

# Endogenous Development: A Commercial Conceptual Perspective of the Management Model in Tungurahua-Ecuador in Industry 4.0

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## Abstract

The research developed seeks the actions, public and internal policies that help the rural parishes of the province of Tungurahua to recover the potential of individuals dedicated to agriculture, livestock, local enterprises and tourism to reach a balance between the needs of these actors and norms that govern the primary sector of Ecuador's economy, create a vision of values and principles to break those paradigms of society in terms of generating resources and wealth to find new ways to realize the management model of the Province, called parliaments; water, people and work, that work for the benefit of the entire community of Tungurahua and help small businesses, which as a group guarantee a real local development of the province and focus a vision of a 4.0 industry in Ecuador that allows creating competitive advantages and standing out as a province at the national level.

## Keywords

Endogenous Development, Territorial Development, Social Economy, Public Policies; Industry 4.0

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## 1. Introduction

This research was carried out in Tungurahua-Ecuador, so the territory of the province was characterized first, followed by the development aspects that it has, going through an SWOT analysis to finally perform a competitive analysis of Tungurahua. For this research, it was essential to analyze the theories of endogenous development, conceptualizations of endogenous development in Latin America and the development and management model of the province with its

water, people, and labor parliaments. For this reason, the characteristics of the analyzed sectors are presented: agriculture, livestock, artisanal and tourism, concluding in the tools of Industry 4.0 that strengthens the productive apparatus of Tungurahua.

The word development is linked to evolution because every individual, situation, or object changes (Ramírez, 2014). Local advancement is the realization of an idea and the comprehensive and detailed explanation of a topic (Puertas, 2016). It is also considered that regional progress is a structural change from the perspective of Acuña, Morón de Salim & Guevara, (2017). Local development can be defined as the process of transformation of the economy and society (Brunet & Böcker, 2015).

Endogenous development encourages the coherent development of policies, plans and projects of the national executive, for endogenous development, the collective and solidarity economy, coordinates actions with other public power bodies (Benavides, Guzmán, & Vila, 2015). Economic development is a process requiring strategies developed by local people (Alvarez, 2017). It is considered a participatory process and carried out by local producers aimed at improving living conditions (Ramírez, Lira, & Cuervo, 2009). Economic development creates plans based on the mobilization of territorial actors (Mora & Martínez, 2018).

Endogenous development has diversified strategic props, referring to economic, social, political, cultural, and environmental knowledge guidelines. Identifying a functional competitive environment that allows identifying and enhancing skills and competencies of the parishes of the Tungurahua province and of society in general to improve local development indices with its management model called water, people, and work parliament. This town has the need to modernize its inclusive management model as it is involved in the globalization of the world, the latter has strengthened terms such as productivity and competitiveness, making the empiricism referents, and in general, empirical administration represents a competitive disadvantage to endogenous and territorial level of development.

On the one hand, the environment frames an absence of comprehensive information, making various components such as strengths and weaknesses unable to be articulated. The immediate result of the situation is that the planning does not adjust to the requirements and subsequently affects the budget, being a limitation for the sustainability of the projects of the rural parishes of Tungurahua.

On the other hand, the absence of information limits the ability to diagnose individual skills, representing an endogenous development problem in the province. The problems faced by rural parishes are similar due to the lack of visionary attitude, and on the other hand, paternalistic thinking, there is still the ideology in peasant and indigenous populations that the governments of the day must solve their dilemmas, which gives as a result, there is no commitment to territorial progress, which is designed and discussed in the work parliament.

This article aims to analyze from a commercial conceptual perspective the

management model in Tungurahua-Ecuador in industry 4.0 through a multidisciplinary work that includes the disciplines of Market Research, Marketing and Administration.

## 2. Characteristics of Tungurahua

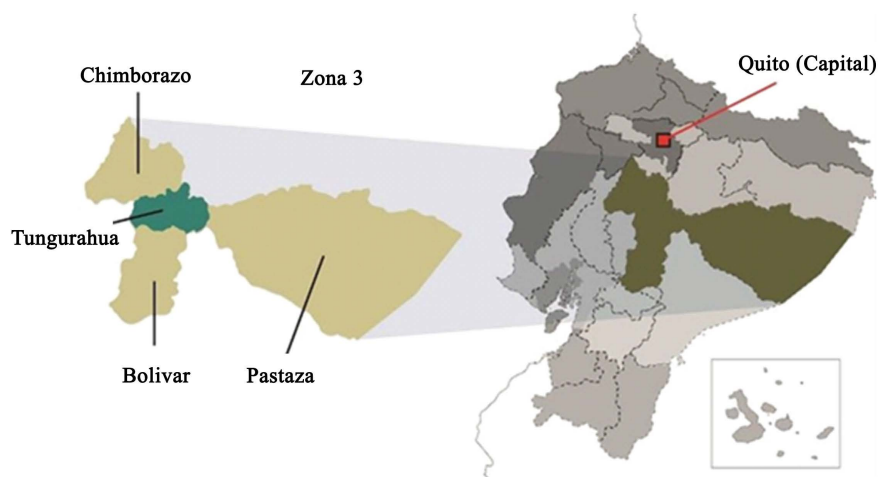
### 2.1. Territorial Characterization of the Province of Tungurahua

The province of Tungurahua is in Ecuador in the southern and western hemisphere of the planet. It is divided into nine cantons: Ambato, its capital, Baños, Cevallos, Mocha, Pelileo, Pillaro, Quero and Tisaleo. Limiting to the north with the province of Chimborazo, to the south Bolívar, to the east Pastazaas show in **Figure 1**. The data from the last population and housing census in 2010 carried out by the National Institute of Statistics and Censuses (INEC) indicate that it has 504,583 inhabitants of which 59% live in rural areas and the other 41% in urban areas, with an average urban increase of 6335 people. Tungurahua represents 1.2% of the national space with 3335 square kilometers.

