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Usages and Customs of the Indigenous Communities in Favour of the Reduction of the Digital Divide: A Case Study of the Nuu Savi People

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<http://dx.doi.org/10.5772/intechopen.69172>

Abstract

This research is of ethnographic nature, focusing on the study of the Nuu Savi people (people of the rain), also called the Mixtec people, of pre-Columbian origin belonging to the Mixteca Region of the state of Oaxaca, Mexico. On the basis of sociocultural theory and the theory of the diffusion and adoption of technological innovations, the study on the cultural identity of the ethnolinguistic group, whose social platform is the “uses and customs,” is carried out. As a result of this research, the descriptive analysis is presented, detailing the effect of information and communication technologies (ICTs) on the situation of the vulnerable and disadvantaged group. Likewise, cultural elements have been identified that allow the formulation of a model for the development and inclusion of the ethnic minority. An educational strategy is designed and implemented through the model. However, in the process of implementing the educational strategy, it was observed that the Nuu Savi people experience a conjunctural stage where technological adoption coexists with some beliefs, aptitudes, and attitudes, characteristic of its form of government of “uses and customs,” which create sociocultural barriers that make social and digital inclusion difficult.

Keywords: cultural identity, digital divide, indigenous peoples, ICT

1. Introduction

According to studies carried out by the Organization for Economic Cooperation and Development (OECD) [1], in developing Latin American countries such as Mexico, the benefits of technology are not being reflected in the poorest societies. This finding has been supported by Boltvink’s socioeconomic study [2], which mentions that more than 93 million poor exist in Mexico. This figure is impressive, given that, according to the census of the National

Institute of Statistics and Geography (INEGI by its Spanish acronym) [3], in the year 2010, Mexico had a total of 112,336,538 million population; therefore, the figure given by Boltvink represents 82.7% of the total Mexican population, of which the population in extreme poverty is 60.4 million, including of ethnic groups. Of this figure, 64.9% is found mainly in rural localities and 35.1% in metropolitan areas.

In addition, factors, such as debt, ignorance, disease, globalization, among others, prevent developing countries from being at the forefront of the use of technology in order to be exploited for socioeconomic development in highly marginalized communities. Under this scenario of poverty and inequality, it is paradoxical that of the huge cultural wealth of 68 ethnic groups, survivors of pre-Columbian Mexico, 16 are registered in the state of Oaxaca [3].

In the world today, where globalization is responsible for making available ubiquitous new information and communication technologies (ICTs), and specifically the existence of the Internet, indigenous people are struggling to maintain their identity and preserve their transcendental culture. The results of this research acquire greater importance considering the fact that of the 517 municipalities that exist in the state of Oaxaca, 418 are governed by “uses and customs.” In other words, 80.8% of the population of the municipalities responds to a government in their own cultural forms [4].

According to figures provided by the National Council for Evaluation of Social Development Policy [5], the state of Oaxaca is considered to have a high poverty rate. These data may give rise to the hypothesis by some studies that maintain that the dramatic situation of the indigenous people in almost all cases—which the World Bank describes as abysmal and severe poverty—is due to their isolation and marginalization [6]. Then, the questions arise: Why isolation and marginalization of ethnic groups underlie an environment of innovation and technological globalization? The answer could be that they have a digital illiteracy profile mainly in the adult population, which, some scholars say, widens the digital divide and is a direct threat to ethnic identity [7]. Then, why consider the culture of the Ñuu Savi people as strength to reduce their gaps, not only the digital divide, but also the economic and social divides?

In response to the questions identified, the culture of the Ñuu Savi people (people of the rain), also called the Mixtec people, is taken as the framework of study in this investigation, which allowed interpretation of the cultural values, as well as Identification of social agents involved in their development and determination of strengths and weaknesses of the minority group. For this case study, rather than considering ICT as a phenomenon forced acculturation of indigenous people [8], it is seen as an agent for reducing gaps by promoting equal access to information for the integration of people with social disadvantages. Likewise, promoting the development of marginalized areas by geographic barriers, as well as the rapprochement between people, economic, and social sectors.

