Digital accessibility: Sensitivity to the size of localities and socioeconomic strata in Mexico.

Accesibilidad digital: Sensibilidad al tamaño de localidades y los estratos en México.

Djamel Toudert
Department of Urban Studies and the Urban Environment.
El Colegio de la Frontera Norte.
toudert@colef.mx (MEXICO)

Received: 19.01.2022
Accepted: 01.04.2024

SUMMARY

Knowledge related to Internet skills and use makes it possible to provide a multidimensional approach to the digital divide and its socially and territorially segmented approach. As part of this academic effort, the search for an explanatory model of the appropriation of ICT allows us to perfect - among others - the theoretical approach of the phenomenon addressed from the perspective of the differences inherent to users and their socio-territorial contexts. This study aims to analyze the sensitivity of the multifaceted model of Internet access to the socioeconomic strata and size of the towns that make up the Mexican Republic. These interests will be examined using the method of analysis and validation of structural equations applied to the responses of 2,400 individuals selected from 21,620 people interviewed by the 2019 National Survey on Availability and Use of Information Technologies in Homes. Results confirm that Internet accessibility and use are higher-order multidimensional constructs in a multifaceted conceptual model of significant causal relationships. With these findings, conclusions are drawn that characterize constructs of differentiated sensitivity vis-à-vis the socioeconomic strata and the size of the localities. From this perspective, the segmentation of the ICT user by their socioeconomic conditions and territorial location continues to be relevant for the beneficial use of the Internet even with the intensification of accessibility to these tools and services.

KEYWORDS

Digital divide, multifaceted model, sensitivity of constructs, socioeconomic strata, size of localities.

RESUMEN

El conocimiento relativo a las habilidades y uso de Internet permite proporcionar un enfoque multidimensional de la brecha digital y su abordaje segmentado social y territorialmente. Como parte de este esfuerzo académico, la búsqueda de un modelo explicativo de la apropiación de las TIC permite perfeccionar -entre otros- la aproximación teórica del fenómeno abordado desde la perspectiva de las diferencias inherentes a los usuarios y sus contextos socioterritoriales. Este estudio, tiene el objetivo de analizar la sensibilidad del modelo multifacético de acceso a Internet a los estratos socioeconómicos y tamaño de las localidades que componen la república mexicana. Estos intereses se examinarán empleando el método de análisis y validación de las ecuaciones estructurales aplicado a las respuestas de 2,400 individuos seleccionados a partir de 21,620 personas entrevistadas por la Encuesta Nacional sobre Disponibilidad y Uso de las Tecnologías de la Información en los Hogares de 2019. Los resultados confirmen que la accesibilidad y el uso de Internet son constructos multidimensionales de orden superior en un modelo conceptual multifacético de relaciones causales significativas. Con estos hallazgos, se adelanten conclusiones que caractericen constructos de sensibilidad diferenciada vis a vis de los estratos socioeconómicos y el tamaño de las localidades. Bajo esta perspectiva, la segmentación del usuario de las TIC por sus condiciones socioeconómicas y de ubicación territorial siguen siendo pertinentes para el uso provechoso de la Internet aun con la intensificación de la accesibilidad a estas herramientas y servicios.

PALABRAS CLAVE

Brecha digital, modelo multifacético, sensibilidad de constructos, estratos socioeconómicos, tamaño de localidades.

1. INTRODUCTION

In recent six-year terms, the formulation of public policies to promote the availability of Internet service has been characterized by a renewed experience aimed at promoting universal access to the network. These initiatives have generally intervened in a dual environment: on the one hand, discourse on the

beneficial impact of the Internet has been stimulated, and on the other, stigmatization has been forged due to the delay in the socio-territorial appropriation of ICT and its corollary, the digital divide (Martínez Domínguez, 2020; Toudert, 2019).

From the point of view of public action, the approach to addressing the problem of the digital divide seems to come from a comprehensive framework that combines actions designed in an agglomeration logic and others based on sectoral strategies. In fact, the provision of Internet service in areas without a market, the promotion of quality accessibility and a consistent digital experience, are lines of action that usually adapt to planning based on the size of the localities (Levine, 2020; Pick et al., 2015). On the other hand, actions designed to develop Internet access and use skills seem more likely to emerge from sectoral planning in professional, educational and family environments (Büchi et al., 2016; Loh and Chib, 2021).

From this perspective, it is considered that the public effort to generalize Internet access is an insufficient action to close the digital divide, which not only affects access but also skills and effective use of the network. Thus, the digital divide is understood as an evolutionary problem that has progressed from the lack of artifacts and services to the inequality in the skills necessary to benefit from digital content (DiMaggio et al., 2004; Ghobadi and Ghobadi, 2015; Loh and Chib, 2021; In this sense, the need for exploratory studies that allow segmentation of targeted public policy instruments may be one of the aspects that facilitate the design of actions aimed at addressing different types of digital divides.