### 2.2. Aspects of the Development of the Production of Tungurahua

In the past, Tungurahua, in most of its geographical territory, has been considered an agricultural province with fruit crops and a great variety of grains and legumes, livestock, fish, poultry, shoe manufacturer mainly and commercial (Vigil & Magri, 2015). Tungurahua, despite being one of the small provinces, has the most complete road and electrical infrastructure, with productive chains, promotion of family economies, tourist routes and artisan sectors; elements that make this town have a high economic movement (Demenus & Coello, 2011).

Tungurahua has diversified its economic participation in tourism, being the largest source of economic exchange, contributing 13% of the gross domestic product (GDP) in the country (Ramirez, Lira, & Cuervo, 2009). The Provincial



**Figure 1.** Territorial characterization of the province of Tungurahua. Figure labels: Territorial characterization of Tungurahua according ministry of agriculture and livestock (MAG).

Government designs and executes projects focused on producers, through the transfer of knowledge and technology, development of abilities, skills and aptitudes for the production and commercialization of products (De La Hoz Suárez, De la Hoz Suárez, Escobar, & Diaz, 2018). The training aspects carried out in the projects are focused on the education and training of human talent from an industry 4.0 perspective linked to an endogenous management and development model (Arias, Reyes, & Torrez, 2018).

### 2.3. SWOT Analysis of the Province of Tungurahua

As strengths Tungurahua has strategic alliances with public and private companies, the footwear industry must adjust to the changes of industry 4.0 and produce intelligently (Castelao, 2016). There are tourist heritages in which crafts are sold and services are offered that, by integrating with the Big Data and analytics posed by industry 4.0, create better business decisions (Diaz, 2017).

Institutional support from various public sectors, the National Council of Rural Parish Governments, from now on (CONAGOPARE), the universities that work together for the development of linkage projects with the contribution of knowledge transfer, techniques and knowledge (Honorable Gobierno Provincial de Tungurahua, 2018).

This province has limited technical advice regarding the fourth industrial revolution directly influencing the agricultural sector (Sampedro & Díaz, 2016). By not having Industry 4.0 implemented, Tungurahua does not have the capacity to effectively cover the demand and processes, as they are not interconnected through the Internet of Things (IoT), national production is delayed (Burbano & Cardona, 2011).

The current industrial revolution forces the province to digitize its processes with a focus on smart infrastructures (Ávalo, Yague, & Cangahuala, 2016). Industry 4.0 consists of trying to automate processes, which will allow the creation of products and services of excellence (Gil, Boada, & Alzate, 2018).

Ecuador has a weak dollarized economy, directly harming the province's society, the same climatic changes that affect agriculture, which is why the production intelligence offered by industry 4.0 is necessary (Moctezuma, López, & Mungaray, 2017). As is the benefit of having smart climate sensors that know the crop field and offer data from the electromagnetic spectrum even from ultraviolet rays, this helps farmers to determine which of the fields needs wetting or eliminating pests (Ynzunza, Izar, & Bocarando, 2017).

The water for irrigation is limited in times of drought, with technology it could reserve precise amounts of water for this time with a strategic planning of irrigation (Mora, Vera, & Melgarejo, 2015). A responsible culture in environmental education is to have options such as sharing the transport that other countries use electromechanical technology (Nogales, 2006). On the other hand, the tourism sector is affected by the poor telephone and internet signal; works without automated processes so competitiveness is lost (Castillo & Cárdenas, 2018).

## 2.4. Competitive Analysis of Tungurahua

The proposed competitive management model consists of three strategic axes: water, people and work for endogenous development, it generated a common vision between the sectors: agricultural, commercial, artisanal, industrial, services and local tourism enterprises, with the contribution of knowledge transfer and technology from local universities (Elgueta & Espinoza, 2015).

## 3. Methodology

### 3.1. Analysis Methodology

The design of this research sought to synthesize the factors and resources in opportunities, threats, strengths, and obstacles that impede endogenous development for the public and private beneficiaries of the management model. This study focused on knowing the logic of the management model perspective and how the actors contribute to local development. This approach takes into account the heterogeneity of individuals and how public policies and their resources are implemented (Vázquez, 2018).

Three stages in the investigation were contemplated. In the first stage, a diagnosis of Tungurahua's resources and their impact on the articulation of the components to the management model was analyzed. The second stage included the analysis of the main theories and concepts of endogenous development authors, through the collection, synthesis, and contrast of information that they contributed to the objectives, evaluative, operational, procedural and resource elements assigned to the management model (Tomási, 2008). Third stage deals with the implementation of the model where the set of elements and products that result from linking projects with local universities were analyzed, in which goods or services are produced by implementing the proposed management model (González, 2016).

Students from the Technical University of Ambato participate in projects in rural parishes to obtain data on productivity and compliance with public policies of the model. The main problem that was identified was the limited infrastructure for the fairs (Suset, Cruz, Machado, Campos, & Miranda, 2007). Once the field research was carried out, it was identified that until now points closely related to topics of interest of the management model in favor of increasing endogenous development remain without innovation (Salcedo, 2018).

