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Social Capital and Population Perception on Aspects of Sustainable Development in México's Central Region, 2018

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Abstract: The promotion of sustainable development, an important objective of most societies world-wide today, requires the participation of all members of society, but it is more viable when the populations´ actions and the public policies pull in the same direction, which in turn requires that people know such policies and act accordingly. This paper shows the results of a study realized in 2018 in four urban areas of the Mexican Puebla-Tlaxcala region, based on a survey among the populations of those areas, with the specific objective of detecting those populations' perceptions of both the implementation of public policies for sustainable development, and its relation to the conditions of their communities, focusing on their social capital and also considering the environmental, economic, technological and institutional aspects of development. With the calculation of Indexes for each one of those development aspects, and the help of Pearson's correlation analysis applied to such Indexes, the study shows a generally positive relationship among all Indexes, but a low perception of the application of public policies. In particular, social capital relates more to human and institutional capital in the larger cities, although natural capital is the most noticeable form of capital in all cities.

Key words: social capital; sustainability; urban development; social perception; México
JEL codes: O180, Q560, R110, Z130

1. Introduction

Since at least four decades ago, there are serious discussions in Mexico on the link between underdevelopment and the degradation of the natural environment. In fact, the Mexican Constitution establishes in articles 25 and 26 the responsibilities and obligations of the government sector in terms of national planning for sustainable economic development. Nevertheless, there exist some obstacles which prevent the design and efficient application of public policies for sustainable development, such as the lack of knowledge of the population about the importance of actions in favor of the ecosystems which individuals can carry out to boost the positive effects of the governmental actions in that respect.

The main objective of this paper is to share the results of research realized in 2018 in four urban areas of the Mexican Puebla-Tlaxcala region with the objective of studying the population's perceptions of the application of public policies for sustainable development which could allow the identification of some characteristics and suitable strategies to favor a better implementation of such policies in the region. The investigation included the

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application of a survey among the populations of the cities of Puebla and San Martin Texmelucan, in the state of Puebla, and of the cities of Tlaxcala and Santa Ana Chiautempan, in the state of Tlaxcala, with the specific objective of detecting those populations' perceptions of both the implementation of public policies and of the development conditions of their communities, stressing their social capital and its relation to the environmental, economic, technological and institutional aspects of development.

The paper is organized into five sections and an Appendix. Section II includes a discussion of some theoretical aspects of the sustainable social development process in general, as well as some of its core elements. Section III presents some general socioeconomic information about the municipalities where the studied cities are located and also, the methodology used for the application of the survey and the determination of the total sample size, stratified for the studied cities on the basis of their socioeconomic characteristics. In Section IV, the results from the study are presented; it shows an attempt made at relating the results obtained for social capital to those obtained for the other elements of development, with the help of correlation analysis. Section V includes some final comments derived from the study. The Appendix includes the questionnaire used in the survey.

2. Theoretical Framework for the Study of Sustainable Development, Social Capital and Population's Perception

2.1 Sustainable Development

Although the term development has never been uniquely defined, and therefore there is not a consensus among social scientists about its exact meaning, the idea which is common in all attempts at defining it, is that "…it is a process by (and during) which, there is a betterment of society's quality of life; that is, an improvement in social wellbeing." (Carrillo, 1978).[1]

So defined, development must be considered and evaluated trough time. However, evaluating the quality of social life through time is a difficult task, as wellbeing is determined by all kinds of variables. Thus, the study of social development faces, at least, the following three main problems: a) to define the variables which affect positively (or negatively) the quality of life; b) to evaluate the effects of all and each one of such variables in life quality, and; c) to measure the variables significantly so as to be able to compare their values for different points in time.

a) The variables which affect the quality of life

Usually, the variables which influence the quality of life in society are shaped by tradition, habits or past experiences; that is, by culture. Thus, variables such as democracy, justice, women's opportunities for professional development, caring for the environment, education, health, housing, empathy, love or internal peace and the like, usually impact wellbeing in the same positive direction, although with different intensities for different societies.

b) The measures for development and its evaluation

What could be done to measure and evaluate a phenomenon such as development, which involves so many

[1] The distinctive characteristic of this definition is that it considers development as a process, and although a process at the universal level neither has a beginning nor an ending in time and space, when defined partially, it has to have boundaries in both elements (time and space). Thus, partial processes such as production, consumption, investment, or development, must be clearly located in time and space to be studied. An ample discussion of the meaning and characteristics of the study of processes can be found in Carrillo (2002). If the proposed definition of development as a partial process is accepted and it is also accepted the separation of aspects of social life, then it is easier to accept that the development process includes as much sub-processes as social life might have, including the economic, political, cultural and environmental development, among others.

aspects of social life? And, how can one say whether the quality of life improves or deteriorates without having an exact measure to apply to such a phenomenon?

Since development involves a great number of elements of wellbeing, some of which cannot be measured cardinally, researches have opted to measure it through indicators which combine such elements significantly; that is, so as to allow one to compare development for different societies for a certain period of time or for a single society in different time periods. Such measures are the Development Indexes, for the positive elements of development, or the Exclusion Indexes, for the case of deficiencies.[2]

2.2 Formal Background for Sustainable Development

As it was argued some time ago (Carrillo & Carrillo, 2001), sustainable development is a theme with has attracted recently the attention and enthusiasm of researchers and of society in general. However, such an enthusiasm, which already is reflected on the curricula of basic education in a great number of countries, it is not always shared by the governments which, pressured either by population growth or by poverty (underdeveloped countries) or by big businesses which could lose income if sustainability was attended (developed countries), have preferred to postpone decisions about promoting a development which could resolve any one of these three problems which define the lack of sustainability: poverty, regional inequalities, and care of the environment. (Carrillo & Carrillo, 2001).[3]