This study analyzes, in the case of frequent Internet users in Mexico, characterized by a daily practice of ICT, the sensitivity to the size of the localities and the socioeconomic strata of Internet accessibility, skills and access to the use of the network. Within the framework of this study, the question of the validity of the digital divide as a general concept is not addressed, but rather the causal interrelation between the different stages that constitute it is explored based on its theoretical formulation. The analysis was carried out using a hierarchical model of latent variables structured around the material accessibility to Internet artifacts and services and access to use that characterizes individual involvement in consultations and interactions on the network. These structural variables are formulated as a multidimensional synthesis of the digital divide for new corroboration in a nomological model more optimized compared to the proposal of Toudert (2019) and van Deursen and van Dijk (2015). As a whole, the research seeks to confirm the incidence of the level of agglomeration and socioeconomic status in the formation, at the individual level, of the determinants of the socioterritorial appropriation of ICT, such as availability, accessibility, skills for use and the beneficial use of Internet devices and services. From this perspective, the confrontation of the multifaceted model of Internet access with the levels of agglomeration and the socioeconomic positioning of the users allows the consolidation of the literature on the digital divide with the addition of these two parameters to the panoply of limitations

that have been identified. examined mainly in the aspect of the intersectionality (gender, age, education, job occupation, among others).

2. THEORETICAL FRAMEWORK

2.1. Multifaceted model of Internet access

The multifaceted model of Internet access was initially developed by van Deursen and van Dijk (2015) with the aim of establishing a step theory of the digital divide, which previously focused mainly on network availability (DiMaggio et al., 2004; Loh and Chib, 2021; van Deursen, van Dijk and Klooster, 2015). Later, multifaceted modeling was adopted in Latin America by Tirado-Morueta et al. (2017) in a study on Ecuador and Toudert (2019) for the case of Mexico.

The multifaceted model considers the digital divide within the framework of an appropriation of ICTs sustained by four incremental stages: motivation for Internet access, material access to the Internet, Internet access skills and, finally, access to use. of the Internet (van Deursen and van Dijk, 2015). The motivation for Internet access expresses, according to Loh and Chib (2021), an emotional and cognitive commitment to experiment with ICT artifacts and services. This commitment significantly affects the digital divide and is closely related to a need for appropriation that usually depends on the objective of using these technologies (Min, 2010; Toudert, 2016). Seen in this way, motivation appears at the base of the multifaceted model and intervenes, mainly, as a preliminary stage of the ICT appropriation process, for those who are about to start their digital experience (Toudert, 2019; van Dijk, 2012). In the case of frequent users who are the subjects of this study, the motivation stage was overcome by accessibility and use itself, therefore, it is discarded from the proposed conceptual modeling.

Internet accessibility characterizes a primary and basic stage in the appropriation of ICTs that is based on a user who has met the conditions of material access to the network and has a management experience that allows him or her to interact with the content consulted (Büchi et al., 2016; van Deursen and Solis Andrade, 2018). Material network access defines the incidence of the context of the consultation that depends on the equipment (or equipment) used to connect to the Internet and the place where the consultation takes place. In fact, several studies confirm that the type and quality of the content viewed is not the same on a computer as on a mobile phone (Loh and Chib, 2021; van Deursen and van Dijk, 2019), the school population that had exclusively The cellular artifact could not carry out the most important of its tasks during the COVID-19 confinement in Mexico (Toudert, 2022). In addition to the impact of the type of connectivity medium, everything seems to indicate that queries of interest are more likely to be made at home than at school or work, and personal experience with the Internet depends on the length of time the network has been used and the daily time that the user spends on their queries (Loh and Chib, 2021; Zhao et al., 2010). In fact, both seniority and time of dedication have been seen to

significantly influence the acquisition of skills that condition the management and interaction with Internet content (Büchi et al., 2016; Loh and Chib, 2021; Turgut and Kursun, 2020). The set of these theoretical-conceptual considerations leads the research to empirically corroborate the hypothesis that an increase in Internet accessibility, defined by the material conditions of access, the context of access and the digital experience, affects a significant increase in skills to access the Internet (H1).

Internet access skills define a transcendental stage of the digital divide, where the lack of knowledge and skills for the use of devices that allow access to the network converge, with the lack of capabilities to interact and assimilate digital content (Grošelj et al., 2021; Loh and Chib, 2021; Within the framework of the multifaceted approach, Internet access skills are translated through a multidimensional conceptualization. For Grošelj et al. (2021), these skills are expressed through operational, navigation, social and creative skills, while for Tirado-Morueta et al. (2017), these competencies are concentrated in a single operational dimension. Under these conditions, everything seems to indicate that the conceptualization of Internet access skills continues to be a dynamic task influenced by various aspects, such as the technological development of intermediation artifacts.