2. Methodology

With the objective of acquiring an extensive knowledge on the ethnolinguistic group, which would permit the establishment of a strategy contributing to the reduction of wide gaps in

the social and technological aspects, methods and tools have been applied through quantitative and qualitative research. In the framework of the quantitative research, data were gathered from 11 localities belonging to the Mixteca Region of the state of Oaxaca in Mexico, are considered by the National Institute of Statistics and Geography [9] and by the National Commission for the Development of Indigenous Peoples [10], as municipalities with high and very high marginality index, where there are Nuu Savi ethnic origin people and speakers of the Mixtec language. The instrument used for choosing data with reference to the module “availability and use of information technologies in the homes” was designed by the INEGI [11] and was applied through a survey stratified according to different areas of the locality between residents in the year of 2013 and updated in January 2016. In accordance with the instrument of work and objectives of the research, the observation unit was the home, and the basis of the sampling frame was formed by a total of 689 houses of the Mixteca Region population. Likewise, within the framework of an ethnographic research and participatory action, the study of descriptive type is carried out, which allowed us to understand the ethnic group, its organization based on the uses and customs, the construction of their meanings, as well as to identify its strengths and weaknesses that originated in the sociocultural factors and technological changes that exist in the minority group.

3. Theoretical framework

The study of the behavior of acceptance of technology of the ethnolinguistic group, where the contribution of its culture and the subjectivity of its emotions take relevance to this research, has its foundation in the framework of the Social Cognitive Theory (TCS) and the Theory of the Dissemination and Adoption of Technological Innovations (TDyAIT). The TCS puts the foundation of the study of the behavior of the ethnic group in the process of acceptance, from a joint complex of interactions between the environment and the individual ethnic features and the situational factors. This human potential is clearly exposed by Bandura [12], creator of the TCS of the learning, when it enunciates: “The concept of human nature assumed by the psychological theories is more than a mere philosophical question. When the human knowledge is taken to the practice, the conceptions on those who rest the social technologies have even major implications. These can influence by indicating the type of human potentials that must develop and that not, of this form, the theoretical conceptions can influence in what really reach the people to be” [14, p.31]. This theory has a descriptive character, classifier and taxonomic, given that it describes in detail the determinants of the behavior of individuals. The theory gives importance to the symbolic processes, vicars (imitation or observational), and self-regulation. The cognitive social perspective of the learning departs from a model of reciprocal determination between the Environment (E), the Conduct (C), and the Personal factors (P) [12, pp. 2–8]. This conduct depends on the environments and personal conditions (cognitive and emotional between others). These, in turn, depend on the behavior of the person and the environmental context. Bandura et al. [13, 14] argue that reciprocity does not mean symmetry, as for the intensity of the bidirectional influences. The relative influence of the factors E, C, and P changes depending on the individual and the situation. For the present case study, if ethnic people had a contextual environment where the information communication

technology infrastructure was within their reach, the behavior of the young population (children, adolescents, and young) would be practically adopted. On the contrary and consistent with the present case study, when the infrastructure, expertise, and competencies in the ICT are weak, personal factors (culture, reasons, emotions, cognition, among others) become predominant in the social system.

4. Individual ethnic features and situational factors

An ethnic group is considered a group of people whose members identify with each other, through a shared common heritage, for example, lineage, culinary art, culture, traditions, language, and religion. In general, it is a set of norms that passes from one generation to another by means of the uses and social customs that forge an ideology on which its existence rests. Smith and Bond [15] view culture as a relatively organized system of shared meanings, something like “collective mind programming” [16], a group whose members identify with each other on the basis of a common history, background, or ancestry. Considering this definition, it is possible to describe the events that intervene in the affective and emotional feeling of the members of the Ñuu Savi culture of the Mixteca Region, which are associated with events in the community, generating cognitive and behavioral reactions that include shared experiences of other niches of the dominant society acquired through their observation during migration, as well as attributes recognized by technological artifacts that can benefit the ethnic community.

There are relevant factors that are derived from their “usages and customs,” such as the case of the Tequio and the way of learning ones language. The Tequio is a custom of the original civilizations of Mexico and has its origin in the nahuatl Tequitl, which means work or tribute. It consists in the community work oriented to the common welfare. The present study considers the Tequio as a fortress, pillar of Ñuu Savi people. The Tequio holds the Mixtecos people together through collective efforts, allowing them to leverage their resources to contribute with activities and services for the progress of the community. In addition, it creates a sense of achievement and belonging, which strengthens their identity and commitment to their community. Currently, the law of the State recognizes the shape of the Tequio and gives it legal character. With regard to learning their language, it has been made verbally through the teaching by parents to their children, which is the reason why its variants are not known by writing by the majority. Wichmann [17] reported a population of 446,236 speakers with 32 variants of the Mixtec language. At present, the Mixtec is the language of the Indigenous people with more speakers in the state of Oaxaca after the Zapoteco. The global scope of the functionality of the languages in an ethnic community is essential, since these depend directly on the status, force demographic, institutional support, social and psychological skills that establish the group and the individual. The flow and development of collective entities is determined by ethnic interaction patterns constituted by economic and political relations of their own transcendental culture established within and outside the community. **Table 1** shows that the population aged 5 and older speaking indigenous and Spanish language is 81.66% nationally. In the case of the Ñuu Savi people, the native language is Mixteco, which is the second most widely spoken indigenous language in Mexico, with 7% (471,710 inhabitants).