The relationship between humankind and their environment has bothered social scientists for ages. Perhaps among the first references of the preoccupation about the impact of the economic activity on the environment was the one advanced by A. C. Pigou (1960), who shared with the Classical economists their preoccupation for the fixity of the land, but suggested, in addition, that there were some unpaid costs in some extractive activities, which overestimated national income.[4]

With population growth and economic development, associated always with the processes of urbanization and industrialization, the rates of use of some natural resources besides the land increased. At the same time, the pollution of the environment by society was intensified, so that a new version of the Malthusian ghost began to preoccupy humankind: that the energy of planet Earth, which is fixed because it is a closed system, could be subjected to a nonreversible process of destruction.[5]

Thus, the Eco-development framework of analysis appeared in the literature, conceived as a style of

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[2] A Development Index can be built as a weighted summation of the variables which influence the quality of social life, where the weights are either subjective, or determined with the use of specific statistical models. For the case of a weighted summation, one could have: $ID = w_1X_1 + w_2X_2 + \ldots + wnXn$, where: ID, is the Development Index; $(X_1, \ldots Xn)$, are the development variables, and; $(w_1 \ldots wn)$, are their respective weights. An example of a widely used Development Index is the Human Development Index (HDI), calculated and used by the United Nations for international comparisons of development. (See Carrillo (2002), for a discussion of the HDI).

[3] In the case of Mexico, federal and local governments are subjected to a double pressure. On one hand, the need to resolve the high poverty indexes is permanently competing with the need for the care of the environment for the scarce public funds. On the other hand, pressures from the market, both direct and indirect, represent an increasing pressure to capitalize on the comparative advantages of regions and their different groups of people, which result in a widening of the interregional and inter-groups gaps of their levels of wellbeing, totally non congruent with the sustainability of development.

[4] In fact, Pigou (1960), sustained that "...the destruction of the natural beauty due to the extraction of coal…leaves national income unchanged, although if a charge had been collected for altering the view, thus national income would have decreased." Pigou (who wrote on this issue in 1920) worried about the treatment of the activities of some people which affect the wellbeing of others, and therefore suggested the application of taxes as a compensatory mechanism. This preoccupation was a most influential element in the advancement of economic theory when dealing with the effects that polluting activities of some producers had on the production processes of others, and which have been identified since then as externalities.

[5] The idea that planet Earth is a closed system, comes originally from the writings of Kenneth Boulding (1966), who thought of the planet as a spaceship which in its walking goes on consuming energy and throwing to space resources in the form of waste.

development by which there was harmony between "…their social and economic objectives with an ecologically appropriate handling of resources and the natural environment."[6] With this concept, it was attempted to resolve the debate on the caring of the environment and the development planning efforts, which took place in the early 1970's where the arguments were heavily charged with ideology, and when some event went to the extreme of suggesting that underdeveloped countries should remain as they were, in order not to destroy the environment with traditional economic growth patterns.

It is important to stress that since the 1990's, it was accepted (Lee, 1993) that sustainability problems arise from scale non-congruencies (or lack of concordance) of these three types: spatial, functional and time-binding, between human responsibility and natural interactions. Spatial, such as polluting at rates which exceed nature's assimilative capacity; functional, such as the waste of resources (for example, water), and, time-binding, such as the exploitation of renewable resources at rates which exceed natures' replenishment capacity (over-exploitation).

Thus, the sustainability principles are applied differently, depending upon the types of non-congruencies and the types of resources. In the case of renewable resources, the sustainability principle is that the exploitation rate must be, at the most, equal to nature's regeneration rates. For the case of pollution, that the rates of waste emissions be equal to the natural assimilation capacities of the ecosystems which receive them. In the case of non-renewable resources, that the rate of exploitation be at the most equal to the rate of creation of renewable substitutes (Daly, 1990).[7]

2.3 The Relationship between the Environment and the Development Process

Undoubtedly, those theoretical reflections on the relationships between humans and the environment resulted from the fact that sustainable development started to be shaped only after recognizing that all societies, rich and poor, present or future, have the right to develop, as long as none of them cancels the possibilities of others to develop and, since the future societies are not here yet, the equality principle obliges all contemporary societies. Thus, sustainable development was defined in 1987, by the World Commission on the Environment, in a report known as the Brundtland Commission Report as a development "…which satisfies present needs without cancelling the possibilities for the future generations to satisfy their own needs." (WCED, 1987).

After such report was issued (scarcely three decades ago) there have been a series of worldwide meetings dealing with the increasing importance of public policies related to sustainable development. Because of the nature of its contributions, it is appropriate to refer to the United Nations General Assembly realized on September 25th, 2015, whereby the Agenda 2030 for Sustainable Development was approved (UN, 2015).

That agreement includes a plan for actions such that, within the framework of international law, promotes the attention to persons, to the planet and to their prosperity. Also, there are established therein, as central axis, the human liberties, the elimination of poverty and the promotion of sustainable development, establishing seventeen objectives and 169 targets for such promotion.

Among those 17 objectives, these six are notable because of their direct impact on public policies and on

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[6] MSachs (1982) resumes the arguments of the debate, and classifies them as optimistic and pessimistic. Among the pessimistic ones, there are those associated with Ehrlich (1970), who "...even suggest that Earth's resources are too scarce so as to allow the industrialization of all countries…" so that "…the third world should be pleased with a '*cuasi*' development (together with the control of the birth rate)" (p. 4). Among the optimists, Sachs includes those of Nicholson (1970), who "...emphasizes that, up to this moment humans have demonstrated to have a very weak imagination in relation to the planet and its almost infinite variety of resources…" (p. 5).

