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Digital inclusion policies in a high Andean Quechua region of Peru

Políticas de inclusión digital en una región altoandina quechua de Perú

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ABSTRACT

Internet connectivity has become a fundamental right today. The study was aimed at evaluating digital inclusion policies in a Quechua-speaking region of Peru from a qualitative case study approach. Education specialists and regular basic education principals participated through semi-structured interviews. The lack of technological infrastructure for internet access and weak connectivity, which affects teachers' digital literacy and students' learning, were highlighted. It is concluded that internet access is not sufficient to meet the criteria for implementing digital inclusion policies. It is recommended to increase and strengthen the training of teachers in digital skills.

KEYWORDS: development policy, internet universality, digital divide, information and development.

RESUMEN

La conectividad a internet se ha convertido en un derecho fundamental en la actualidad. Al respecto, este estudio evalúa las políticas de inclusión digital en una región quechua hablante del Perú desde un enfoque cualitativo, estudio de caso, donde participaron especialistas en educación y directores de educación básica regular a través de entrevistas semiestructuradas. Se evidencia la falta de infraestructura tecnológica para el acceso a internet y la débil conectividad, que afectan la alfabetización digital de los docentes y el aprendizaje de los estudiantes. Se concluye que el acceso a internet no es suficiente para cumplir con los criterios de implementación de políticas de inclusión digital. Se recomienda incrementar y fortalecer las capacitaciones a los docentes en competencias digitales.

PALABRAS CLAVE: política de desarrollo, universalidad de internet, brecha digital, información y desarrollo.

INTRODUCTION

Currently, there are radical changes in access to knowledge and communication technologies, as a result of the fourth industrial revolution. The scenario of digitization demands the development of digital skills in various human activities, such as education, health, governance, and economy, as well as new challenges of robotization of artifacts and vehicles through artificial intelligence and 3D printing (Martínez *et al.*, 2020).

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During COVID-19, educational processes have been changing from a focus on face-to-face education to virtual or hybrid education, which requires teachers to develop digital skills and enter into a dynamic of technological adaptation and digitization (Melchor-Canevaro *et al.*, 2022; Méndez-Ilizarbe *et al.*, 2021; Mescua Figueroa *et al.*, 2022). However, social equality or equity cannot be understood if the right to the internet is overlooked, which has now become a fundamental right. Governments must guarantee access to it (Acata Águila, 2011).

In Paraguay, Bolivia, El Salvador, and Peru, more than 90% of rural areas do not have access to the internet, even though in countries that have connectivity such as Uruguay, Chile, and Costa Rica, less than 50% of these areas lack connectivity (CEPAL, 2020; Ziegler *et al.*, 2020). In this sense, access to the internet in Peru grew rapidly in 2021, with coverage reaching over eight million households (87.7%); an indicator that shows growth of up to 21.2% compared to the results of 2016 (66.5%). However, in the last five years, in rural areas, there has been a greater increase from 37.8% to 68.7% of families with access to the internet. The COVID-19 indicator has certainly been important in raising the ratios, consolidating it as a necessity for studies, work, or other social connection or administrative procedures (OSIPTTEL, 2022).

Despite this macro growth, in specific terms, the inequality of internet accessibility has increased, being greater in rural areas of the Andean and Amazonian regions of the country, where the digital divide has negatively impacted the equity of educational quality, which directly decreases opportunities for socioeconomic development, environmental sustainability, and social inclusion (Melgarejo Bardales, 2022; Moral *et al.*, 2020).

In contrast, digital inclusion understood as a state action that promotes effective access to the internet for all citizens has allowed rural communities in the United Kingdom to enjoy digital spaces through virtual platforms (Wagg & Simeonova, 2022). With this, contradictory aspects were identified: on the one hand, poor connectivity in some rural areas due to lack of resources and, on the other hand, the demand from teachers for the development of digital skills for students. It should be added that it is not only the lack of infrastructure, but also the individual's worldview and cultural adaptation to cyber technology and the natural environment to which they are accustomed.

Similarly, in Australia, access to the internet was a complex process that did not end with the installation of internet connection infrastructures –ADSL, mobile phone connection, fiber optic, or satellite– but began with unique experiences such as having users from different groups and rural communities, thus identifying different levels of connectivity. In other words, analyzing the sociocultural contexts of the population in general is a plus to establish inclusive digital policies so that economic, political, social, and educational problems are addressed (Park *et al.*, 2019).