Condition native speaking and Spanish speaking	Mexico	Oaxaca	National position
Population 5 years and over	100,410,810	3,405,990	
Speaks native language	6,695,228	1,165,186	1
Speak Spanish (%)	81.7	82.3	19
Population that does not speak Spanish (%)	14.7	16.2	3
Unspecified (%)	3.7	1.6	31
Source: National Institute of Statistics and Geography (INEGI), 2010 Census. Oaxaca statistical perspective			

Table 1. Status of population aged 5 and older as indigenous and Spanish speaking.

In the legacy of “uses and customs,” humanitarian values are reflected, such as collaboration, cooperation, equity, solidarity, tolerance, and respect, directed mainly toward their community. Sensitivity, religiosity, manual skills, creativity in the design, the mixture of colorful clothing and craft products, as well as the relationship of coexistence and respect that occurs between the ethnic groups are characteristics that distinguish the ethnic group. The Mixtec people have a broad knowledge of their origins and biodiversity, coexist in a natural environment, possess ancestral knowledge—the use of medicinal properties of plants, the motion of heavenly bodies, that to say, of the adults and the elderly—announce the climate change and therefore the preset/change dates for agriculture.

5. ICT and the “Ñuu Savi” people

5.1. The digital divide

From the social perspective, information and communication technologies are a means to access information that allows the creation of knowledge, which in turn leads to improvement and progress, thus forming a set of tools that contribute to decrease poverty indices [18].

However, in order to establish an interconnected society that benefits from ICT and reduce poverty rates in ethnic communities, interconnection indicators, such as access to networks in terms of availability, cost, quality of networks and infrastructure, must be integrated into productive and social activities, so as to favor the development and progress of the community. Despite the efforts of the Federal Government to make available ICT to all Mexicans, the results are not favorable. According to the sociocultural variables analyzed in the present study, there has been a lag in the consolidation of an information society in ethnic communities, which leads to the presence of the digital divide.

The digital divide (BD) is understood as an inequality of opportunities in the access to the ICT, such as personal computers, the Internet, and cell phones, among others, of some social groups with respect to others. The intensive and extensive use of ICT has accentuated the gap between the different social groups and their access—or lack thereof—to technologies, in a

phase of economic, social, and legal development, which is called the digital divide. In a general conception, the BD is defined as "... the separation between people (communities, states, countries...) who use Information and Communication Technologies as a routine part of their daily life and those who do not have access to the same ones and that although they do not know how to use them" [19]. For the OECD, the BD concept refers to "the distance between individual, residential, business and geographical areas in the different socioeconomic levels in relation to their opportunities to access new information and communication technologies as well as to the use of the Internet, which ends up reflecting differences both within and between countries" [20].

The Federal Government has applied a strategy to reduce the digital divide to provide ethnic communities of Community Learning Centers (CLC), equipped with technological infrastructure, such as computer equipment and Internet access. However, it is not enough just to reduce the digital divide because, in addition to the infrastructure and connectivity, there is a need for qualified staff to provide preventive and corrective maintenance on a regular basis to the hardware for optimal state of technological equipment. It is also necessary that staff have technological skills to make use of the resources and services provided by ICT, such as educational use of virtual platforms, access to teleworking, e-commerce, portals of health and social welfare, among others (i.e., knowledge and mastery of the software).

The minority group has a material fortress. It is located in the set of goods and services (transportation, telephone, television, electricity, radio, etc.) that are in the community or that the community has access to. The percentage of the statewide as well as all the cases concerning cities in the present study shows that households have one of the major services required for the digital inclusion process: the electricity, livelihood of the digital age. According to the National Commission for the Development of Indigenous Peoples (CDI), it is observed that the indigenous population at the State level has an electrical infrastructure of 91.5%. This certainly is an important fortress, in addition to covering one of the main basic needs of ethno communities, it is a factor that is considered as an aid in the process of the reduction of the "digital divide."

5.2. Transition of knowledge

The transition of knowledge in the ethnic community under study is constituted by the survey of data from people who have used a computer, the Internet, and a cell phone. The sample is composed of 801 people from nine communities of the Nuu Savi population. As shown in **Figure 1**, there is a variation in the numbers, in terms of the total number of people surveyed. This variation occurs because some people have used computers, but they do not have access to the Internet; some have used computers and they also have access to the use of a cell phone; in other cases, there are people who have not used any type of device and have not used the Internet.