[7] For the case of non-renewable resources, Daly considers to equal the rates of exploitation and the creation of renewable substitutes as a "*cuasi*" sustainability principle, since sustainability is impossible for such a case.

sustainable development: Objective 1, to abolish poverty in all of its forms and in all countries; Objective 3, to guarantee a healthy life and to promote wellbeing for all at all ages; Objective8, to promote an inclusive and sustainable economic growth as well as full and productive employment and decent jobs for everybody; Objective 12, to guarantee forms of sustainable production and consumption; Objective 13, to adopt urgent actions to fight climate change and its effects, and; Objective 16, to promote peaceful and inclusive societies for sustainable development; to ease access to justice for all and to design accountable efficient and inclusive institutions at all levels (UN, 2015).[8]

2.4 Factors which Influence Sustainable Development

Although everyone has an idea of particular things or conditions that improve (or not) the quality of life of society, one could say that society would be in better conditions the larger the number of goods and services it has access to.[9] Clearly, quality of life is much more than the simple fact of having more goods and services for its members, that is, much more than simple economic growth. However, economic growth combined with mechanisms which assure a just distribution, are positive candidates to generate an improvement in the quality of life of society, that is, in its development.

Also, it is generally recognized that economic growth is generated by the accumulation of capital, and that, when growth is combined with an appropriate distribution of the increased production, it is most likely that the quality of life increases, independently of the types of capital which accumulate: economic capital, natural capital, human capital or social capital. Thus, a discussion of those types of capital is in order. This will be done in the next section, emphasizing the case of social capital.[10]

2.5 Different Forms of Capital and their Impact on Development

a) Economic (Manufactured) Capital

From the point of view of economic theory, this type of capital consists of produced durable goods which can be used to produce other final or intermediate goods or services. Such is the case of the factories or business buildings where productive activities take place, but also the energy stations, the roads, streets, highways and bridges, and the tools and equipment which enter the production process, with the new technologies of information and communication included.[11]

In economic theory, physical capital is related to production through what is called the 'production function',

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[8] Some other not less important objectives include the following: to achieve the gender equality and the empowerment of women; to assure the availability and sustainable handling of water and its disposal; to guarantee the access to secure, sustainable and modern energy, and; to protect and promote the sustainable use of the ecosystems, protect the forests, combat desertification, prevent the degradation of the soil and stop the loss of biodiversity.

[9] For example, to have more physicians and medicines, with better houses, more educational options, a better and more balanced diet for all, better transport possibilities, better roads, more time for entertainment, more leisure time, and, of course, better wages and more incomes, among many other things, without the need to destroy nature around us, and without taking those things away from other communities, means to live better; to have a life of better quality.

[10] Traditionally, researchers have associated the growth of production to the increase or accumulation of the factors which intervene in such a process: human work (human capital), produced or economic capital (tools, equipment, physical infrastructure), raw materials offered by nature (natural capital), and technology, which is the way in which those factors of production are handled and combined into the productive process. More recently, another form of capital was recognized: social capital, whose accumulation also has demonstrated to positively influence both economic growth and social wellbeing. (See Georgescu-Roegen (1971), for natural capital, Schultz (1971), for human capital, Carrillo et al. (2007) for economic or manufactured capital, and Bourdieu (1980), for social capital).

[11] It has to be stressed that, in order for durable goods to be considered as capital, they have to be used for productive purposes and not for consumption. The classic examples for this distinction are automobiles, which in some societies could be used for consumption (as riding them for pleasure) or as capital goods when used to go to work, or as working instruments, as when used as taxis.

which is defined as the catalog of different forms or processes that exist at a certain point in time to obtain a certain product, and can be represented as: Q = F (K, L, T, O), where Q, is the product obtained with the combination F, of factors K, capital; L, labor force; T, land, and; O, organization (Carrillo, 2005, p. 334).

In the case of such a function, its variables can refer to the production of an individual producer to the aggregate production of a country. In fact, when it refers to national production, such a function has been used to show the effects of those factors in the productive capacity of society, so that many public goods, such as roads, bridges, schools, hospitals, among others, contribute to economic growth.[12]

b) Human Capital

Together with manufactured capital and other factors, human participation (labor force) in the productive process can increase its quality through education and training, which in turn increase the productive capabilities of society.

Indeed, the contribution of education to the betterment of the quality of social life can be done into two different ways. On one hand, it promotes social wellbeing directly by generating the advancement of knowledge which has given humankind greater freedom and capacity to understand and handle surrounding phenomena. On the other hand, education has indirectly contributed to development since as human capital has increased the productivity of society, both individually and collectively, thus allowing the improvement and the expansion of its capacities to generate production and income.

Investment in human capital is then understood as entailing all expenditures which individuals realize on themselves, which might contribute to increase their productivity (Bracho & Zamudio, 1992). Thus, the theory of human capital explains the relationship between education and the income which results from the increased productivity of individuals who receive more education; that is, that can be attributed to the better education and the formation of abilities which are compensated by the market through higher incomes. Therefore, the theory of human capital treats education and training as forms of investment which generate future benefits in terms of higher incomes, both for the individuals and for society as a whole (Schultz, 1963; Becker, 1962).

c) Natural Capital

Up until the end of the past century, economists considered that natural resources were an important factor in productive processes, but that they were not limitative as manufactured or human capital; they simply were considered as raw materials so that they entered the production function as a parameter, in a way similar to technology or organization.

On the basis of some theories advanced by Georgescu-Roegen (1971a) in the area of production processes, Daly (1990) argued first, that as capital should be considered not only the one produced by humans or humans themselves, but also the natural capital composed of natural resources and their capacity to regenerate and assimilate waste, and, second, that natural capital should be considered as complementary to human and manufactured capital, and not as substitutes, as it is done in traditional neoclassical analysis (Carrillo, 2006).[13]

2.6 Social Capital

[12] The formal way in which one could see the impact of manufactured capital on economic growth, is through some growth models which consider it a fundamental factor. (Carrillo et al., 2007).