Consequently, in other studies, human relationships are those that establish limited connections between society and the state. However, this (connectivity) would be meaningless if quality and digital inclusion in rural areas were not present in basic (formal) education, causing a high impact on the development of these same communities (Guerrero Martínez, 2020; Villar & Villarreal, 2017). Nevertheless, in countries such as Uruguay, Argentina, and Peru, connectivity has been related to the success of unsustainable policies from successive governments that do not bet not only on the implementation of computer equipment but also on the training of teachers, so that they, in turn, educate future generations in the humanistic and civic aspects, free of corruption (Larrouqué, 2017; Mescua Figueroa *et al.*, 2022; Vertiz-Osores *et al.*, 2020).

1. LITERATURE REVIEW

1. 1. Policies for digital educational inclusion

Connectivity or digital inclusion is a natural or subjective right that the state protects (Acata Águila, 2011; Riofrío Martínez-Villalba, 2014). A subjective criterion that is governed by the parameter of free access to

information, but that does not have a legal framework to discriminate it, disposes of it, or regulates its use, since in many cases it violates the dignity and honor of individuals. This means that there is no regulation for access to technology and freedom of expression through social networks, and the right to distribute information (Riofrío Martínez-Villalba, 2014).

Digital inclusion involves three fundamental aspects: “access”, “digital learning or literacy,” and “appropriation of technology or technological innovation.” The first refers to access to infrastructure and ICT, that is, physical and material aspects. The second, to basic skills in the use of ICT, it is about school technology literacy. The third includes digital literacy that presupposes and implies creativity in use and application (Mori, 2011).

According to Crovi Druetta (2010), digital gaps must be addressed through policies of digital inclusion that must manifest or take into account the following dimensions: technological, which includes the infrastructure that allows connections to the Internet and broadband. Knowledge, which includes the development of skills and knowledge to use technological equipment and digital tools. Information and its management, where those who handle or possess information are identified from those who are uninformed. Finally, the economic dimension, which deals with resources to access digital technologies, either at a personal or institutional level, and to achieve participation and presence in cyberspace.

For this reason, the quality of education should take into account the elements of internet connectivity, being more effective and relevant in cultural interaction (Menacho-Vargas *et al.*, 2021). Furthermore, it is necessary to consider public policy as the response to public affairs issues, where citizens are the protagonists, and various state sectors participate coherently in their planning and execution, demanding immediate responses to address and overcome digital gaps (Fung, 2006; Roth Deubel, 2016).

Therefore, digital inclusion policies must be addressed as state policies that aim to mitigate gaps in access to information and its use. This is to ensure quality learning for students in all sectors, especially those in rural and high Andean areas. This will enable students to have digital skills and competencies to use educational platforms and software with a socio-cognitive formative approach focused on learning, database management, emotional management, and critical thinking.

In this sense, Peruvian reality has a regulatory framework in place that provides legal conditions to reduce digital gaps so that most children and citizens can have access to the internet with speeds within minimum standards, allowing to achieve objectives in student learning and communication effectiveness: Law No. 29904, which establishes the promotion of broadband and the construction of the National Fiber Optic Backbone; Law No. 31207, which establishes the minimum speed of access and internet connection, as well as the control of the service in favor of users. In this perspective, public digital spaces (EPAD) are being applied in several regions of the country, such as Apurímac, Huancavelica, Ayacucho, and Cuzco (223 nationwide), which constitute infrastructure that provides free internet by the Peruvian state focused on rural localities, possible through high-speed symmetrical WIFI of 20 MB per second, with access to broadband internet speeds, streaming connections that allow for interviews, videos, and academic materials (Mansilla, 2023).

Likewise, the National Network of the Peruvian State (REDNACE), as a non-profit private network of the state under the protection of the General Telecommunications Law and Law No. 29904, includes the National Research and Education Network (RNIE), which incorporates all public universities and research institutes into REDNACE, which integrates with regional research and education networks worldwide, with the aim of accelerating research, technological development, and innovation processes.