The transition of knowledge implies possession of the specialized knowledge and capacity for the use of information technology and communication, as shown in **Figure 1**. It is observed

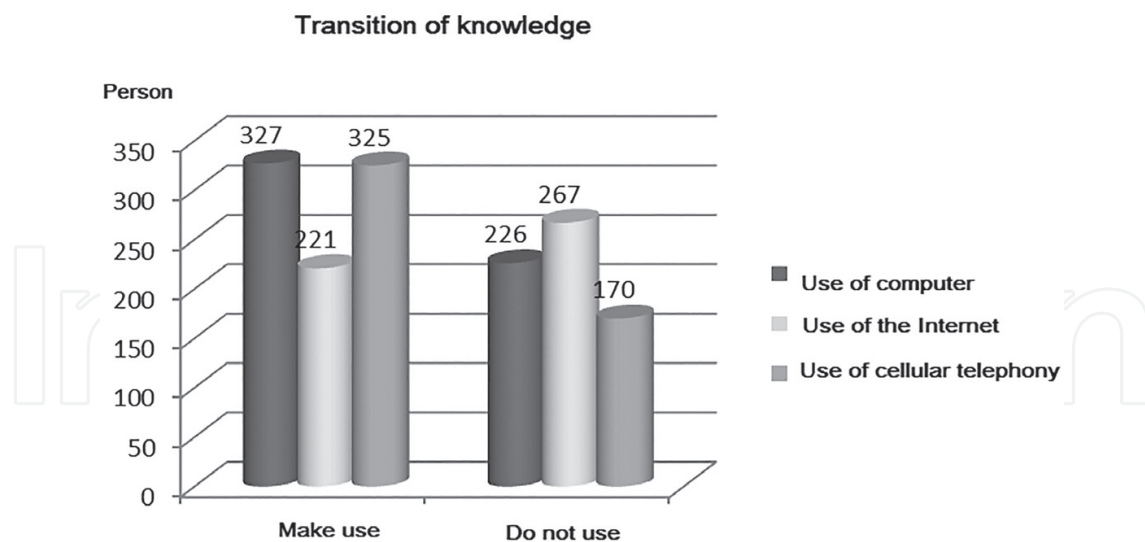


Figure 1. Transition of knowledge.

that the transition of knowledge is increasing in ethnic communities, as shown in the results, where 60% of people have used computers, 45% have made use of the Internet connection, and 66% reported using a cell phone. It is important to clarify that these figures correspond to people surveyed who are younger than 35 years. As already explained, policies on the use of technology and ICT implementation strategies in the country have contributed to the transition of knowledge, especially at the school level with students from the communities at primary and secondary levels (basic education), where the initiative of educational reform is a key factor for the transition of knowledge through the updating of the school curriculum for ICT literacy.

Ethnic communities are made up of nuclear families, where young people who have emigrated and stayed for long or short periods in large cities feel that having a cell phone, computer, and/or Internet connection puts them at the forefront of information and communication technologies. In a way they are right, except that even with this infrastructure, it is not enough when there are deficiencies in the speed of data transmission, a situation that still prevails in the communities. Surveys confirm this phenomenon where each household has at least one cell phone, a tablet, or a laptop. The last two, in spite of having an architecture that supports WIFI, are not used for this purpose in the homes, since in the communities, generally there is a lack of telecommunications infrastructure that hinders wide access to the service of Internet. However, the Mexican government has created a National System called e-Mexico [21, 22] through a federal policy, which focused mainly on four aspects: e-government, e-health, e-economy and e-learning. With the initiation of these actions, ICT penetration strategies have been implemented in marginalized communities, such as Community Learning Centers equipped with computers and Internet access, to provide services to the general population, provision of computer equipment to students of fifth and sixth grades, and satellite connection to health and educational centers.

5.3. Digital commerce strategy for the use of technology in minorities

The Mixtec communities have adopted the strategy of digital commerce through the Qiubo Network [23]. This strategy is aimed at small merchants (“local grocery stores and miscellaneous”) and is implemented by the union of three companies: the largest bakery company in the Mexican Republic, “Grupo Bimbo,” the telecommunications company “Blue Label Telecoms,” and “Better than Cash,” which have set out to break the barrier of natural resistance that small business owners (microentrepreneurs) have to approach for the use of technologies. This collaborative action greatly benefits localities marginalized by geographical issues.

