.33713873
Non-metallic minerals	3673	3673.034676	0.03467622
Metal products, machinery, equipment	2681	2681.467926	0.4679264
Commerce	146564	146566.7478	2.74780419
Transports	40422	40422.44419	0.44419099
Mail and storage	229	229.0842279	0.08422791
Mass media information	7710	7710.071929	0.07192943
Financial and insurance services	1177	1177.011592	0.01159195
Real state services and furniture rental and intangible assets	1193	1193.220634	0.22063405
Professional, scientific and technical services	3158	3159.473213	1.47321252
Support services to business and waste management and remediation services	4513	4517.490627	4.49062661
Educative services	6516	7036.912727	520.912727
Health care and social assistance	8829	8829	0
Services of cultural and sporting amenities, and Recreation services	1600	1600.004354	0.00435388
Temporary accommodation and food and beverage preparation	20546	20546.80611	0.80611045
Other services except Government activities	19746	19746.33102	0.33102095
Total	658036	658568.7555	533

Changes in the VBP in front of 20% in the DF of the educative sector in Huetamo.			
Sector	VBP Original	VBP' Simulate	Difference
Agriculture, animal husbandry, forest exploitation, fishing and hunting	332968	332968.1791	0.05913337
Mining	27806	27806.00885	0.00884557
Food, beverages and snuff	18306	18306.30373	0.3037286
Textiles	9381	9381.115547	0.11554748
Wood	468	468.0060175	0.00601754
Paper, printing, publishing	550	550.8428468	0.84284684
Non-metallic minerals	3673	3673.086691	0.08669056
Metal products, machinery, equipment	2681	2682.169816	1.169816
Commerce	146564	146570.8695	6.86951049
Transports	40422	40423.11048	1.11047748
Mail and storage	229	229.2105698	0.21056977
Mass media information	7710	7710.179824	0.17982359
Financial and insurance services	1177	1177.02898	0.02897988
Real state services and furniture rental and intangible assets	1193	1193.551585	0.55158512
Professional, scientific and technical services	3158	3161.683031	3.68303129
Support services to business and waste management and remediation services	4513	4524.226567	11.2265665
Educative services	6516	7818.281818	1302.28182
Health care and social assistance	8829	8829	0
Services of cultural and sporting amenities, and Recreation services	1600	1600.010885	0.01088471
Temporary accommodation and food and beverage preparation	20546	20548.01528	2.01527613
Other services except Government activities	19746	19746.82755	0.82755236
Total	658036	659368	1332