2. METHODOLOGICAL ORIENTATION

The research comprises a qualitative approach, a case study design, in the sense that it exhaustively investigated the depth of the application of digital inclusion policies in a Peruvian high Andean region. The categories that have been taken into account are:

TABLE 1
Categorization matrix

Categories	Definition	Subcategories
Technological Infrastructure	It comprises the infrastructure that enables connections to the Internet and broadband.	Installation of optical fiber Internet kiosks Internet Digital platforms Broadband
Digital Literacy	It comprises the development of skills and knowledge to make use of technological equipment and digital tools.	Digital tools Use of social networks Educational software Digital citizenship. Citizen participation Digital democracy.
Information and Knowledge Management	Identifies those who handle or possess information from those who do not have information or are uninformed.	Database Virtual libraries
Digital Access Economy	It refers to the resources needed to access digital technologies, whether at a personal or institutional level, and to achieve participation and presence in cyberspace.	Digital divides Social inclusion Personal development Social development

Source: Own elaboration based on the consulted literature and theoretical criteria.

The research took into account six executives of Regular Basic Education Institutions in rural areas of the province of Tayacaja in the Huancavelica region of Peru, as well as specialists on the subject who live in the area, comprising the towns of: Sachacoto, San Martín de Vista Alegre, Bellavista, La Union, Pucarumi, Rumi Chaca and San Antonio de Chilhua, which are located between 2 585 to 3 900 meters above sea level.

Key participants were selected based on the following criteria: residing in the study area, being a user of the internet connection network they currently have, owning some technological equipment with internet access and being aware of public policies for digital and technological inclusion. Observation and interview techniques were applied, using a semi-structured in-depth interview guide as an instrument, which allowed the collection of relevant information for the processing and analysis of the findings (Hernández-Sampieri & Mendoza, 2018).

3. RESULTS AND DISCUSSION

Having the technological infrastructure to access to Internet connectivity through broadband, fiber optic or satellite is not enough to meet the compliance criteria for the execution of digital inclusion policies, but it is the sine qua non condition to overcome digital gaps (Stiglitz, 2002). In this sense, the profile or performance of the teacher in the digital era is of vital importance for sustainability and for the authentic achievement of educational goals. However, according to the results, it was evident that the internet signal is very weak or simply not available in some places within the jurisdiction of the Local Education Management Unit (LEMU). However, in places like Sachacoto and Union Milagro that have access, this is unstable. Considering that there is no electricity, and the geography is very rugged, which does not allow connectivity.

Fiber optic or satellite internet has more power in communication and data transmission, but costs are very high for installation due to the rugged geographical conditions, which makes it more expensive and therefore the budget increases even more. This would mean having more users, so it would not be convenient to make a high investment for the use of so few users, since in rural areas the attendance of children and young people is quite low. On the other hand, with fiber optic, there is more speed for the use of video conferencing platforms such as Zoom and Google Meet, making the uploading and downloading of information more effective compared to

broadband. Meanwhile, broadband was the best option at the beginning of internet connectivity, despite various difficulties, it reached the point of saturation, thus decreasing speed (Rudner & Thomson, 2012).

Certainly, many telephone companies entered, but their performance was subject to the quantity and power of antennas installed in the high Andean areas. Furthermore, the REDNACE project, which is within the framework of the General Telecommunications Law No. 29904, the law promoting broadband and construction of the national optical fiber backbone network, would be in the process of installing the service publicly for the population (Sikapizye, 2021; Stefanchuk *et al.*, 2021). In this sense, the lack of infrastructure for internet connectivity generates conditions in the increase of digital gaps, manifested in the poorest sectors, where the mobile phone is the only means and effective communication resource, both for students and teachers (Flores-Cueto *et al.*, 2020), which indicates that there are still significant gaps in education that affect social development (Villar & Villarreal, 2017).

In the jurisdiction of the LEMU under study, no budget has been identified for carrying out more infrastructure development projects or alliances with internet connectivity providers, but a budget has been established for maintenance of technological devices such as computers/laptops or tablets, even though informants have stated that they are currently inoperable. However, Law 29904, in its Articles 1 and 2, establishes the mass use of broadband and fiber optic throughout the national territory, promoting the deployment of infrastructure and the services that imply social inclusion, socioeconomic development, and the driving or insertion into the society of information and knowledge. In this way, the State's work is guaranteed, a postulate of exercising the right to education, health, work, and freedom of expression with "good quality and effective internet service speed."