[13] Georgescu (1971) argued that neoclassical economic analysis caused an inadequate use of natural resources by not recognizing them as complementary to the labor force and to manufactured capital in the production function, which in turn allowed the use of polluting technologies and undervalued raw materials. Also, he argued that for any product, there are factors and raw materials going into its production process, and there are usable goods coming out of it, but there is also waste coming out of the process.

According to Carrillo (2015), the main difference between social capital and the other types of capital is that social capital is always determined by the productive interactions of the members of society, while the other types can be generated also at the individual level. Bourdieu (1980) asserts that social capital refers to the institutions, relations and norms which shape the quality and quantity of social interactions in a community. Numerous studies show that social cohesion is a central factor for societies to prosper economically and for development to be sustainable.

A restrictive notion of social capital considers as a series of horizontal associations among people which include social networks and associated norms which affect productivity and wellbeing in the community. Social networks can increase productivity by lowering the costs associated with the establishment of business firms. Social capital facilitates coordination and cooperation. A wider interpretation of social capital considers both horizontal and vertical associations as necessary to give a sense of identity and common causes to communities. But it is also insisted that if relations do not transcend various social divisions (for examples religion, race, socio-economic status), horizontal relations can become a base to look for narrow interests which could prevent access to the information and material resources which could be of great assistance to the community (Carrillo, 2015)

The widest point of view about social capital includes the social and political environments which constitute the social structure and allow for the development of norms. Such an analysis extends the importance of social capital to include the more formal relationships and institutional structures such as the government, the political regime, the rule of law, the judicial system and the civil and political liberties. This point of view does not only take into account the virtues of social capital and the importance of the formation of relations within and among communities, but also vices of social capital in the form of the capacity of certain social groups to act on self-interests.

Existing literature points at these three ample perspectives about social capital; one, Putnam (1993) definition which considers it as a set of 'horizontal associations' where networks of civil compromise, norms and trust facilitate the cooperation and coordination which lead to the achievement of common benefits which promote society's efficiency. Thus, social capital combined with human and manufactured capitals stimulate economic growth, but social capital is the only one which enhances the benefits from investing in human and manufactured capital. Putnam (1993) suggests that society will be more efficient the more coordinated actions take place. Thus, social capital is a public good, different to the conventional one which tends to be undervalued by private agents.

Coleman (1990) offers a wider definition of social capital which focuses of its function and indicates that: "It is not a simple entity, but a variety of different entities with two common elements which are: some aspect of the social structure and the facilitation of the actions of the actors — individuals or groups — within the structure. As in the case of others forms of capital, social capital is productive, making it possible to achieve certain objectives which could not be achieved without it".[14]

To Coleman, the usefulness of social capital is contingent: "A form of social capital which is of high value and facilitates certain actions could be less useful in other actions…" (1990, p. 75). From the point of view of Coleman, factors which influence the creation or destruction of social capital include the following: a) proximity; b) the stability of the social structure; c) ideology, and d) government support.

[14] The idea is that subjective values such as trust are closely related to the well functioning of the economy. Those associations where there exists an environment of trust among its members and toward their authorities are more solid and show a better functioning.

This definition also considers that the concept of social capital might include not only the horizontal associations, but also the vertical ones, as well as the behavior within the firms and among the firms.

According to Woolcock and Narayan (2002), social capital refers to norms and networks which facilitate collective actions. And, according to Morris (2002), associations and social networks can be formal or informal. Thus, informal social capital refers to networks which operate outside of the formal system, that is, relations among relatives, and informal networks among them (measured, for example, by the amounts of resources transferred), and among individuals or groups. This social capital is a form of improvement or development in the community (in its objective of abandoning poverty) to help it take advantages of the business opportunities out of the restrictive options in the community.

The World Bank (1998) definition considers both of the previous ones and includes -besides the horizontal and vertical associations- the socio-political environment as well as formal national structures such as the government and the legal framework.

Although those three viewpoints recognize the enormous potentials that social relations have of economic performance, they do not disregard the possibility that those same relations might have negative effects. The final result with depend upon the nature of the relationships, the preexisting cultural norms and values, as well as the historical background and the political and legal contexts. Around these three variables: networks, norms, and trust, is where one could find social capital, and the three variables are clearly interconnected.

It is not possible to have a strong civil society with functioning networks if it is not based upon trust as the basic element. In turn, norms which are clear and are strictly enforced might generate trust. To analyze the importance of trust for a society and for its development is very important because, among the elements associated with social capital, trust is one of the most difficult to measure, as it relates to something that is experienced only at the subjective level.

2.7 Special Characteristics and Measurements of Social Capital

As the fourth category of capital in the production function, social capital has its own distinctive characteristics, which include the following: 1) Unlike the other forms of human capital (knowledge), social capital is created and transmitted through cultural mechanisms such as tradition, religion and historical traits; 2) It is not acquired by rational decisions of people who act individually, but through the interactions of the members of a society; 3) Its transformation and destruction take place through a slow process; 4) At the aggregate level is not limited by the laws of diminishing returns, because it is not bounded by the market limits; 5) It does not depreciates with its use; on the contrary, it grows and develops; 6) It generates future bonuses (trust, courtesy, respect for the law) which are not limited by income or wealth; 7) It reduces costs and/or complications in social transactions; 8) The benefits derived from it are not susceptible to be valued in the market, although in theory it is possible to develop indicators alternative to those of the market.