However, in a pragmatic approach oriented towards extensive evaluation, network access skills are formulated by van Deursen and van Dijk (2010) and van Dijk (2012) as a multidimensional construct forged by operational, formal, and informational skills. and strategic. Operational skills characterize the basic skills that allow Internet technology to be operated, formal skills focus on interaction with the hypermedia structure of the network, while informational skills are those that allow information needs to be satisfied, and strategic skills define the ability to use of the Internet to meet particular and general objectives that include social assumption (van Deursen and van Dijk, 2010; van Dijk, 2012).

Access to the use of the Internet constitutes the last stage of the appropriation of the network, which focuses on the type of uses, once there is access to the Internet (van Deursen and Solis Andrade, 2018; van Deursen and van Dijk , 2015). Regardless of the availability of access, several studies have documented that users do not enjoy the Internet in the same way. In fact, exclusion factors dictated, among others, by gender, demographic, social and economic aspects usually interfere with the use, which end up closing the access of some social categories to certain types of uses (van Deursen and Helsper, 2015; van Dijk , (2012); Yu et al., 2018). As an example, having scarce economic resources reduces the ability to make purchases and payments on the Internet, selectively obstructing commercial use and transactions that make up one of the dimensions of Internet access (Büchi et al., 2016, Toudert, 2019). The other uses, such as entertainment, which is usually the most open, exhibit different uses of training-updating and e-government that depend, among others, on age, educational level and degree of socio-political involvement. (Nandal and Singla, 2019, van Deursen et al., 2015).

From another perspective, the set of constructs addressed in the preceding paragraphs served as a basis for modeling that involved different causal interrelationships in previous studies. Internet accessibility was found to significantly impact Internet access skills in Ghobadi and Ghobadi (2015) and Tirado-Morueta et al. (2017) and Toudert (2019). Similarly, this accessibility to the Internet, which seems to govern the other stages of use, was also evidenced by its significant impact on the use of the network in Ghobadi and Ghobadi (2015) and Toudert (2019) and van Deursen and van Dijk (2015). Internet use was also found to be influenced by network access skills, which were evident as determinants in the use that users make of these devices and services (Ghobadi and Ghobadi, 2015; Tirado-Morueta et al., 2017; van Deursen and van Dijk, 2015). Considering the relevance of the background presented above, this study seeks to verify, within the Mexican framework of socioterritorial appropriation of ICT, the hypotheses that broader Internet accessibility leads to greater use of the network (H2), and that this effect is mediated by the increase in access skills that allow deeper use (H3).

2.2. Sensitivity of access, skills and use by socioeconomic stratum and size of localities

Regardless of whether there is a direct or indirect relationship between socioeconomic strata and the size of localities with the determinants of ICT appropriation, few studies have specifically referred to their impact on the different stages of the digital divide such as availability, accessibility and use. Regarding socioeconomic strata, the most common approaches have been developed through transversal and semantic concepts, as in the case of low income in Wong et al. (2015), classes and status in Lindblom and Räsänen (2017) and Eynon et al. (2018) and social differences in Büchi et al. (2016). This same situation is also observed with the incidence of the size of localities, which has been studied in relation to the availability of the Internet and, in a few cases, has referred to the contexts of accessibility, skills and use of the network (Pick et al. al., 2015).

Traditionally, certain suspicions have been cultivated that negatively imply positioning in the lower socioeconomic strata for adequate social appropriation of Internet artifacts and services. The unfavorable living conditions that usually accompany low income, a low educational level and poor digital habitability are seen as barriers to the appropriation of ICTs and even prone to the development of an attitude of rejection towards them (Eynon et al., 2018; Lindblom and Räsänen, 2017; Wong et al., 2015). However, manifestations that may exhibit social expressions of digital exclusion do not seem to translate in all cases into an equivalent digital divide with strong signs. Furthermore, it is evident that the socioeconomic position of users has a transversal impact on all dimensions of a digital divide that is both evolutionary and multifaceted. Its capacity to discriminate is such that it can even stimulate the regressive aspect of

transactionality defined by factors such as gender, age, educational level and professional occupation, among others (Eynon et al., 2018; Lindblom and Räsänen, 2017; Büchi et al., 2016; Yu et al., 2018). This socioeconomic influence can be so powerful that it redefines digital interactions and experiences, creating a feedback loop that can reinforce existing inequalities.

Yu et al. (2018) and Büchi et al. (2016) revealed that, beyond the socioeconomic context that identifies a specific social group, access, skills and use of ICT seem to depend largely on the sociodemographic profiling of the social group. From this perspective, gender, age, educational level and professional occupation are, among others, the determinants that seem to condition the use of ICTs (Büchi et al., 2016; van Deursen et al., 2015). In fact, belonging to an affluent socioeconomic group does not exempt its individuals from falling into exclusion from ICTs when they are, among others, women, elderly or have some limitation in developing skills for using the Internet (van Deursen and Helsper, 2015; van Dijk, 2012; Furthermore, this type of incidence induced by specific sociodemographic groups was found as a variable by countries, cultures and belonging to different levels of development (Eynon et al., 2018; Lindblom and Räsänen, 2017). However, beyond the effectiveness of the approaches that have been carried out in the semantic periphery of the socioeconomic strata, incorporating the strata proposal of the National Institute of Statistics and Geography (INEGI, 2019b) in an initial exploration can be useful. interest for both reflection and action.