There is evidently a current legal framework of the Peruvian state that promotes access to the internet for all inhabitants and the investment of concessionaires or providers that, to date, is not executed and does not comply with its guidelines, which paradoxically has increased digital gaps; and, of course, has had an impact on social exclusion, low levels of educational quality, and poor socioeconomic development. The indifference of municipal and regional governments cannot continue, on the contrary, they must provide technical facilities for infrastructure support and increase more coverage of access to the internet with greater speed and stability, despite the private sector's interest in investment. Maintaining the status quo of this problem is inevitably violating the fundamental rights of Quechua-speaking students in the highland areas, putting their learning at risk, which should be addressed as human rights (Riofrío Martínez-Villalba, 2014).

Another point that was considered was digital literacy, which includes the use of educational software in educational institutions. According to the informants, there have been limitations due to low connectivity, lack of electricity (only some communities have solar panels, whose nine-volt power is not sufficient for the use of technological equipment), and lack of training for teachers in its use. While the need to use a mobile phone has allowed the use of social networks such as Facebook, Instagram, and TikTok, and influencers have motivated young people to use YouTube, this is a limited way for them to exercise their digital citizenship (Bianchi, 2023). In this sense, the digital divide is not only related to access, but also to how people gradually make it their own, benefiting from and participating in digital democracy. Obviously, digital literacy is characterized by continuous learning and skill development.

However, digital literacy that is limited to learning how to use educational software or developing digital skills is not enough. It is necessary to broaden the spectrum of training from a more integral perspective, which should include the development of critical thinking skills. In this perspective, the information and data in cyberspace can be dangerous in some cases, and their use will depend on people's training. Therefore, it is essential to establish a legal framework to regulate these aspects (Gómez Navarro *et al.*, 2018; Guerrero Martínez, 2020).

According to the provisions of Law No. 29904, Article 23 establishes that the State promotes training for the development of digital competencies and the benefits of broadband. Likewise, in Article 24, paragraphs 24.1 and 24.2, it is stipulated that state entities must generate public access spaces with broadband for accessing information and spaces for digital skills training, as well as the allocation of budget for the achievement of these activities and objectives.

In reality, according to the statements of the informants, the training has been insufficient, and in the institutional operational plans (IOP) of the last three years, there has been no allocation of resources for digital literacy training, an issue that still involves officials in the education sector of the jurisdiction of the LEMU.

Developing competencies and skills for information management and generating knowledge requires access to information search engines, with Google being one of the most important and widely used today. In this regard, the following findings have been found: Lack of training for teachers in handling technological devices, even in basic programs such as Microsoft Office: Word, Excel, and PowerPoint. The training that teachers have received so far has been primarily in the use of tablet applications and conference platforms such as Zoom, but it has been insufficient because teachers need to know more about digital tools.

On the other hand, the lack of ICT training due to economic factors, the low availability of technological offers in some areas, or the limited resources of teachers to enroll in training, but also the lack of interest and little willingness to invest in their professional training.

Under the described conditions, it is not feasible to integrate Quechua-speaking students into the information and knowledge society, which constitutes backwardness and underdevelopment. Therefore, public policies for digital inclusion must be reconsidered to include internet access and training programs that integrate the use of digital tools and access to virtual libraries (Melendez *et al.*, 2017). Consequently, in line with the proposals for digital inclusion and closing digital divides in rural communities, the participation of residents is essential to reverse this reality and have a different prospective view (Wagg & Simeonova, 2022).

Regarding the economic investment for access to digital technologies and broadband, it has not been used to reduce digital divides simply because it does not exist.

In the allocated budget, there is no specific item for installing or expanding broadband coverage, purchasing satellite antennas, or installing fiber optic for educational institutions. There is only a budget for the maintenance and repair of technological equipment. In many educational institutions, expanding or improving connectivity is not a priority because their basic needs are infrastructure-related, such as civil construction installation (Wang *et al.*, 2022). The budget primarily allocated is for addressing infrastructure issues, which have many shortcomings and needs. Indeed, in areas located at 4 000 meters above sea level with very low temperatures, there is a need for heated environments so that students can feel comfortable. However, in general, there is no budget for connectivity and pedagogical implementation for the development of digital competencies (Liu *et al.*, 2023).