### 3.2. Methodological Aspects of the Research

The scope of the research covers the sectors: agricultural, artisanal and tourism that contribute to endogenous development. The methodology used in this study was qualitative with a descriptive design, which defines characteristics of the institutions that were subjected to the analysis, for which databases endorsed by the National Council of Statistics and Censuses were used (Sabando, Pérez, & Odriozola, 2018).

The descriptive statistical method includes this study to determine the struc-

ture and reliability of the relationship of the elements analyzed using measures of central tendency and dispersion measures that allow quantifying the variability of the data. Industry 4.0 proposes the automation of processes that helps to manufacture quality products and provides benefits for companies that produce in this way, these elements will be analyzed under parameters of reliability and variability in this research.

The territorial nature of the economic development of Tungurahua has long known a situation of theoretical marginality that should not be identified as if it were a model of industrialization (Fragoso, 2015), rather, it highlights the identity values that have existed in the past in the forms of production not based only on large industry, but on the general and local characteristics of a given territory (Fajardo, 2006).

#### 4. Endogenous Development Theories

The theory analyzes the mechanisms of capital accumulation and the forces that support the immediate sources of development, and the efficient use of resources (Mballa, 2017). The development potential studies the mechanisms responsible for regulating the accumulation processes (Hernández, Herrera, & Chávez, 2015). Moreover, it is an interpretation that does not conflict with approaches to habitual development, but rather its theoretical basis turns out to be compatible with various visions of development (Issa, 2017).

When wanting to analyze endogenous growth models, the endogenous development theory is vital, being this useful to affirm that there are different growth paths of economies, depending on resources (Del Pozo, Calderón, & Pascual, 2016). But endogenous development theory differs from growth models in that it contemplates the growth of production, in that it embraces a territorial and non-functional view of growth processes (Vazquez, 2007).

Endogenous development theory holds that economic growth is a process represented by market uncertainty (Gonzalez, 2009). The theory by recognizing increasing returns of accumulative factors and investments in human capital will allow to discover elements of endogenous growth (Amaro & Gortari, 2016). Then the theory of endogenous development facilitates addressing the problem of growth, it is also accepted that endogenous development depends on factors such as investment in human capital formation (Rodríguez, 2015). The theory states that the economic growth of a place depends on internal factors but not external (Caicedo, 2016). In Latin America there are important conceptualizations about endogenous development as shown in Table 1.

Quispe (2016) states that endogenous development models are alternative strategies, which support local community development. The model revolves around three axes which are: politics seeking to activate the popular movement; economic seeking the creation of companies of social production; and popular power with the aim of making decisions through training, in addition this model is managed with three characteristics that are the cooperation of the members,

**Table 1.** Outstanding conceptualizations of Latin American endogenous development.

<b>Endogenous Development</b>			
<b>Gabith Miriam Quispe</b>	<b>Gil Ramón, Boada Antonio &amp; Alzate Isabel</b>	<b>María Elena Rodríguez Urbaneja</b>	<b>Jaime Puertas Acosta</b>
<p><b>Endogenous development is a process that entails transformation and productive differentiation whose main idea is that each community has been constituted according to its links of interests, building a cultural identity which makes them differentiate one from another, therefore a community can take advantage its resources thus finding to satisfy its needs and solving all its problems, supporting the productive development of a country (Quispe, 2016)</b></p>	<p>Endogenous development is the ability to transform a socio-economic system, being able to face challenges that arise, with the support of society and government, carrying out community projects in such a way that the resources required for execution are the same. community, thus achieving innovation at the local level, launching an internal development model which can satisfy the community (Gil, Boada, &amp; Alzate, 2018).</p>	<p>It plays a relevant role in the processes of economic progression, since it acts as a catalyst for the mechanisms of accretion, which act after the accumulation of capital, through local initiatives, in addition to facilitating business advancement and the creation of business networks, promoting the diffusion in innovation, thus improving urban progress, the endogenous development policy works in combination on all the mechanisms that sustain productivity (Rodríguez, 2016)</p>	<p>Endogenous development can be analyzed from different points of view, one of them is how evolutionary endogenous development has, which is presented as a process to accumulate capital and technology, the strategic aspect of endogenous development is understood as an alternative of local initiatives to the problems that globalization externalizes and the third of the cultural panorama because it is based on the capacities and creativity of man (Puertas, 2016)</p>

a. Conceptualizations of endogenous development.

reinvesting the profits in social production and carrying out policy management (Ahumada & Perusquia, 2016).

#### **4.1. Development and Management Model of the Water, People and Labor Province**

The Water Parliament is in charge of controlling the use of goods among the interest groups: moors, drinking and irrigation water, sanitation and environmental pollution, in this part the ecological side of this model is shown by optimizing the use of resources (Oliver, 2016). CONAGOPARE is involved in this aspect as it is an institution with the purpose of contributing to rural development while taking care of natural resources. In Tungurahua, collaboration is fostered, for this reason a permanent provincial parliamentary space for citizen participation is created called the People’s Parliament that has interest groups, childhood and adolescence, women, youth, and older adults (Delgado, 2017).

In the work parliament, agricultural strategies are proposed: associative agricultural marketing, generation of added value and agroindustry in its production, agricultural training and technical assistance, clean productivity, and organizational and institutional strengthening (Lázzaro, 2017). The tourism strategy develops tourism products, training, and tourism skills training. The artisan agenda raises: design of new models, structural analysis, assistance of specialized techniques and development of new articles (Gambarota & Lorda, 2017).