Unlike socioeconomic strata, the size of localities was considered in Toudert (2019) to examine its mediation within the framework of a multifaceted model of Internet access. In this study, significant differences were evident between certain sizes of localities for the causal relationships H1, H2 and H3, which are identical to the hypotheses formulated in this present study. These findings generally confront differences between localities with a large population size with other smaller ones, reflecting structural oppositions between urban-metropolitan areas and others with a rural essence (Pick et al., 2015; Toudert, 2015, 2019; van Deursen and Solis Andrade, 2018).

The difference between large and small towns is integrally expressed through the availability of Internet in areas with reduced demand and the structural contrasts that affect the sociodemographic distribution of the population (Chen, 2013; Nandal and Singla, 2019). The relative scarcity of potential users of ICT tools and services in small and peripheral locations generally adds to the business refusal to provide services where there is no market. The low participation in the population of young students, middle-high tertiary workers, migrants and ethnic minorities, in addition to minimizing demand levels, also stimulates a refractory attitude towards Internet tools and services that seem unnecessary (Pick et al. , 2015; In these contexts, comparing the sensitivity of the constructs of the multifaceted model of Internet access to the different sizes of localities complements the knowledge obtained with previous studies on causal relationships.

3. DATA AND METHODOLOGY

3.1. Instrument and sampling

To carry out this study, publicly distributed microdata from the National Survey on Availability and Use of Information Technologies in Homes (ENDUTIH-2019) was used. This survey was prepared by the National Institute of Statistics and Geography (INEGI) from July 1 to August 23, 2019 (INEGI, 2019a). The questionnaire was applied in 24,003 homes to collect the responses of 21,620 people over 6 years of age, distributed in the urban and rural areas of the 32 states of the republic (INEGI, 2019a). This survey was characterized in the estimation of the sample size by a confidence level of 90%, a maximum relative error of 13.2% and a non-response rate of 15% (INEGI, 2019b).

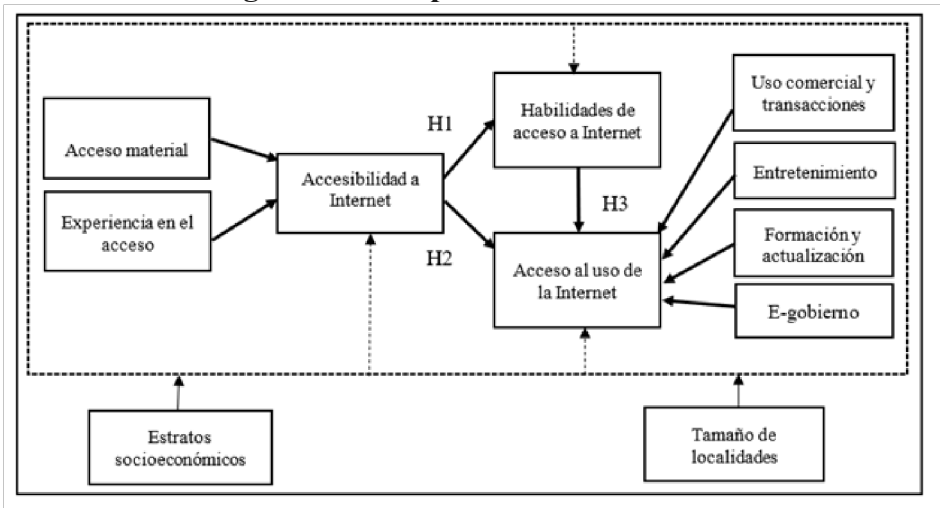
To prepare the study sample, those who stated that they used the Internet on a daily basis were selected first, representing 57.75% of the entire population interviewed by the survey. This selection is due to an approach based on a sufficient density of use to influence the different aspects of the research model shown in Figure 1. From this selected population, a second alternatively structured random selection was carried out with 400 subjects per each size of localities and socioeconomic stratum, adding up to 2,400 individuals in the end. This last selection has an operational motivation that seeks to maximize the conditions of algorithmic application of the partial least squares (PLS) structural method.

The research model of this study, shown in Figure 1, is structured, among others, by two second-order constructs: Internet accessibility and access to Internet use. These are reflective-formative constructs and, therefore, the repeated indicator approach was applied for the evaluation of this hierarchical model of latent variables (Becker et al., 2012). Similarly, to validate the sensitivity of the constructs of Internet accessibility, Internet access skills and access to Internet use induced by the size of the localities and socioeconomic strata, an evaluation based on the predictors was chosen. categorical with indicator variables (Russolillo and Lauro, 2011).