Public policies for digital inclusion require and presuppose an economic factor, the budget that is planned, which must respond to the needs of the population. According to the evaluation of the IOP of the LEMU, it had allocated for the year 2021 in the PIM S/ 31,567,379, executed S/ 31,548,805 with a 99% spending progress. 56 operational activities were carried out with an expenditure of S/29,035,060. The mentioned amount does not specify the construction of technological infrastructure and digital literacy training, only budget executed in the pedagogical management area in general. Certainly, the report states that it is not coherent with the current laws such as Law No. 29904 and Law No. 31207, which promote and support the legal conditions for the growth of broadband in rural areas and internet speed.

Connectivity or digital inclusion has posed new paradoxes to human beings. On the one hand, it implies a need and a right, but at the same time, it implies a new submission, making them dependent and seemingly remote from liberation, that is, as if there were no way out and they are heading towards living in a new artificial cave, giving way to virtualization, leading to a process of denaturalization and at the same time dehumanization.

Connectivity grants power and democratization of information, but at the same time, humans find themselves submerged in a whirlwind of time and life because, in the “immense ocean of information,” humans are lost, denaturalized. Nevertheless, they have the opportunity to exercise greater social control horizontally and allow greater openness of citizen participation and achieve greater social transparency (Mendoza-Montes de Oca *et al.*, 2022).

Digital inclusion has become a new way of eradicating any form of exclusion, becoming the new icon to strive for equity, equality, and consolidating democracy in society (Taghipour *et al.*, 2022). This is why addressing

the problem involves, fundamentally, striving for inclusion in its various manifestations, such as educational, social, and economic inclusion. The consolidation of public policies for digital inclusion implies new forms of social inclusion, new mechanisms of integration, and conditions for a more dynamic and productive economy (Larrouqué, 2017). On the other hand, digital inclusion tends to be part of globalization, which raises tension between identity and universalization.

Therefore, the sustainability of digital connectivity or inclusion must be considered through sustainable public policies that generate development, progress, and change. This implies considering the Millennium Development Goals (MDGs), included in the 2030 Agenda on Sustainable Development Goals (SDGs), which consist of achieving 169 targets grouped into 17 objectives that aim to eradicate poverty and include social, economic, and environmental dimensions as part of sustainable development (Park *et al.*, 2019), presupposing balance with the resources of its environment. Therefore, it is important to consider that productive maintenance over time implies taking into account its relationship with other factors that must generate synergy and tend to the growth of human beings. All of this is feasible and viable with the contribution and assistance of citizens and the business sector (Moral *et al.*, 2020).

PROSPECTIVE

Having the technological infrastructure for access to Internet connectivity via broadband, fiber optics or satellite is not enough to meet the criteria for compliance with implementing digital inclusion policies, but it is the *sine qua non* condition (without which it is not) to overcome the digital divide. In this sense, the profile or performance of the teacher in the digital era is of vital importance for sustainability and for the true achievement of educational goals. It should be considered, according to the diagnosis mentioned above, that there are teachers who know Office and do not have the digital skills and competencies to make use of educational platforms and software. Therefore, the following is proposed:

- a) Teacher Training Program for Digital Inclusion in Rural Areas. Rationale: It is unavoidable to be on the margins of the information and knowledge society. According to Supreme Decree No066-2011-PCM, which approved the “Plan for the Development of the Information Society in Peru. The Peruvian Digital Agenda 2.0,” which states that access to the Internet and TICs is a means to achieve fair and sustainable human development, allowing economic growth, job creation, increased competitiveness and social inclusion. Information is growing at a dizzying pace, data through social networks, blog publications, books, scientific articles, videos, etc. is indescribable, which is why we are now considering big data and information and knowledge management. Education in the 21st century must have a clear and forceful perspective in the progressive development of digital literacy and greater achievements in the levels of complexity in the systematization of information.

A training program is a set of systematic activities through which knowledge, and skills are acquired. Based on a needs assessment, a design is established, which must be covered in the program's execution and then its results are evaluated. Objective: Train and develop bilingual (Spanish and Quechua) digital competencies to managers and teachers at the initial, primary and secondary levels in using technological tools, TICs and management of academic information databases. Diagnosis: Managers and teachers show heterogeneous knowledge and development of digital competencies, which could be established in levels of initiation, process and achievement. There are teachers who have minimal knowledge about the computer or technological devices, have very basic mastery in using Office and the use of virtual platforms or educational software. Almost all the educational institutions are bilingual, except for school 30061 in the town of Unión Milagro (Ex Hacienda Palca), where only Quechua is spoken and written and there is no electricity. In this sense, there is an Andean worldview of the world and life that is centered on nature and the natural. Internet access is the entrance to the virtual and/or artificial world.