#### **4.2. Results of the Application of the Management Model**

**Table 2** shows the characteristics of the sectors analyzed under five parameters: the type of company that is divided into the agricultural, tourist and artisan

**Table 2.** Characteristics of the analyzed sectors.

Sector	Frequency	Percentage
Agricultural	117	37.7
Tourism	101	32.6
Artisan	82	26.5
Company size	Frequency	Percentage
Small (1 to 10 employees)	206	66.5
Medium (11 to 50 employees)	83	26.8
Large (51 to 100 employees)	11	3.5
Industry 4.0	Frequency	Percentage
Information Technology	10	3.2
Big Data	2	0.6
Smart sensors	3	1.0
Smart infrastructure	3	1.0
3D print	1	0.3
None	281	90.6
Experience	Frequency	Percentage
1 - 5 years	123	39.7
6 - 10 years	142	45.8
11 - 20 years	22	7.1
Over 21 years	13	4.2
Competitive advantages	Frequency	Percentage
Best Products	80	25.8
Produce at a lower cost	86	27.7
Value brand	41	13.2
Impeccable customer service	37	11.9

a. Analysis parameters.

sectors. It details the size of the company between small, medium and large. The third parameter is the elements that Industry 4.0 currently exists, the fourth parameter is the experience of these companies in the sectors analyzed and finally the fifth parameter is the competitive advantages to which companies aspire as show **Table 2**.

The elements analyzed correspond to the agricultural, tourist and artisan sectors of Tungurahua. The businesses are mostly small companies in different sectors. It is observed that the majority of companies in the analyzed sectors do not use the tools offered by Industry 4.0, although they have experience in the business, they have not managed to create competitive advantages. With the application of industry 4.0 in the province, it will be possible to produce in a more efficient way that contributes to the endogenous development of the province.



The form of automated production has some elements such as benefits of the implementation of Industry 4.0, these are productivity, customer satisfaction, personalized service, control of production according to demand and the generation of competitive advantages. After the analysis of these elements, a Cronbach's Alpha of 0.849 was obtained, demonstrating the reliability of the elements analyzed and a variability of 0.097 with respect to its mean of 3.826. The range of the elements studied is 0.660 that is to say that the data are related to each other.

#### **4.2.1. Agricultural Sector**

The agricultural area of the Province of Tungurahua represents 33.8% of the economically active population and is a fundamental pillar for the generation of employment with approximately 66 thousand families dedicated to agriculture. However, it is the least attended sector to promote true progress, here is if it is not by far the greatest weakness, but one of the most influential in the endogenous development of the province of Tungurahua. The Ministry of Agriculture and Livestock from now on (MAG) is the governing institution of the multicenter, to regulate, regulate, facilitate, control and evaluate the management of agricultural, livestock, aquaculture and fisheries creation; aims to promote actions that allow rural development.

Potato cultivation covers approximately 2641 hectares, according to MAG's communication department, the benchmark yield is 25 tons per hectare. 60% of the national production of blackberry from Castile comes from Tungurahua, according to the Production Directorate of the Provincial Government of Tungurahua. Within the associative trade plans and the strengthening of the business partner, the Tungurahua Dairy Consortium was born as a need for small and medium-sized dairy producers to associate in order to market together, considering that milk is a fundamental pillar in the family economy.

#### **4.2.2. Artisan Sector**

In the artisan trade, Ambato stands out, due to the quality of the materials that are manufactured here. There are 180 artisan branches with base guilds and the branches that do not have an association are grouped into interprofessional guilds, within this group there are also 12 artisan academies where modern artisan forms are taught. Tungurahua encourages development through the HGPT with trainings that are carried out in response to the agreement that exists between the HGPT and the unit of indigenous movements, which aims to strengthen the productive and economic apparatus, within the framework of the Labor Parliament.

#### **4.2.3. Tourism Sector**

Tourism contributes to endogenous development with more than 280 tourist attractions, according to the INEC 2019, 1.381726 tourists entered the country, the most representative percentages coming from the United States with 15.1%, Spain 15.8%, Germany 4.5%, Canada 10.6% and France 12.2%, in regarding the

number of tourist establishments in zone 3, the largest infrastructure is in the province of Tungurahua, which is mostly located in Ambato, and Baños, the concentration of foreign demand in tourism in relation to the country is 15.1%.

The tourism committee, together with the HGPT, with the nine Decentralized Autonomous Governments and CONAGOPARE, in addition to the universities of the canton such as: PUCESA, Technical University of Ambato, Indoamérica Technological University, were in charge of designing and structuring five parish artisan agrotourism routes, nine cantonal and six provincial through the Tungurahua Tourism specialization program. The joint effort of public, private, community and academic actors is destined to promote the development of tourism. After the analysis of the sectors, **Table 3** shows the objectives, institutions and elements that participate in the implementation of Industry 4.0 in Tungurahua.

## 5. Conclusion

This research was carried out in Tungurahua, one of the provinces of Ecuador characterized by its production and trade trajectory. It was focused on the three main sectors: agriculture, artisanal and tourism. It is worth mentioning that industry 4.0 can be applied in different productive sectors of the province and throughout the country as a response to the new forms of consumption that are currently being experienced.