Both the segmentation of those interviewed by the four sizes of localities and by the four socioeconomic strata were prepared by INEGI and recorded directly with the data from the ENDUTIH-2019 survey (INEGI, 2019b). In effect, INEGI generates four socioeconomic strata, taking into consideration mainly variables of income, education, conditions and housing ownership to classify Mexican households based on their capacity to satisfy the needs of their members. These socioeconomic strata are characterized by four classes (low, medium-low, medium-high and high), in the same way, four classes also define the variable of the size of localities (1: 100,000 and more inhabitants, 2: 15,000 to 99,999 inhabitants, 3: 2,500 to 14,999 inhabitants, 4: less than 2500 inhabitants). Within the framework of this last characterization, the urban-rural demarcation point is placed by INEGI at 2,500 inhabitants (INEGI, 2019b).

Both the measurements and the scales used to characterize the latent variables and the study items are mentioned in table 6, they were taken from previous studies that used similar research models (Tirado-Morueta et al., 2017; Toudert, 2019; van Deursen and van Dijk, 2015).

Figure 1. Conceptual research model.



Source: self-made.

4. RESULTS

From the perspective of the analyzed sample, the target population is characterized by a gender distribution similar to that which predominated throughout the country during 2020 (INEGI, 2020). Approximately 78% of those interviewed range in age from 6 to 44 years, with 37% of them under 25 years of age. A little more than 50% have a high school and university education, levels that are generally associated with frequent use of ICTs. 54% of the sample are professionally employed and 67% of this population are dedicated to the work of employees and workers (see table 1).

Table 1. Sociodemographic characteristics of the analyzed sample

Gender	%	University	22.71
Men	47.46	Postgraduate	2.17%
Women	52.54	Others	1.13%
Age classes (in years)	%	**Occupation**	%
6 a 14	12.63	Retired or pensioner	4.56
15 a 24	24.75	Dedicated to the home	22.18
25 a 34	22.79	Student	9.62
35 a 44	17.71	Busy at work	54.18%*
45 a 64	18.92	Employee and worker	67.76
65 and over	3.21	Self-employed	24.91
Education level	%	Business owner	3.55
Primary	16.25	Unpaid worker	1.65
Secondary	29.96	Others	2.13
Preparatory	27.79	Target sampling size	2,400

* Employment rate in the total population.

Source: Own elaboration with data from INEGI (2019c).

To evaluate the validity and robustness of the research model, the guidelines recommended by Hair et al. were adopted. (2019) and Henseler et al. (2016), starting with the evaluation of the goodness of fit of the model followed by the measurement model and finally, with the validation of the structural model.

The evaluation of the fit of the second-order model exhibits the discrepancies d_G andd_{ULS} below the current model at a 95% level and a standardized root square residual (SRMR) null value less than the accepted limit of 0.08 for adequate fit (Henseler et al., 2016; Hu and Bentler, 1999).

The evaluation of the measurement model reveals load figures in Table 2 that are very close to or higher than the value of 0.7 recommended by Hair et al. (2019). The reliability of internal consistency was validated through composite reliability (CR), exhibiting values rated from satisfactory to good by Diamantopoulos et al. (2012). The variance inflation factors (VIF) are in all cases less than 3, ruling out the drawbacks of multicollinearity (Henseler et al., 2016). Convergent validity was evaluated with the average variance extracted (AVE), which is shown in Table 3 at figures greater than 0.5 (Fornell and Larcker, 1981), while discriminant validity was validated with the heterotrait-

monotrait correlation ratio (HTMT) that indicates values less than one that reflect adequate discrimination between factors (Henseler et al., 2016).

Table 2. Reliability of the items involved in the model

Constructs / Variables	Loads	Valor T	VIF	CR*	R_2
Internet accessibility (second order construct)			1.197	0.813	
Material access to the Internet			1.335	0.826	
Equipment used	0.838	135.327			
Internet access location	0.839	139.078			
Access experience			1.329	0.793	
Antiquity in the use of the Internet	0.785	88.134			
Daily usage time	0.835	136.67			
Internet use (second order construct)			1.11	0.765	0.529
Commercial use and transactions			1.127	0.772	
Online payments	0.707	13.704			
Online purchases	0.758	30.933			
Online shopping frequency	0.732	20.767			
Online payment frequency	0.718	16.447			
Entertainment			1.144	0.802	
General information search	0.775	75.959			
Entreteinment activities	0.773	73.152			
Communication	0.726	61.14			
Training and updating			1.206	0.804	
Training and school support	0.827	69.78			
Professional training	0.812	59.163			
E-government			1.272	0.799	

Interaction with the government	0.744	16.865			
Procedures and requests	0.883	40.946			
Internet access skills			1.261	0.87	0.454
Operational skills	0.854	80.805			
Formal skills	0.876	92.837			
Informational skills	0.895	210.611			
Strategic skills	0.882	97.342			

*Variance inflation factor. **Composite reliability.

Source: Own elaboration based on the information analyzed by the study.