- b) Program design: It is included in the pedagogical proposal of the Ugel Surcubamba as part of the profile of the student of the EBR a person with digital skills and in connection with the information and knowledge society. A formative socio-cognitive approach focused on learning to learn and entrepreneurship. In all cycles and levels of Basic Education, the use of digital tools should be applied, promoting the contact and relationship of the rural Andean student with the world and where the planning of learning should safeguard at every moment the cultural identity of the students. The design includes the constant and permanent training of teachers integrally. Topics: Basic, intermediate and advanced Office; use of digital platforms such as Zoom, Google Meet, Google Drive, Google Classroom, Google Sites, Chamilo, Quizzis, Kahoot, Moodle, Socrative, Inshot, Powtoon, Moovly, Vylon, Explaindio. Teachers' Tools, social networks (Facebook, TikTok, Twitter, etc.), database management, emotional management and critical thinking.
- c) Program implementation: For the program to be implemented, the following conditions are required. Internet access with a moderate speed of 4 to 5 mbps that allows downloading files, uploading and downloading videos; technological equipment with good power and experienced teacher trainers. This condition implies that the respective budget for implementing digital inclusion policies through the Digital Inclusion Teacher Training Program has been included in the POI and the PIM. In this sense, the Management Proposal must understand the need to perform these policies, since leaving them aside would impoverish the quality of education. In today's world, being on the margins of ICTs, the use of digital tools and the management of databases that connect us with virtual libraries, scientific journals and academic and educational information leads to a self-absorbed and obsolete education. Teacher training and constant preparation should be a State policy through the Ministry of Education and its immediate operators, which are the Ugels. In this sense, during every month of the year, a schedule of continuous training in the development of digital competencies should be established. It is proposed that the main training should be developed in the facilities of the Ugel Surcubamba with the respective implementation and laboratories, then teachers should be visited from time to time in their respective educational institution to receive monitoring and feedback from the teacher trainers. The visit and the permanence of the teacher trainer or teacher strength are of vital importance for the achievement of digital competencies in teachers.
- d) Program Evaluation: Before the end of the year the Learning Achievement Day should be organized, where students should expose their products made with digital tools, as well as teachers should expose their achievements, especially in the presentation of contextualized products, in Quechua and Spanish.

CONCLUSIONS

Having the technological infrastructure for access to Internet connectivity through broadband, fiber optic, or satellite is not enough to meet the execution criteria of digital inclusion policies, but it is a necessary condition to overcome digital gaps. In the Local Education Management Unit (LEMU), there are no advances due to the rugged geography, which means a disproportion between supply and demand, that is, there would be a high investment in technological structure for so few beneficiaries. Therefore, the guidelines of Law No. 29904 on facilities for greater broadband and fiber optic coverage, Law No. 31207 that establishes the right to have a moderate-speed internet service, are not met.

Digital literacy includes the use of educational software in educational institutions but has limitations due to low connectivity, lack of electricity flow, and lack of training for teachers to use it. The need to use a mobile phone has allowed the use of social networks such as Facebook, Instagram, TikTok, and YouTube as a way of exercising the right as a digital citizen in a limited way. On the other hand, the proposals of Law No. 29904 art.23 and 24, which establish that the State promotes training for the development of digital competencies and benefits of broadband, are not met.

In the management of information and knowledge generation derived from Internet connection in the high Andean zone of study, internet access was limited, weak signal or no connectivity, lack of electricity, and only access to low-power solar panels. Public policies for digital inclusion must be rethought, which should include, together with internet access, a training program that integrates the use of digital tools and access to virtual libraries (academic databases).

Finally, the economic investment for access to digital technologies and broadband access should start with a dialogue among regional authorities, district, Ministry of Transportation and Communications, private companies, and non-governmental organizations. The report states that it is not coherent with current laws such as Law No. 29904 and Law No. 31207, which promote and sustain the legal conditions for broadband growth in rural areas and internet speed.

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