In terms of the measurements for social capital, some recent studies have tried to quantify it and estimate its contribution to economic development. Nevertheless, to obtain a unique and certain measure of social capital is probably an impossible task. The following are some reasons for that assertion.

First, the most complex definitions of the concept are multidimensional as they involve different levels and analytical units. Second, the nature of some forms of social capital change throughout time, as the balance between informal organizations and formal institutions might change. Third, given that at the start of the research in this field, researchers neither contemplated the long run nor selected specific areas for study, contemporary researchers have had to collect indicators from a wide spectrum of proxy elements (measures of trust, trust in

government, electoral tendencies, social mobility, among others). Nevertheless, there are some recent studies which have identified useful indicators for measuring social capital or, at least, some of its distinctive elements.

One measure is the enrollment in associations and networks, formal and informal. In underdeveloped countries in general and in their rural zones in particular, the measures which detect informal transactions through community festivals, sports events and other traditional methods to promote social interactions are important indicators of the existence of social capital (Narayan & Pritchett, 1997).

Another form of social association includes norms and values which facilitate exchange by reducing transaction and information costs, as they allow commerce without contracts, and stimulate a responsible citizenry and the collective handling of resources (Fukuyama, 1995). The contribution by Inglehart et al. (1997) for the Study of World Values is the most advanced one in this field, and the questions which the involved economists considered as the most telling are those which measure the presence of trust ("In general, would you say that most people is trustful or one should be very careful when relating to them?")

In order to evaluate social capital at the community level, Narayan and Pritchett (1997) prepared a questionnaire which included eight basic factors which constituted the social capital of an individual: participation in the local community, proactive action in a social context, feeling of trust and safety, contacts with neighbors, contacts with family and friends, tolerance when facing diversity, valuation of life and labor contacts.

Capital formation through social capital is not easily observable because one has to take into account aspects such as trust, honesty, personal and social responsibility. That suggests that there exists a great difficulty to prepare social capital indicators, as they should include a definition both conceptual and operational. Grootaert and Bastelaer (2001) suggest some of the characteristics which social capital indicators should have, as follows: 1) To be determined within an operational and conceptual framework; 2) To be clearly defined and be easily grasped; 3) To be susceptible for aggregation (that is, such that it can be used for analyzing different aspects which might transcend from the family to the community, and from the community to the nation); 4) To be objective (independent of the researcher's opinion); 5) That the requirement of the necessary data for the elaboration of the concept be reasonable (that is, those which are available and can be obtained within certain costs limits, and be available so that the statistical national mechanisms be able to gather them); 6) To be limited in numbers; 7) I has to reflect processes, relations; in other words, it must allow one to obtain results.

In most recent studies realized in the area of social capital, one can identify these three main forms to built indicators: a) Through the density of voluntary associations (Putnam, 1993); b) By using rates of participation in voluntary associations (Scott, 1977); c) Measuring levels of trust (Knack & Keefer, 1997).

2.8 Social Perception

One of the most important elements which define perception is the recognition of daily experiences which, in turn, is an important process that allows one to recall all of the knowledge acquired through life in order to contrast the new experiences for a better interaction with the environment (Vázquez & Carrillo, 2017).

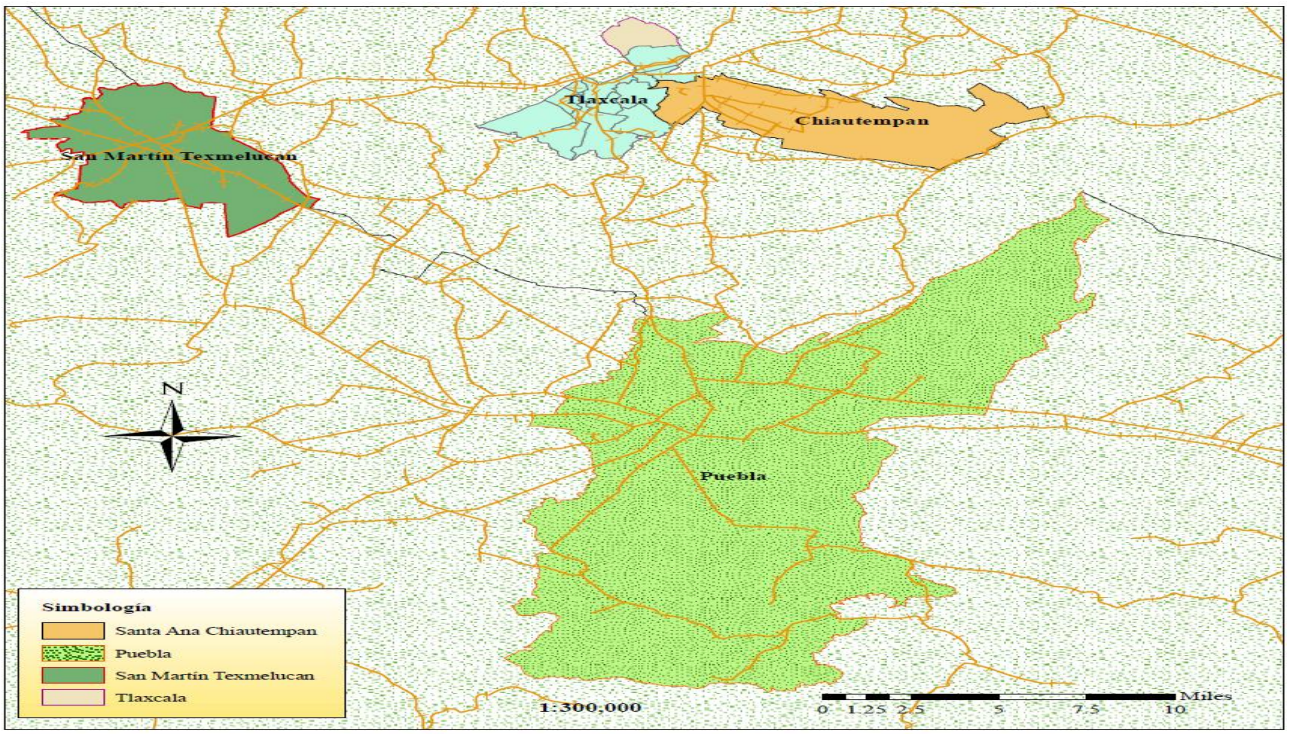
One of the disciplines which has studied perception is psychology where, in general terms is defined as a cognitive process of conscience which consists of the recognition, interpretation and signification for the elaboration of judgments about sensations gathered from the physical and social environments, in which other psychological processes intervene, including learning, memory and symbolization.