Through the Qiubo Network, the massive distribution of point-of-sale terminals (**Figure 2**) was started among the more than 700,000 small businesses that make up the Bimbo distribution network, mainly focused on three objectives:

1. Implement terminals that allow transactions involving the purchase of air time and payment of services (**Figure 2**).
2. With the support of commercial partners such as Visa and Bancomex, banking is offered from the point-of-sale terminal, i.e., to carry out financial operations as well as the payment of products.
3. Operate correspondent transactions, i.e., stores (micro-businesses) become a distribution channel of the financial institution (e.g., cash withdrawal).

The sense and importance of the use of Qiubo Network technology is to meet community needs, notably for the payment of the digital television service (suppliers VeTV and Sky) and for the purchase of air time for the mobile phone. Otherwise, the community could obtain the service at a high cost in time (2 hours and 30 minutes of distance to the nearest population) and money by payment of transportation.

With the purchase of air time for the mobile phone, they gain access to social networks, textual and voice communication, entertainment applications, music in digital format, among other applications, provided by the Internet. Therefore, the use of ICT through mobile technology is promoted as an appropriation by members of the Mixtec culture and not as an imposed

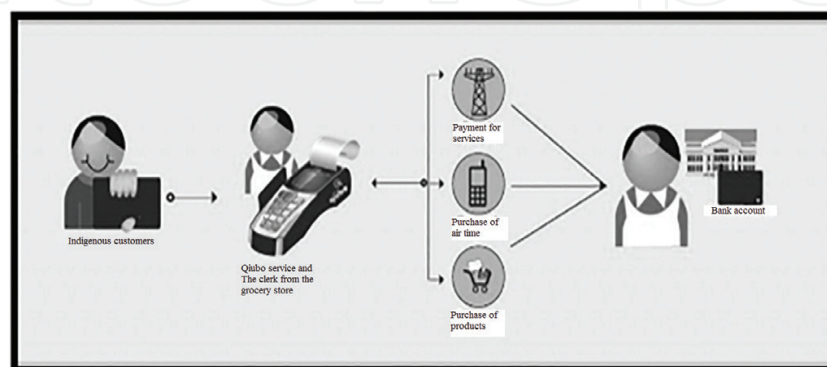


Figure 2. Qiubo Network (Bimbo and Blue Label). Source: <http://www.redqiubo.com/en/index.php>.

extension of the dominant society, involving the manipulation and extermination of its cultural identity. In this connection, the Omar Dengo Foundation [24] defines social appropriation of digital technologies as “Appropriating something means making it proper to the point of being able to apply it in accordance with the requirements and characteristics of specific situations” [24].

5.4. Knowledge building: ICT and the Ñuu Savi people

Through action-participatory research, it is observed that the acceptance behavior of the technology by the ethnolinguistic minority Ñuu Savi group contributes to the development of its personality; at the same time, it enhances self-esteem and facilitates the construction of knowledge, skills, and technological skills. This statement is based on the framework of the Social Cognitive Theory (SCT) and the Theory of the Diffusion and Adoption of Technological Innovations (TDyATI). In other words, the behavior of the ethnic group in the process of accepting ICT is conceived from a complex set of interactions between the environment and individual ethnic traits and situational factors [25].

In this sense, it is relevant to the attitude of the Mixtec children and adolescents, who learn by imitating the actions of the adult and the environment that surrounds them in terms of the use of technology (**Figure 3**). In the process of constructing their knowledge, they present a behavior that is mainly derived from two sources: the first one is given by the interaction with the environment of the big cities, which the Mixtecos experience in their short periods of migration (from 2 to 6 months). The second source has its origin in personal subjective factors,



Figure 3. Social Learning (father-daughter).

to maintain a communication with the dominant social environment, which mainly motivates young members of the ethnic group to make use of ICT through Internet applications, such as Facebook, Twitter, YouTube, among others.

The construction of knowledge is based on a vicarious learning, in this respect, reaffirms the position of Bandura [25], noting that the group of children and adolescents has the capacity for attention and retention, which leads to social learning in an immediate, unconscious and without the need for a process of practice and knowledge development. The theory gives importance to the symbolic and vicarious learning processes (observational or imitation). Thus, considering that Mixtec language is one of the main symbols of the culture of the ethnic group, the use of ICT through mobile technology acquires relevance in the process of communication of the Mixtecos. The cultural development of the Nuu Savi people, originated by technological influence, is manifested by holding dialogues in their native language (Mixteco), through the mobile phone as an instrument of communication. It should be emphasized that the Mixteco language is tonal; therefore, the ease of sending voice messages strengthens the preservation of the language. For text messages in their native language, there is still a barrier, mainly for two reasons: for the few Mixtecos with knowledge of the morphosyntax of their language, not having technological tools that facilitate writing complicates the development of their texts; and in the most common case, the writing of their own language is unknown.