The evaluation of the structural model highlights, first of all, an adequate predictive power of the research model through the endogenous variables. This is evident in an R^2 showing moderate rates of variance explained by the constructs of Internet use (53%) and Internet use skills (45%) (Henseler et al., 2016). Next, we observed that all the hypotheses raised by the research model (H1, H2 and H3) and their total effects, which were evaluated with bootstrap of a resampling of 5,000, were significant with P<0.001 (see table 4). Likewise, all the relationships and their total effects between the first and second order constructs of the model were significant with P<0.001. The only two indirect effects recorded were generated by the relationships between the items of the Internet accessibility construct and Internet access skills, which also showed a significant link with P<0.01.

Table 3. Convergent and discriminant validity (AVE and HTMT)

Constructs	AVE*	(a)	(b)	(c)	(d)	(It is)	(f)
(a)	0.522						
(b)	0.666	0.219					
(c)	0.575	0.758	0.236				
(d)	0.657	0.611	0.204	0.701			
(It is)	0.672	0.596	0.342	0.681	0.554		
(f)	0.703	0.592	0.234	0.316	0.617	0.637	

(g)	0.769	0.745	0.342	0.54	0.786	0.768	0.705
(h)	0.559	0.256	0.341	0.353	0.523	0.304	0.388
(i)	0.535	0.749	0.692	0.608	0.694	0.559	0.605

*Average of the variance extracted. (a) Internet accessibility, (b) E-government, (c) Entertainment, (d) Access experience, (e) training and updating, (f) material Internet access, (g) Internet access skills , (h) Commercial use and transactions, (i) Internet use.

Source: Own elaboration based on the information analyzed by the study.

The sensitivity of the second-order constructs in our research model, which was induced by the size of the localities and socioeconomic strata, was evaluated using a bootstrap of 5,000 resamples. For this, the method of categorical predictors with indicator variables was applied (Russolillo and Lauro, 2011). The findings reveal that the Internet accessibility construct presents a significant sensitivity (P<0.001) in all the sizes of locations analyzed. Furthermore, the 'Internet use' construct shows a significant sensitivity (P<0.001) for type 3 localities (from 2,500 to 14,999 inhabitants), and the 'internet access skills' construct for type 4 localities (less than 2,500). population). Regarding the socioeconomic strata, the Internet accessibility construct shows significant sensitivity in all strata (P<0.001), while the Internet use construct only shows this sensitivity for stratum 3 (medium-high) with P<0.01 (see table 5).

Table 4. Level of significance of the hypotheses of the research model

Model hypothesis	Trajectory coefficients	T-statistic	Total effect	T-statistic
H1: Internet Accessibility -> Internet Access Skills	0.674	60.315***	0.674	60.315***
H2: Internet Accessibility -> Internet Use	0.123	6.041***	0.554	38.712***
H3: Internet access skills -> Internet use	0.639	33.905***	0.639	33.905***
First order relationships				
Access Experience -> Internet Accessibility	0.511	70.198***	0.511	70.198***
Material Internet Access -> Internet Accessibility	0.628	77.932***	0.628	77.932***
Commercial Use and Transactions -> Internet Use	0.459	12.899***	0.459	12.899***
Entertainment -> Internet Use	0.493	17.664***	0.493	17.664***
Training and updating -> Internet use	0.343	18.7***	0.343	18.7***

E-government -> Internet Use	0.236	10.111***	0.236	10.111***
material Internet access -> Internet access skills			0.423	47.128***
Access Experience -> Internet Access Skills			0.344	51.706***
Indirect effects				
Access Experience -> Internet Access Skills	0.344	51.706***		
Material Internet access -> Internet access skills	0.423	47.128***		

***P < 0.001.

Source: Own elaboration based on the information analyzed by the study.

Table 5. Results of the construct sensitivity analysis test.

Sensitivity of the model constructs to the size of the localities

Constructs	Size 1	T-Statistic	Size 2	T-Statistic	Size 3	T-Statistic	Size 4	T-statistic
accesbility to Internet	0.224	10.919***	0.067	3.376***	-0.109	5.574***	-0.182	9.767***
Acess skills to Internet	0.021	1.276	-0.004	0.248	0.019	1.31	-0.037	2.392**
Use of Internet	0.028	1.736	0.01	0.691	-0.028	2.235**	-0.009	0.793

Sensitivity of the model constructs to socioeconomic strata

Constructs	Stratum 1	T-statistic	Stratum 2	T-statistic	Stratum 3	T-statistic	Stratum 4	T-statistic
Accessibility to Internet	-0.219	12.212***	-0.103	5.204***	0.147	7.037***	0.249	12.62***
Access skills	0.002	0.145	-0.025	1.653	0.005	0.331	0.034	1.944

Use of Internet -0.025	1.934	-0.018	1.335	0.033	2.15**	0.02	1.11

**P<0.01, ***P<0.001.

Source: Own elaboration based on the information analyzed by the study.