Industry 4.0 raises principles of process automation that allow companies to manufacture quality products and at the time the consumer needs it. This automation also supports providing a personalized service thus increasing customer satisfaction. The competitive advantages that can be created under the vision of industry 4.0 would increase the productivity of Tungurahua, as we previously analyzed these elements are reliable, which shows that they are necessary for the endogenous development of the province. The proposal of this research is the application of Industry 4.0 in the productive processes of the sectors of the Tungurahua province.

The endogenous development models proposed by the analyzed authors have reference points that are adapted in the province by the water, people and work management model, this to the reality of the provinces of Ecuador, it is not yet developed efficiently so it is needed that the parishes generate competitive and comparative advantages that allow them to excel, cooperate and contribute to the social economy of Tungurahua through the application of tools that we offer to produce under the industry 4.0 parameter to generate products with greater and better technology.

In attention to the water, people and labor parliaments, the local development of the province is harmonized by analyzing issues of social responsibility and care for the environment as raised by the water parliament, when talking about the people parliament, individuals are identified as the main entity of endogenous development and the labor parliament is in charge of technical assistance for

**Table 3.** Tungurahua and industry 4.0.

Tungurahua 2025	Industry 4.0 Platform
<p>Launching</p> <ul style="list-style-type: none"> <li>• 2015</li> </ul>	<ul style="list-style-type: none"> <li>• In 2015 the territorial ordering plan was launched: The Province Management Model with three parliaments, water, people, and work.</li> </ul>
<p>Objectives</p> <ul style="list-style-type: none"> <li>• Elevate the industry</li> <li>• Evolve in the way of producing</li> <li>• Promote local innovation</li> <li>• Responsible and efficient use of resources</li> <li>• Motivate skills and talents</li> <li>• Create competitive advantages.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply new communication and information technologies in industry</li> <li>• Support small and medium-sized enterprises in the agricultural, tourist and artisan sectors.</li> <li>• Qualify Workers</li> <li>• Automated processes</li> </ul>
<p>International References</p> <ul style="list-style-type: none"> <li>• Industry 4.0 from the United States and the United Kingdom.</li> </ul>	<ul style="list-style-type: none"> <li>• Countries with outstanding Industry 4.0 practices Sweden and the Netherlands.</li> </ul>
<p>Authorities</p> <ul style="list-style-type: none"> <li>• Promote internal and public policies</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate compliance with the objectives of the management model</li> </ul>
<p>Institutions</p> <ul style="list-style-type: none"> <li>• Ministry of Agriculture and Livestock</li> <li>• Honorable Provincial Government of Tungurahua</li> <li>• Decentralized Governments</li> </ul>	<ul style="list-style-type: none"> <li>• National Council of Rural Parish Governments of Ecuador</li> <li>• Academy: Universities of the Province</li> <li>• Public and private sector</li> </ul>
<p>Position of the Tungurahua province</p> <ul style="list-style-type: none"> <li>• Tungurahua needs to enter Industry 4.0</li> <li>• You need to increase the quality of the products</li> <li>• Requires a higher level of automation</li> <li>• Increase innovation to lead among the other provinces</li> </ul>	<ul style="list-style-type: none"> <li>• Have competitive advantages in the agricultural, artisanal and tourism sectors.</li> <li>• Raise the productivity of the province</li> <li>• Ensuring a sustainable economy for workers</li> </ul>
<p>Sectors</p> <ul style="list-style-type: none"> <li>• Actions, public and internal policies for the agricultural, artisanal and tourism sectors the agricultural sector that represents 33.8% of the economically active population</li> </ul>	<ul style="list-style-type: none"> <li>• The artisan sector with 180 artisan guilds and 12 artisan academies</li> <li>• The tourism sector with more than 280 tourist attractions with the entry of 1.381726 tourists in Ecuador</li> <li>• The tourism sector receives tourists from Colombia, the United States, Peru, among others.</li> </ul>
<p>Innovation strategies</p> <ul style="list-style-type: none"> <li>• Imitation, adaptability, and improvement</li> </ul>	<ul style="list-style-type: none"> <li>• Innovation based on research, and development</li> </ul>
<p>Technologies for development</p> <ul style="list-style-type: none"> <li>• Information technologies</li> <li>• Machines for process automation</li> <li>• Transportation</li> <li>• Electronic equipment</li> <li>• New and higher quality materials</li> <li>• Intelligent machinery</li> <li>• Ultraviolet ray sensors</li> <li>• Process automation</li> </ul>	<ul style="list-style-type: none"> <li>• Internet of things (IoT)</li> <li>• Smart sensors</li> <li>• Sensors for collecting data from the electromagnetic spectrum</li> <li>• 3d print</li> <li>• Big Data</li> <li>• Integrated systems</li> <li>• Analytics</li> <li>• Mobile Internet</li> <li>• Electromechanical technology</li> <li>• Efficient telephone and internet signal</li> <li>• Smart infrastructure</li> </ul>
<p>Internationalization</p> <ul style="list-style-type: none"> <li>• Tungurahua will be able to compete with its products internationally</li> </ul>	<ul style="list-style-type: none"> <li>• Export of products</li> <li>• Market expansion and discovery of new market niches</li> </ul>

a. Elements of Industry 4.0 in Tungurahua, taken and adapted from (Arbix, Miranda, Toledo, & Zancul, 2015).

production, which must be able to face technological advance in order to maintain production activities with excellence.

The global economy is going through a new phase characterized by digitization and connectivity, technologies, computing, big data, artificial intelligence and 3D printing, which have a fundamental role in the manufacturing industry, which leads to the manufacture of products using intelligent machinery, the way in which data is analyzed and decision making positively affects the entire value chain, helping new business models emerge. In the province of Tungurahua, this new vision of production contemplated in industry 4.0 must be generated to compete in the country with quality products.