In this way, the use of the technological devices modifies the behavior of the ethnic group, their vision of the world, the time allocated for the use of the physical space which is now shared with the cyberspace on the Internet. Today, when people carry out their work, but they carry their cell phones and hearing aids all the time. The factor of the communication without geographical barriers (mobile technology) constitutes the essence of their daily lives (**Figure 4**). For this reason, its sociocultural system is influenced by affecting its behavior, its way of being, the way of thinking, and of seeing things.



Figure 4. Police in wireless-mediated communication from CLC.

6. Model for the development and inclusion of ethnic minorities (MODIEM)

After presenting the analysis and diagnosis of the communities of the Mixteca Region, the following is the Model for the Development and Inclusion of Ethnic Minorities (MODIEM) (see **Figure 5**). In this model, the strengths of the ethnic group are emphasized under an autonomous vision of the Ñuu Savi ethnic community, protected by the principle of recognition of their indigenous rights, uses and customs established in Article 4 of the Political Constitution of the United Mexican States. The sociocultural and technological factors identified in the ethnic identity of the study group define the strategic circles for the strengthening and development of their quality of life.

Why consider a palm plant for illustrating the model (**Figure 5**)? Because it is part of its natural context, the royal palm is a plant that the Ñuu Savi people have considered as a symbol of the Mixtec culture. The leaves of the palm are the raw material for the Mixtec artisans, with which they make products like hats, clothes, flowers, bags, among other items, that are marketed to obtain an economic benefit. In addition, palm is a plant that generates a sense of belonging and identity among the minority group of this study.

6.1. Description of the MODIEM model

In the study group, the main variables in the identification of ethnic social structure are migration, culture, schooling and poverty, as can be seen in the base of the stem of the royal palm (**Figure 5**). Also, each of the variables shows the factors that impact on their development and

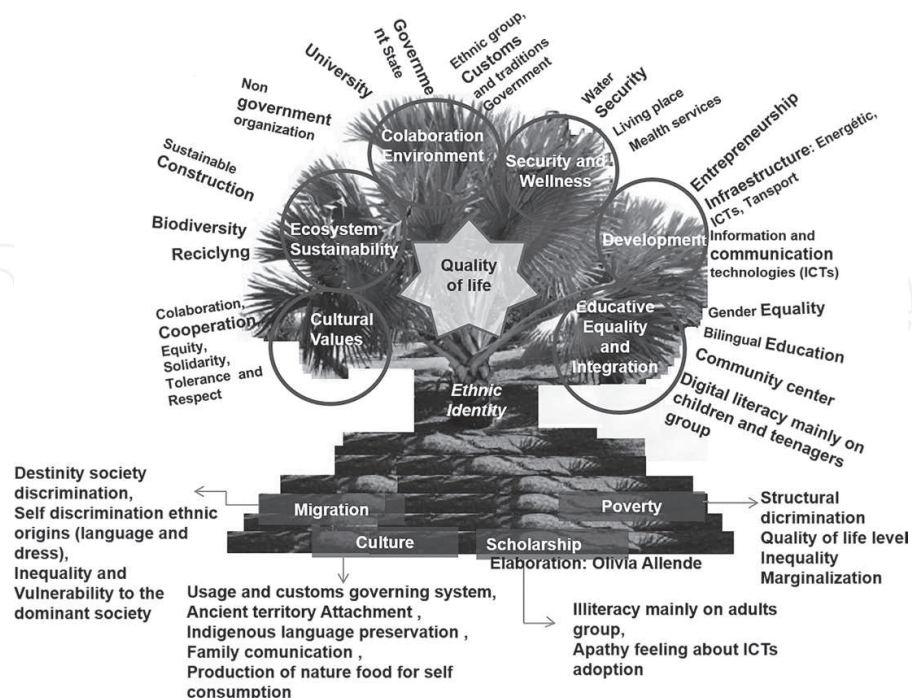


Figure 5. Model palm tree for the development and inclusion of ethnic minorities.

quality of life, as mentioned earlier. Although these factors are not exclusive to an ethnic minority group, in this study they were a constant in the diagnosis of the 11 communities studied: El Molino, San Francisco el Chico, San Francisco Yosucuta, San Jerónimo Silacayoapilla, San Pedro and San Pablo Tequixtepec, Santa Maria Camotlan, Santa Maria Chachoapam, Santa Rosa, Santos Reyes Yucuna, Saucitlan de Morelos, and Villa de Tamazulapan del Progreso.