Table 6. Constructs and items used in the research

Constructs / Variables	Variable generation mechanics
Internet accessibility (second order construct)	
Material access to the Internet	
Equipment used	Do you connect to the Internet through…? Add options for the devices used to connect.
Internet access location	Where have you used the Internet...? 4: Home, 3: Work, 3: School or educational institution tive, 2: Public site with cost, 3: Public site without cost, 2: Someone else's home, 2: Any place using a mobile connection, 1: Another place.
Access experience	
Antiquity in the use of the Internet	How long have you been using the Internet? 1: More than 2 and up to 5 years, 4: More than 5 years, 1: No Less than 1 year, 2: Between 1 and up to 2 years, 3: remember).
Daily usage time	How many hours a day do you use the Internet? Number of hours answered.
Internet use (second order construct)	
Commercial use and transactions	
Online payments	Are the payments you have made online...? Add the positive answers for all the options.
Online purchases	In the last twelve months, what have you bought online...? Add the positive answers for all the options.
Online shopping frequency	In the last twelve months, how often have you made purchases online? Reversing the order of the options asked and keeping the number of the option answered.

Online payment frequency	How often have you made payments online? Reversing the order of the options asked and keeping the number of the option answered.
Entertainment	Add the positive responses for all the options related to the use of artifacts and services to search for information.
General information search	

Constructs / Variables	Variable generation mechanics
Entertainment activities	Add up the positive responses for all the options related to the use of devices and services for entertainment activities.
Communication	
Training and updating	Add positive responses for all options related to the use of artifacts and services for training and updating activities.
Training and school support	Add up the positive responses for all the options related to the use of artifacts and services for school support activities.
Professional training	Add positive responses for all options related to the use of devices and services for professional training activities.
E-government	
Interaction with the government	Add positive responses for all options related to the use of artifacts and services for interaction activities with the government.
Procedures and requests	Add positive responses for all options related to the use of devices and services for procedures and requests to the government.
Internet access skills	
Operational skills	Add positive responses to the use of artifacts and services in activities that require operational skills.
Formal skills	Add positive responses to the use of artifacts and services in activities that require formal skills.
Informational skills	Add positive responses to the use of artifacts and services in activities that require information skills.
Strategic skills	Add positive responses to the use of artifacts and services in activities that require strategic skills.

Source: Own elaboration based on the information provided by INEGI (2019a).

5. DISCUSSION OF RESULTS

This work initially reveals the revalidation of the multidimensionality of the constructs Internet accessibility and access to Internet use, framed in a hierarchical model of latent variables. Compared to what was achieved in Toudert (2019), this new conceptual proposal suggests an optimized nomological integration. The material Internet access dimension (0.628) has a significant impact on Internet accessibility, only one decimal point greater than the access experience (0.511). This characterizes both dimensions as important for network access, as was evidenced by Büchi et al. (2016) and van Deursen and Solis Andrade (2018) (see table 4). This finding, in the case of frequent users in Mexico, seems to indicate that both the provision of material access to the network and the age and time of daily use are comparable variables for accessibility. In this sense, public policies focused exclusively on the provision of material connectivity to the Internet seem to be, as stated in Levine (2020), insufficient to achieve mass accessibility to the network on their own. The promotion of temporary appropriation of Internet use (seniority and daily use) is constituted as a central axis for reflection within the framework of policies for the generalization of Internet accessibility.

For the second-order construct access to Internet use, its four dimensions show a varied interaction among frequent users in Mexico. The dimensions of entertainment (0.493) and commerce and transactions (0.459) have a greater weight compared to training and updating (0.343), and the e-government interaction (0.236) is twice less than the most attractive activity. This pattern of use was corroborated in different contexts where entertainment and transactions prevail over personal development (van Deursen et al., 2015; van Deursen and van Dijk, 2013). These findings show sociodemographic characteristics of users that seem to stimulate specific uses of the network (Toudert, 2019). Büchi et al. (2016), who analyzed this type of incidents in New Zealand, Sweden, the United States, Switzerland and the United Kingdom, reported a significant dependence on age in the case of entertainment, while the latter is less influenced by the female gender.

Along the same lines, educational level, professional dedication as an employee and experience of use were found as predictors of use for commercial transactions. Büchi et al. (2016) also clarify that these observed incidences are not identical in all the countries analyzed, which showed nuances and even significant differences. Regarding the activities of lesser use, training and updating is sensitive, as stated in Tirado-Morueta et al., (2017), to the Ecuadorian student population aged 16 to 18, to the family's income level, the

level of education of the parents and, above all, the availability of operational skills in young people.

In our case study, the total student population represents close to 10% of frequent Internet users, which would leave a significant proportion of Internet users out of interests related to online training and updating (INEGI, 2019c). This last unschooled population would be prone to the development of activities influenced, in its employed segment (54%) by employment and self-employment, highlighting a level of education that seems clearly higher than the rates observed in the general population (See table 1). Together, these characteristics tend to favor uses aimed at entertainment and commercial transactions, while in the case of the adoption of E-government they seem to have a negative impact, as stated in Nandal and Singla (2019), the low educational level and the residence in rural contexts. However, it is crucial to emphasize that the available evidence indicates contextual variations that are probably originated from sociocultural differences and/or developmental conditions (Büchi et al., 2016; Tirado-Morueta et al., 2017; Toudert, 2019). This situation raises, of course, guidelines for future research that allow conclusions to be validated in one sense or another.