In Latin America, the fourth revolution begins to break in such that databases are executed in a similar way, but innovating in connectivity, this helps decision-making in real time allowing to achieve better standards of product quality and processes, in addition to facilitating entry into new markets.

Each year Ecuador invests very little in technology and innovation, assuming for the country that wanting to adopt this revolution will become a great challenge, but leaving afloat a variety of opportunities, unleashing debates between technology and traditional, but the trajectory it has already been drawn up and it is expected by 2030 to adopt it in its entirety, with this achieving as a central axis the technological transformation for a modern, innovative and productive Tungurahua province.

Tungurahua has been characterized as a producing province at a high level, but it has encountered limitations which prevent an increase in production, to this is added that there is little training for the people in charge of planting and harvesting, all this entails unless they are competitive with other provinces and Ecuador is not competitive compared to other countries, internal policies must be generated in conjunction with local authorities with a vision for the future that Tungurahua expects to have productions with technology at another level.

In a globalized technological world, Tungurahua must raise awareness that it needs intelligent machines in charge of automating various tasks that were previously in charge of humans, they are the new trend worldwide, through processes, navigation, control, integration of sensors and actuators, all this in Together it seeks to increase collaborative robotics, where each area of a company works in a connected way and at a high level of automation in tasks. The application of industry 4.0 will result in what is known to this day about the logic of the usual production process, preventing the machines from processing the product, if not that the product communicates with the machine to tell it exactly to the machine to do. In order to anticipate customer needs, Tungurahua companies use several sources of information, what is achieved with this is that at the time of producing products and services they will no longer be made in series but rather manufacturing will become low. Demand, changing your production so that it is flexible and giving the market what it really needs to satisfy its most basic needs.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- Ahumada, E., & Perusquia, J. (2016). Inteligencia de negocios: Estrategia para el desarrollo de competitividad en empresas de base tecnológica. *Contaduría y Administración*, *61*, 127-158. <https://doi.org/10.1016/j.cya.2015.09.006>
- Alvarez, C. (2017). Saberes del territorio en la economía solidaria. Aprendizajes para un desarrollo endógeno del buen vivir. *Coperativismo y Desarrollo*, *25*, 13-21. <https://doi.org/10.16925/co.v25i111.1769>
- Amaro, M., & Gortari, R. (2016). Innovación inclusiva en el sector agrícola mexicano: Los productores de café en Veracruz. *Economía Informa*, *400*, 86-104. <https://doi.org/10.1016/j.ecin.2016.09.006>
- Arbix, G., Miranda, Z., Toledo, D., & Zancul, E. (2015). Made in China 2025 e Industrie 4.0. *Revista de Sociología de USP Tiempo Social*, *30*, 143-170. <https://doi.org/10.11606/0103-2070.ts.2018.144303>
- Arias, M., Reyes, R., & Torrez, C. (2018). La gestión Pública del desarrollo local desde el enfoque metodológico del marketing. *Universidad y Sociedad*, *10*, 76-81. <http://rus.ucf.edu.cu/index.php/rus>
- Ávalo, J., Yague, J., & Cangahuala, G. (2016). El capital social y la planificación adaptiva en una comunidad industrial innovadora del Perú. *Estudios Gerenciales*, *32*, 162-169. <https://www.sciencedirect.com/science/article/pii/S0123592316300225?via%3Dihub> <https://doi.org/10.1016/j.estger.2016.05.001>
- Benavides, L., Guzmán, V., & Vila, J. (2015). Sistema de innovación tecnológica desde la perspectiva del desarrollo endógeno. *Revista Venezolana de Gerencia*, *20*, 217-232. <http://produccioncientificaluz.org/index.php/rvg/article/download/19994/19927> <https://doi.org/10.31876/revista.v20i70.19994>
- Brunet, I., & Böcker, R. (2015). Desarrollo sostenible, humano y endógeno. *Estudios Sociológicos*, *33*, 311-335. <https://www.redalyc.org/pdf/598/59844199003.pdf> <https://doi.org/10.24201/es.2015v33n0.4>
- Burbano, P. P., & Cardona, N. M. (2011). Los cuellos de botella del desarrollo endógeno territorial, desde la perspectiva del sistema de ciencia, tecnología e innovación en Colombia. *Revista Iberoamericana de Ciencia, Tecnología y Sociedad*, *6*, 161-177. <http://www.revistacts.net/files/Volumen%206%20-%20N%FAmero%2017/Burbano.pdf>
- Caicedo, G. (2016). Perspectivas del desarrollo regional local para la orinoquia. *Orinoquia*, *20*, 7-9. <http://www.scielo.org.co/pdf/rori/v20n1/v20n1a01.pdf> <https://doi.org/10.22579/20112629.320>
- Castelao, M. E. (2016). Las políticas públicas y su visión de la economía y solidaria en Argentina. *Revista Mexicana de Ciencias Políticas y Sociales*, *61*, 349-378. <http://www.revistas.unam.mx/index.php/rmcpys/article/view/49598/49076> [https://doi.org/10.1016/S0185-1918\(16\)30032-0](https://doi.org/10.1016/S0185-1918(16)30032-0)
- Castillo, Y., & Cárdenas, G. (2018). Turismo una alternativa de desarrollo local. Potencialidades del Corredor del Santa Barbara, Ecuador. *Revista Killkana Sociales*, *2*, 9-20. [https://killkana.ucacue.edu.ec/index.php/killkana\\_social/article/view/102](https://killkana.ucacue.edu.ec/index.php/killkana_social/article/view/102) [https://doi.org/10.26871/killkana\\_social.v2i4.102](https://doi.org/10.26871/killkana_social.v2i4.102)
- De La Hoz Suárez, A., De la Hoz Suárez, B., Escobar, A., & Diaz, R. (2018). Desarrollo