In the perception process there intervene ideological and cultural elements which reproduce and explain reality, and which are applied to different daily experiences for their ordering and transformation. Perception must be understood as referring to the socio- historical situation, as it has space and time locations, and depends upon

the changing circumstances and the acquisition of new experiences which introduce other elements to the previous conceptual structures, modifying and adapting them to the new conditions.

3. The Framework of Reference of the Investigation

The framework of reference for the investigation is constituted by the populations of four cities of Mexico's Central Region, of which two cities are in the state of Puebla (San Martín Texmelucan and Puebla) and the two other cities are in the state of Tlaxcala (Santa Ana Chiautempan and Tlaxcala), where a survey was conducted by the end of 2017 and the beginning of 2018 (Map 1).



Map 1 Location of the Geographical Area of the Study
Source: Own preparation with data from INEGI, 2017

The most recent data available show that in terms on Gross Domestic Product (GDP) the state of Puebla was well ahead of the state of Tlaxcala in 2014-2015, as it can be seen from the data shown in Table 1 (INEGI, 2017).

Table 1 Gross Domestic Product by State, 2014-2015 (Millions of Mexican Pesos at Constant Prices)

States	2014	2015
Puebla	425,693	435,028
Tlaxcala	72,749	75,578

Source: Own preparation with data from INEGI, 2017.

In terms of population, by 2017, the studied cities had the following structures: Puebla, with a total population of 1,539,819 inhabitants, with 734,352 male and 805,467 female; San Martin Texmelucan, with a total population of 141,112 inhabitants, with 67,505 male and 73, 607 female; Tlaxcala, with a total of89,795

inhabitants, with 42,529 male and 47, 266 female, and; Santa Ana Chiautempan, with a total population of 66,149inhabitants, with 31, 651 male and 34,498 female.

The following expression was considered to determine the size of the sample for the survey:

$$n = \frac{N z_{\alpha/2}^2 pq}{(N-1)e^2 + z_{\alpha/2}^2 pq}$$

where: n, is the sample size; z, the confidence level at 95% = 1.96; p, the negative variability 50 = 0.5; q, the positive variability 50 = 0.5; N, the population size, and; e, the error, equal to 0.1.[15] The results from those calculations are shown in Table 2.

Table 2 Sample Sizes by City

City	Number of Questionnaires	Euivalence in %
San Martin Texmelucan, Puebla	66	17.18
Tlaxcala, Tlaxcala	66	17.18
Puebla, Puebla	186	48.4
Santa Ana Chiautempan, Tlaxcala	66	17.18
TOTAL	384	100%

Source: Own preparation with data from the survey

4. The Methodology and the Results From the Investigation

4.1 The Calculation of Indexes for Social Capital

As it was mentioned in the Introduction, this research project aimed at detecting the population's perception of public policies implemented to promote sustainable development in their communities. Thus, all of the calculations realized for the different analyses made in this study come from population's perceptions.

Four main questions relating to social capital which were included in the questionnaire represent the core of this study: 51 (satisfaction with social relations); 52 (trust on social actors and relations); 53 (participation in associations), and 54 (personal opinion about the associations).[16] The responses to those questions were used to calculate partial indexes of social capital by applying the Linkert scale, and assigning values, depending upon the number of response options. Such indexes were then combined to obtain a General Social Capital Index, for the populations of each one of the four cities studied.[17] The results from the calculations of all indexes are shown in

[15] According to data from INEGI, the total population of the Puebla-Tlaxcala Metropolitan Urban Zone was 2 785,778 inhabitants in 2010 (Iracheta, 2012).

[16] The questionnaire is included in full in the Appendix.

[17] The method used to calculate the indexes are explained as follows. It is important to mention that only the questionnaires which had one option of response answered were considered. Then, considering question 51, if an individual answered option (1), a value of 0.0 was assigned; for option (2), a value of 0.25 was given; for option (3), a value of 0.5 was assigned; for option (4), a value of 0.75, and for option (5), a value of 1.0 was assigned. Thus, each element of the possible responses had a value for each individual. Then, an average of the values for all individuals was calculated for each element in each city. The same was done for all the elements of the question, and then, an average value was calculated for all the elements of question 51 for all the individuals of a certain city, thus obtaining the (Partial) Index of Social Capital corresponding to Social Satisfaction for the city, and the same was done for each one of the other cities. Similarly, with the responses to the different elements of question 52, a (Partial) Index corresponding to Social Trust was calculated. In the case of question 53, the values assigned to different responses were as follows: a value of 0.25 for answers (1), a value of 0.5 for answers (2), a value of 0.75 for answers (3), and a value of 1.0 for answers (4), proceeding then in a similar way as for questions 51 and 52, to calculate a (Partial) Index of Social Capital, corresponding to Social Participation. For the case of question 54, a value of 1.0 was assigned to answer (1), a value of 0.0 was given to answer (2), and a value of 0.5 to answers (3), proceeding then to calculate a (Partial) Index corresponding to Opinion about Social Groups, for each city. The General Index of

Table 3.