The crown of leaves that forms the top of the palm is composed of branches representing six circles in red: inclusion and educational equity, development, safety and well-being, collaboration environment, ecosystem sustainability, and cultural values. The circles represent the strategic dimensions that have been identified as priorities for fostering actions that reduce the digital divide and promote social inclusion. Thus, for each dimension, there are a number of influential factors in the process. The following describes the dimensional circles that concentrate the relevant factors in the context sociocultural of the Nuu Savi people.

6.1.1. Dimension of the circle: inclusion and educational equity

Inclusion and educational equity has been considered as a strategic development circle because it contemplates factors that provide opportunities for all the people of a community to develop their potential, regardless of gender, age, or any other sociocultural condition. Sen [26, pp. 297–298] stresses that “development is, in fact, a transcendental commitment to the possibilities of freedom.” And that “freedom is inherently a diverse concept, involving considerations related to processes, as well as considerations related to opportunities.” As a consequence, the actions taken by the Federal and State governments in relation to the social development objectives include the strengthening of the education sector, deepening of human rights, democracy, and gender equity. Therefore, in this dimension, the following factors were identified: gender equity, bilingual education, community learning center (digital village), and digital literacy preponderant in children and adolescents.

6.1.2. Dimension of the circle: development

Development requires the elimination of the main variables identified as weaknesses in the social structure of the Nuu Savi people (see **Figure 5**), such as illiteracy, migration due to the scarcity of economic opportunities, the limitation of public services and the poverty they entail to the deprivation of liberty, necessary to satisfy the needs of the human beings. In this regard, Sen [26, pp. 282–292] states that the development can be conceived like “a process of expansion of the real freedoms that enjoy the individuals.” Sen still says: “Focusing on human freedoms contrasts with stricter development visions, such as their identification with the growth of gross national product, with increasing personal incomes, industrialization, technological advances, or with the social modernization.” Sen further states, “Development has to do more to improve the life we live and the freedoms we enjoy.” Likewise, according to Gimeno and Monreal [27, p. 5], “development is a product of the imagination of each other, an imagination that is always the result of a social, cultural and material history. To consider development as a social and historical construction is to recognize that it is a contingent product and, therefore, can be modified.”

The strategic dimension of the development circle presented here is part of the expansion process of freedom raised by Sen [26] and of the sociocultural foundation expressed by Gimeno and Monreal [27]. Therefore, development and quality of life are conceptualized from within the ethnic group; that is to say, taking the liberty that the government entails of its uses and customs, its values, beliefs, and symbols that give meaning to the daily life of the Nuu Savi people. It has already been shown that among the members of the Nuu Savi people, there coexist principles of fraternity, cooperation, and collaboration that are socially cohesive for the economic and sociocultural growth of the people, through collective and community projects that are implemented in the ethnic community. These projects are mainly aimed at economic development, social and human development, basic social infrastructure, human rights, cultural development, technological communication networks, and environmental protection. According to the interviews conducted with the municipal presidents and with the data provided by the National Commission for the Development of Indigenous Peoples, the main dependencies and associated programs, contributing to the development process that impacts on the quality of life of the Mixtec people are SAGARPA (projects for the development of the agricultural field), SEDESOL (social development programs), SEP (scholarships for education), CDI (production projects), CEVI and SINFRRA (housing projects), and health sector (medical consultation and food supplements). It should be mentioned that in addition to the aforementioned units and government programs, by linking the Technological University of the Mixteca through the Division of Promotion to Development, the State has implemented programs to support communities in the Mixteca Region. The main objective is to provide technical assistance and training in the different productive areas for the human, economic, and cultural development of the social sectors of the region. With the formation of interdisciplinary working groups, where teachers and students participate, projects for the development of communities have been undertaken. In some cases, financial support has also been received, mainly from calls issued by the Federal and State governments. In general, these resources have been applied to the training of women, men, and children involved in entrepreneurship, such as backyard orchards, nurseries, design and creation of handicrafts, metal management through blacksmithing techniques, courses for improvement and human development, among others. Although the immediate impact is on adults, it also helps to create an entrepreneurial and regional belonging mentality in children and young people, in order to reduce migration rates.