- endógeno comunitario producto de actividades de inversión en ciencia, tecnología e innovación. *Económicas CUC*, 39, 61-74.  
<https://doi.org/10.17981/econcuc.39.1.2018.04>
- Del Pozo, B., Calderón, B., & Pascual, H. (2016). La gestión territorial del patrimonio industrial en Castilla y León (España) fábricas y paisajes. *Investigaciones Geográficas*, 2016, 136-154.
- Delgado, J. C. (2017). Gestión urbana en el contexto del desarrollo local. *Vision Gerencial*, 16, 274-287. <http://oaji.net/articles/2017/6147-1523139926.pdf>
- Demenus, W., & Coello, C. P. (2011). *Cadenas productivas y desarrollo económico rural en Latinoamérica*. Quito: Consorcio de Consejos Provinciales del Ecuador CONCOPE. <http://www.congope.gob.ec/wp-content/uploads/2014/08/Cadenas-Productivas-y-Desarrollo-Economico-Rural-en-Latinoamerica.pdf>
- Díaz, G. (2017). Turismo y desarrollo local. *PASOS. Revista de Turismo y Patrimonio*, 15, 333-340. <https://www.redalyc.org/articulo.oa?id=88150355004>  
<https://doi.org/10.25145/j.pasos.2017.15.021>
- Elgueta, R., & Espinoza, V. (2015). Tres perspectivas sobre el desarrollo regional endógeno. *Revista Austral de Ciencias Sociales*, 28, 9-28.  
<https://doi.org/10.4206/rev.austral.cienc.soc.2015.n28-01>
- Fajardo, L. A. (2006). Desarrollo humano sustentable: Concepto y naturaleza. *Civilizar, Ciencias Sociales y Humanas*, 6, 27-46. <https://doi.org/10.22518/16578953.727>
- Fragoso, J. T. (2015). Teorías en torno a la globalización y sus implicaciones par el desarrollo económico latinoamericano. *Economía Informa*, 391, 32-53.  
<https://doi.org/10.1016/j.ecin.2015.05.003>
- Gambarota, D. M., & Lorda, M. A. (2017). El turismo como estrategia de desarrollo local. *Revista Geográfica Venezolana*, 58, 346-359.  
<https://www.redalyc.org/pdf/3477/347753793006.pdf>
- Gil, R. E., Boada, A., & Alzate, I. (2018). Desarrollo endogeno y sustentable mediante un modelo de planificación estratégica. Caso de estudio: Comuna Guaicamacuto, Venezuela. *Espacios*, 39, 9-25. <https://www.revistaespacios.com/a18v39n32/a18v39n32p09.pdf>
- Gonzalez, F. (2009). Desarrollo humano sustentable local. *Polis*, 8, 53-66.  
<http://polis.ulagos.cl/index.php/polis/article/view/621/1155>
- González, X. O. (2016). Iniciativas de planificación territorial transfronteriza en Matamoros-Brownsville (México-Estados Unidos). *Investigaciones Geográficas*, 2016, 154-167. <https://doi.org/10.14350/rig.44396>
- Hernández, J., Herrera, T., & Chávez, C. (2015). Capacidades, liderazgos y estrategias de gestión de organizaciones de la sociedad civil en zonas rurales. *Contaduría y Administración*, 60, 817-835. <https://doi.org/10.1016/j.cya.2015.07.001>
- Honorable Gobierno Provincial de Tungurahua (2018). *Honorable Gobierno Provincial de Tungurahua*.  
<https://www.tungurahua.gob.ec/index.php/proyectos-hgpt/produccion/estrategia-de-turismo-de-tungurahua/3361-con-las-rutas-agroturisticas-artesanales-parroquiales-cantones-y-provinciales>
- Issa, S. (2017). Dimensiones del desarrollo endógeno en la gerencia de la universidades. *Revista de la Facultad de ciencias Económicas, Administrativas y Contables*, 9, 174-188.  
<https://doi.org/10.17081/dege.9.2.2625>
- Lázaro, S. (2017). Reforma agraria y practica política del desarrollo y la modernización. *América Latina en la Historia Económica*, 24, 193-223.