Table 3 Partial and General Indexes of Social Capital

City	Satisfaction (Q. 51)	Trust (Q. 52)	Participation (Q. 53)	Opinion (Q. 54)	General Index
Puebla	(4) 0.603000	(4) 0.458210	(3) 0.261749	(2) 0.310084	(4) 0.4081451
S.A. Chiautempan	(1) 0.746069	(1) 0.523582	(1) 0.293432	(1) 0.310116	(1) 0.4683001
S. M. Texmelucan	(3) 0.650505	(3) 0.483939	(4) 0.246666	(4) 0.283670	(3) 0.4161953
Tlaxcala	(2) 0.664477	(2) 0.500000	(2) 0.266567	(3) 0.296020	(2) 0.4404617
Averages	(I) 0.665750	(II) 0.491250	(III) 0.267000	(IV) 0.300000	

Source: own preparation. The numbers inside parentheses show the place of the value of the Index in the order among cities.

4.2 The Indexes for the Different Types of Capital

Table 4 shows the indexes calculated for the different types of capital in the studied cities. The data in that table show that, in almost all cities considered, the local population perceives technological capital as the most noticeable one, followed by natural capital, while in all of the cities, their populations perceive that institutional capital and social capital are the least noticeable ones.

Table 4 Indexes of Different Types of Capital, by City, in the Puebla-Tlaxcala Metropolitan Zone

Types of capital	Puebla	Santa Ana Chiautempan	San Martín Texmelucan	Tlaxcala
Economic	(2) 0.773414855	(3) 0.746579602	(4) 0.764035296	(3) 0.801616915
Human	(4) 0.766304348	(4) 0.744169776	(3) 0.765144231	(4) 0.771688433
Natural	(3) 0.769248188	(2) 0.754975124	(2) 0.775883838	(1) 0.864427861
Institutional	(5) 0.751766304	(5) 0.732089552	(5) 0.737500000	(5) 0.757089552
Technological	(1) 0.786911232	(1) 0.789179104	(1) 0.791666667	(2) 0.807189055
Social Capital	(6) 0.408145139	(6) 0.468300166	(6) 0.416195286	(6) 0.440461724

Source: own preparation. The numbers inside parentheses show the place of the value of the Index in the order among types of capital.

4.3 The Calculations of Correlation Coefficients

The relationship between social capital and other aspects of development, perceived by the population of the cities in the Puebla-Tlaxcala Metropolitan Zone included in this research, was done with the help of Pearson's correlation analysis, and considering the different Indexes calculated from the responses to the questionnaire for all of the individuals included in the corresponding sample.[18] As it was expected, the results show positive correlations among all types of Indexes in all cities considered. However, as it will be shown shortly, each city had its own particular behavior in this respect.[19]

Table 5 shows the correlation coefficients found between social capital and the other different types of capital for the four studied cities. The data shown in that table suggest the existence of positive relationships in the cities

Social Capital was calculated considering, simultaneously, all the elements of the four questions. Thus, a General Index was calculated for each city.

[18] According to Anderson et al. (2008), the correlation coefficient of Person's product-moment, is calculated by dividing the covariance into the multiplication of the standard deviation of *x*, by the standard deviation of *y*, as it is shown in the following equation: $r_{xy} = \frac{S_{xy}}{S_x \, S_y}$, where: r_{xy}, is the correlation coefficient; S_{xy}, the covariance; S_x, the standard deviation of *x,* and; S_y, the standard deviation of *y*.

[19] The indexes for the other studied aspects of capital (economic, human, natural, institutional, technological), were calculated as it was done in the case of social capital, from the responses to questions in the relevant sections of the questionnaire. The main difference is that in those five cases, partial indexes were not calculated (as it was the case for social capital).

which are the capitals of the respective states (Puebla and Tlaxcala), and coefficients with negative values (although non-significant) in some cases of the other two cities (San Martín and Santa Ana).

Table 5 Correlation Coefficients between Social Capital and other Types of Capital in the Cities of Puebla, San Martín Texmelucan, Santa Ana Chiautempan and Tlaxcala

Types of Capital	Cities			
	Puebla	San Martín Texmelucan	Santa Ana Chiautempan	Tlaxcala
Economic	(2) 0.280273067	(3) 0.077503544	(4) 0.068030753	(5) 0.305919441
Human	(1) 0.313066693	(1) 0.172088616	(3) 0.125089742	(2) 0.396043656
Natural	(4) 0.169326549	(5) -0.113842724	(5) -0.072280032	(3) 0.356238395
Institutional	(5) 0.140044752	(4) -0.012441763	(1) 0.267654023	(1) 0.407008812
Technological	(3) 0.274487884	(2) 0.15199012	(2) 0.205346846	(4) 0.327230041

Source: own preparation. The numbers inside parentheses show the place of the value of the Index in the order among types of capital.

It is also noticeable that the strongest relationships of social capital (that is, the highest correlation coefficients) in general are with human capital and institutional while the weakest ones are with natural capital and with economic capital. This was as expected since the social, human and institutional forms of capital refer to relationships that take place among the members of a society.

5. Final Comments

As it was said in the Introduction, this paper has the objective of presenting the results from an investigation into the perception of the population of the social capital in their communities, and how it is related to other different aspects of social development (economic capital, human capital, natural capital, technological capital and institutional capital).

Through the paper one could see that the analysis of the perception of social capital was made by virtue of the calculation of a series of partial indexes, built from the responses of the participants in the survey, as well as a General Index of Social Capital. Also, the analysis of the relationships between social capital and the other aspects of development was made through a comparison between cities of the results of the application of correlation analysis between the Index of Social Capital and the corresponding indexes of the other variables, calculated also from the responses to relevant questions of the questionnaire.