6.1.3. Dimension: safety and well-being

This strategic dimension arises from the point of view where safety is the state of well-being that the human being perceives and enjoys. Consequently, the most relevant factors are health and well-being, which for this study have been considered health services, water, and housing. Generally, the communities have a health clinic installed in the municipal head of the localities, which only provides service from Monday to Friday. To reduce this fact, the Federal and State governments have implemented vaccination, health and nutrition programs and campaigns. Due to the insufficient drinking water that the Mixteca Region suffers to cover the needs of the population, especially in the months of February to May, rainwater

harvesting systems have been implemented for human consumption, through construction of cisterns made of ferrocement or acquired through the support of a social program. The cisterns are stocked with rainwater captured through the laminated ceilings of houses in the months of June to October. Each family unit is responsible for ensuring that the tank is hygienically clean, the water is free of impurities and chlorinated, which does not penetrate the air or light, as well as the stored water is aerated, to prevent it from generating a bad odor or extraneous agents. This strategy, undertaken by the National Water Commission, has been successful due to the commitment and active participation of its municipal agents and the Tequios carried out by the members of the community. As for the housing factor, communities in extreme poverty have been favored with the support that the Federal Government has given for the construction of standard and affordable housing in the communities. The program envisages sustainable construction model involving water and electricity services, education for the treatment of solid waste, as well as recycling and care for biodiversity.

6.1.4. Dimension: Tequio (collaboration and cooperation)

The Tequio is one of the principles of the Ñuu Savi culture and is present in all dimensional circles of the MODIEM model, through the collaboration and cooperation of the Mixtec. Efforts by governmental agencies and non-profit non-governmental organizations (NGOs) would not be successful without the community-made Tequios that facilitate actions and tasks to achieve goals. That is, there is an added value that the community gives to the development and inclusion, which involves voluntary non-profit work, only the satisfaction of having contributed to public works, to social welfare. Likewise, the convergence in the commitment made by the members of the groups guarantees the equality to eliminate the inequalities. The effort and the active participation of the Mixtecos and all the actors involved who provide public goods and services to the communities allow teamwork for community development and a better quality of life.

6.1.5. Dimension: ecosystem sustainability

The biological and cultural biodiversity of the Mixteca Region is an ancestral heritage for present and future generations. At present, municipal governments have given importance to the strategic circle of ecosystem sustainability; it has begun to raise awareness in the ethnic communities about the benefits of maintaining a balance between species and the environment. This is why the population is sensitized, informed, and educated through environmental education. Programs and actions have been implemented, for example, recycling techniques for materials such as paper, books, plastic bottles, among others. Techniques for the elaboration of composts such as organic fertilizers, “biodigestor baths,” “ecological stoves,” and “packing of materials for housing” include material for the construction of housing with thermal and ecological characteristics. In the last three years, 506 homes have been built in 14 municipalities in the state. Fifty-five percent of the study communities have benefited from these programs, impacting their quality of life.

6.1.6. *Dimension cultural values*

The main cultural values that strengthen their social development are collaboration, cooperation, equity, solidarity, tolerance, and respect present in their government of uses and customs. In the Nuu Savi culture, value emerges from coexistence with the members of the community and its context; it is a social consequence that forges its identity. Principles such as the Guelaguetza, which alludes to an attitude with which one is born and grows, is a feeling through which the ethnic brother is accepted and esteemed, feeling of kinship, of brotherhood. Their values are forged and cultivated today; however, these can change due to the effect of time and space, and the Mixtec people wisely recognize the positive impact these values bring to the community. The solidarity and mutual help they keep among themselves are feelings that reflect when receiving the economic supports and that is distributed in an equitable way among the members of the community.

7. Conclusion

This study has corroborated the active participation of the Federal Government of Mexico in reducing the digital divide and social exclusion by promoting the use and application of ICTs in education, health, security, and the fight against poverty. Among other aspects, as mentioned, this has been raised through various programs and projects set out in the digital agenda. However, the way national strategies have been developed so far has emphasized three aspects: (1) the installation of infrastructure through the Community Learning Centers installed in the municipal head offices, (2) training Instrumental to the beneficiaries on the use of technological tools; however, a staff turnover is observed due to the migration factor, which brings with it the absence of qualified personnel to coordinate the CLC, and (3) the impulse to the generation of contents considered socially useful (generally from governmental agencies, institutions, and agencies that promote social security and public education welfare). The lack of public mechanisms for sustained monitoring and submission of complementary assistance to ethnic groups by all involved (Federal, State, and Municipal Government) has limited the access of members of ethnic communities to the use of ICT.

However, as the use of technological devices modifies the behavior of the ethnic group, this change is observed with greater effect in the Mixtecos children and adolescents through their migratory stays and their coexistence with the dominant societies of the surroundings of the big cities. Skills, attitudes, and knowledge, which transform their sociocultural state of origin, affect their way of thinking, doing, living together, feeling, and expressing themselves. For this reason, it can be inferred that the ethnic group is in a conjunctural process of sociocultural transformations where the Mixtecos give a special meaning to the technology of information and communication for their family and communal context. Therefore, it is visualized that in a medium term the new generations of Mixtecos adopt technology to promote their skills and knowledge through the use of digital devices, gradually contributing to narrowing the digital divide and social exclusion.

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