- <https://doi.org/10.18232/alhe.834>
- Mballa, L. V. (2017). Desarrollo local y microfinanzas como estrategias de atención a las necesidades sociales: Un acercamiento teórico conceptual. *Ciencias Políticas y Sociales*, 62, 101-128. <http://www.revistas.unam.mx/index.php/rmcyps/article/view/51127/51527>  
[https://doi.org/10.1016/S0185-1918\(17\)30005-3](https://doi.org/10.1016/S0185-1918(17)30005-3)
- Moctezuma, P., López, S., & Mungaray, A. (2017). Innovación y desarrollo: Programa de estímulos a la innovación regional en México. *Problemas del Desarrollo*, 191, 133-159. <https://doi.org/10.22201/iiiec.20078951e.2017.191.57820>
- Mora, E., Vera, M., & Melgarejo, Z. (2015). Planificación estratégica y niveles de competitividad de las Mipymes del sector comercio en Bogotá. *Estudios Gerenciales*, 31, 79-87. <https://doi.org/10.1016/j.estger.2014.08.001>
- Mora, M., & Martínez, F. (2018). Desarrollo local sostenible, responsabilidad social corporativa y emprendimiento social. *Equidad y Desarrollo*, 31, 27-46. <https://doi.org/10.19052/ed.4375>
- Nogales, M. (2006). Desarrollo rural y desarrollo sostenible. La sostenibilidad ética. *Ci-riec-España, Revista de Economía Pública, social y cooperative*, No. 55, 7-42. <https://www.redalyc.org/articulo.oa?id=17405502>
- Oliver, L. G. (2016). La política de desarrollo rural en México Existe correspondencia entre lo formal y lo real? *Journal of Economic Literature*, 14, 93-95. <https://doi.org/10.1016/j.eunam.2017.09.004>
- Puertas, J. A. (2016). *Desarrollo endogeno: Comercio, cambio técnico e inversión extranjera directa*. Madrid: UOC.
- Quispe, G. M. (2016). Visiones del desarrollo endogeno desde las comunidades locales. *Perspectivas*, No. 37, 95-122. <https://www.redalyc.org/pdf/4259/425946304006.pdf>
- Ramírez, D. (2014). Desarrollo sostenible como un proyecto de modernidad. *Ciencias Estratégicas*, 22, 67-82. [https://www.researchgate.net/publication/275580988\\_Desarrollo\\_Sostenible\\_como\\_un\\_Proyecto\\_de\\_Modernidad](https://www.researchgate.net/publication/275580988_Desarrollo_Sostenible_como_un_Proyecto_de_Modernidad)
- Ramirez, J. C., Lira, S. I., & Cuervo, L. M. (2009). *Economía y territorio en América Latina y el Caribe: Desigualdades y políticas*. Santiago de Chile: CEPAL. [https://www.cepal.org/sites/default/files/events/files/ilpes-alc\\_economia\\_y\\_territorio.pdf](https://www.cepal.org/sites/default/files/events/files/ilpes-alc_economia_y_territorio.pdf)
- Rodríguez, A. (2015). Dinámicas sectoriales y desarrollo territorial en economías locales interiores. El caso de rivera en Uruguay. *Economía Sociedad y Territorio*, 15, 217-250. [http://www.scielo.org.mx/scielo.php?script=sci\\_arttext&pid=S1405-84212015000100009&lng=es&tlng=es](http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S1405-84212015000100009&lng=es&tlng=es)  
<https://doi.org/10.22136/est002015560>
- Rodriguez, E. (2016). *Las potencialidades para el desarrollo endogeno*. México: Pearson.
- Sabando, H., Pérez, O., & Odrizola, S. (2018). El desarrollo local del cantón Manta y sus conexiones con el plan nacional para el buen vivir en Ecuador. *Revista ECA Sinergia*, 9, 83-96. [https://doi.org/10.33936/eca\\_sinergia.v9i1.1192](https://doi.org/10.33936/eca_sinergia.v9i1.1192)
- Salcedo, D. (2018). Una definición operativa del desarrollo local para El Salvador. *Realidad: Revista de ciencias sociales y Humanidades*, No. 103, 51-77. <https://doi.org/10.5377/realidad.v0i103.3898>
- Sampedro, J., & Díaz, C. (2016). Innovación para el desarrollo inclusivo: Una propuesta para su análisis. *Economía Informa*, 396, 34-48. <https://doi.org/10.1016/j.ecin.2016.01.002>

- <http://www.economia.unam.mx/assets/pdfs/econinfo/396/02SampedroDiaz.pdf>
- Suset, A., Cruz, A., Machado, H., Campos, M., & Miranda, T. (2007). El desarrollo sostenible, perspectivas y enfoques en una nueva época. *Pastos y Forrajes*, 30, 191-204. <http://scielo.sld.cu/pdf/pyf/v30n2/pyf01207.pdf>
- Tomási, J. A. (2008). El desarrollo local sostenible en clave estratégica. *CIRIEC-España, Revista de Economía Pública, Social y Cooperativa*, No. 61, 73-101. <https://www.redalyc.org/articulo.oa?id=17412302005&idp=1&cid=2944599>
- Vazquez, A. (2007). Desarrollo endógeno, teorías y políticas de desarrollo territorial. *Investigaciones Regionales*, No. 11, 183-210. <https://www.redalyc.org/pdf/289/28901109.pdf>
- Vázquez, A. (2018). Constitución, Desarrollo Endógeno y Dinámica de las instituciones. *Economía Mundial*, 48, 201-220. <http://rabida.uhu.es/dspace/bitstream/handle/10272/14718/Constitucion.pdf?sequence=2>
- Vigil, J., & Magri, A. (2015). El problema regional: Desarticulaciones Regionales y Sectoriales en el Desarrollo Argentino. *Problemas del Desarrollo*, 46, 91-118. <https://www.sciencedirect.com/science/article/pii/S0301703615000243> <https://doi.org/10.1016/j.rpd.2015.06.003>
- Ynzunza, C. B., Izar, J. M., & Bocarando, J. G. (2017). El entorno de la industria 4.0: Implicaciones y perspectivas futuras. *Conciencia Tecnológica*, 54-66. <https://www.redalyc.org/jatsRepo/944/94454631006/94454631006.pdf>