A comparative analysis of the partial indexes of social capital showed that the population of the two cities from the state of Tlaxcala value more the different aspects of social capital tan those from the cities of the state of Puebla suggesting that the relationships which constitute social capital are stronger among larger cities with higher economic levels than among smaller cities without such advantageous conditions.

On the other hand, a comparison of the social capital index to the indexes for the other aspects of development considered showed that the population perceives that social capital is more comparable to the institutional capital in the cities of the state of Tlaxcala, while in the cities in the state of Puebla social capital compares more to human capital, but in none of the cities, social capital relates to natural capital. Finally, in all of the cities studied, technological capital is perceived as the most noticeable one, together with natural capital.

Finally, it is important to mention that the public's perceptions of the public policies to promote sustainable development, is not very optimistic, taking into account that their opinions about the authorities and public

officials in general, neither show high levels of trust, nor high satisfaction from the relations they have with them.

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Appendix The Questionnaire

A) General Data

1. Place of residence: _____ 1a) Municipality: _____
2. Age: _____2a. Gender: M___ F___2b. Do you work? Yes ___ No ___
3. Occupation: _____
4. Civil status: Single____ Married ____ Divorced____ Widow____ Free union_____
5. Complete studies of: a) Primary___ b) Middle___ c) High school___ d) Technician _____
   e) College_____ f) Graduate_____
6. Number of persons living at home: _____

B) Questions Related to Factors Which Influence Social Sustainable Development

(RESPONSES: 1. No answer; 2. Does not know; 3. In disagreement; 4. In agreement)

I) Economic Development	**1**	**2**	**3**	**4**
7. There have been programs of government support for entrepeneurial development				
8. There exists a place where one can get information about PYMES programs				
9. There is access and promotion of new technologies (computerized systems, internet and the like) 10. There are conditions to start businesses				
11. Local resources are used for the realization of productive activities				
12. Own family enjoys a good quality of life				
13. Women earn as much as men do				
14. There are means of communication available and in good shape				
15. There are systems/centers of information which support productive processes				
16. There exist centers for promoting development (consulting and formation of human resources)				
17. There exist good conditions for family development				
II) Human Capital				
18. Services are of good quality				
19. The urban transportation systems are sufficient				
20. There exist programs, projects and actions to combat poverty				
21. There exist quality and quantity in educational services				
22. Women have access to the public decision making process				
23. The state has the capacity to retain its technicians and professionals				
24. There exist infrastructure for disabled persons				
25. There exist social participation in the development process (all sectors of society participate)				
26. There exist good conditions to achieve agreements among different social actors of the municipality 27. There exist respect, conservation and care for the historic and cultural wealth				
28. The government relates closely with research centers, universities and the productive sector				
29. All members of the community count				
III) Natural Capital				
30. There are programs, courses and lectures on environmental education				
31. There is no pollution				
32. There is a good availability of water for the long run development				
33. There is a water-care culture				
34. There are green areas in the community				
35. The environmental normative is applied				
IV) Institutional Capital				
36. There seems to be coordination among different government levels (federal, state and municipal)				

37. There is transparency on the expenditure of public resources				
38. Public servants are well prepared				
39. Public servants offer good attention to citizens regardless of gender				
40. Women can be integrated to public services under the same conditions as men				
41. There are instances which favor the cooperation between the public and private sectors				
42. Government works for the benefit of citizens				
43. Government promotes programs and policies in favor of women				
44. Citizens have equal opportunities to access public posts				
V) Technological Capital				
45. All citizens have equal access to the internet services				
46. Access to the wide band has grown (to internet through cellular phones, computers, and the like)				
47. The use of technology is adequate for the development of the community				
48. Access to internet has improved the quality of life of the members of the community				
49. Girls have a level of dominance of technology equal to boys'				
50. There is an improvement plan for the technological renovation of my community				

VI) SOCIAL CAPITAL

51. How do you feel with the following aspects of your life? *(mark one option only for each element)*

Elements	Highly unsatisfied (1)	Unsatisfied (2)	Indifferent (3)	Satisfied (4)	Highly satisfied (5)
a) Relationships with my neighbors b) Relationships with my friends c) Relationships with my family d) Relationships with my mate e) Relationships with my children f) Relationships with my colleagues at work g) Relationships with my boss at work h) My occupation/work i) The use of my free time j) The level of my income k) The level of my studies l) The level of my children's studies m) With politicians and authorities in general n) With my present conditions of life o) With my rights and obligations					

52. How much do you trust……? *(mark one option only for each element)*

Element	No trust (1)	Low trust (2)	Regular trust (3)	High trust (4)	Complete trust (5)
a) People who live in the community b) Public servants c) Political parties d) The police force e) The military f) Spiritual and religious leaders g) Colleagues at work h) My family i) Teachers j) Friends					

53. Indicate if you participate in groups or organizations in your community and how

Elements	How often do you participate?			
	Do not participate	Once a year	Once a month	One or more times a week
a) Cooperatives b) Unions c) Neighbors committees d) Parents/teachers associations e) Religious groups f) Study groups g) Sports/recreational/cultural clubs h) Self help associations i) Political party j) Other (specify)				

54. If you participate in a group or organization, comment on them *(mark only one option for each element)*

Elements	Yes	No	Do not know
a) The members of the organizations have political ideas similar to own b) The members of the organizations live in the same community c) The members of the organizations have a religion similar to own d) The leaders consult with the members of the organizations and then decide e) All members of the organizations receive the same benefits f) The organizations interact with other groups with interests similar to own g) There are supports for the organizations h) Know that own opinion is important for the organizations i) The organizations are trustful			