The research model proposed for this study revealed a high significance for all its causal relationships (H1, H2 and H3), confirming the solidity of the nomological approach together with the variants that have been implemented in previous works (Tirado-Morueta et al., 2017; In fact, the proposed model manages to substantially explain both Internet access skills and use, which brings it increasingly closer to the conditions of empirical confirmation. In this exploratory trajectory, the impact of material access to the Internet on access skills and the incidence of both on Internet use was confirmed (Toudert, 2019; van Deursen and van Dijk, 2013; van Deursen and van Dijk, 2015). . However, as in the study by Toudert (2019) and to a lesser extent in van Deursen and van Dijk (2015), the weight of the impact of access skills on Internet use is five times more important than the incidence of material access in the same construct. For Mexican frequent users, these impact levels suggest Internet use explained mainly by digital competencies, which, in turn, are defined to some extent by material access to the Internet. This finding is transcendental to enhance public policies that seek to reduce the digital divide through strategies focused on the provision of Internet service, such as the Telecommunications and Internet for All initiative led by the Federal Electricity Commission (CFE) of the federal government. (SCT, 2020).

However, these initiatives, like many others, seem to focus exclusively on the provision of Internet service rather than offering comprehensive alternatives for the social appropriation of ICTs through their use. From this perspective, in addition to the provision of the service, it is necessary to stimulate the development of digital skills that expand the possibilities of using the network (Correa Pavez and Contreras, 2018; Martínez Domínguez, 2020). Thus, providing quality accessibility conditions (equipment and access location) and favorable contexts for the development of a digital experience (age and time of

daily use) that come to structure a strategy with the possibility of translating into concrete goals and actions.

In addition to confirming the causal relationships of the research model, this study focused on investigating the sensitivity of the analyzed constructs with respect to socioeconomic strata and the size of the localities. In a previous study, Toudert (2019) analyzed the incidence of locality size in causal relationships similar to those used in this work, showing significant differences ($P<0.10$) between some agglomeration sizes. In general terms, the causal relationships were characterized by different impacts when comparing users who live in localities with a small population size with others from larger agglomerations. These disparate behaviors generally find their explanation in differences in the provision of Internet service and in the sociodemographic composition that prevail in urban or increasingly urban agglomerations, in contrast to those dominated by rural features (van Deursen and Solis Andrade, 2018; Pick et al., 2015;

In the present work, the focus was on the sensitivity of the constructs of the research model to the size of the localities and socioeconomic strata. Regarding the incidence of the agglomeration effect, the Internet accessibility construct showed significant sensitivity in all types of locations (see Table 5). This finding highlights an accessibility to the Internet that differs from the availability of the network, something that often stands out in agglomerations with a small population. As mentioned in Gladkova and Ragnedda (2019) and van Deursen and Helsper (2015), the lack of accessibility widens the digital divide beyond the availability of the network, towards other deficiencies such as the availability of equipment, the place of access, the age and duration of daily use. According to the results of the ENDUTIH-2019 survey (INEGI, 2019c), these shortcomings are evident both in large agglomerations with Internet access and in rural towns that still lack the service. In these contexts, marked by unfavorable Internet accessibility conditions, public policies that focus mainly on the provision of the service, such as those mentioned in previous paragraphs, are insufficient to achieve the digital empowerment of marginalized populations, as stated in the Ministry of Communications and Transportation (SCT, 2020).

Regarding the construct of network access skills, a significant sensitivity is observed only in localities with less than 2,500 inhabitants, where 81.13% of inhabited homes lack fixed Internet service in 2020 and the available accessibility is generated exclusively through the mobile phone (INEGI, 2019c, 2020). The exception of localities with less than 2,500 inhabitants is probably due to structural conditions characterized by the extreme scarcity of fixed Internet and the interaction with artifacts that are not conducive to the development of this type of skills (Toudert, 2019; Gladkova and Ragnedda, 2019). . These skills are often developed more efficiently with media such as computers, which allow a higher level of interaction with online content (Loh and Chib, 2021).

From the perspective of Internet use, a significant sensitivity is observed in this construct only in localities classified as type 3, which have a population

ranging between 2,500 and 14,999 inhabitants. These areas are home to approximately 18.89% of the country's total population in 2020 and experienced a notable growth of 16.17% over the last decade. According to INEGI data, in the 2010 and 2020 censuses, these localities have twice as many inhabited homes without Internet access compared to the largest urban areas, with more than one million inhabitants. Furthermore, INEGI (2019c) interviewees who reside in type 3 localities belong to 90% of low or medium-low socioeconomic strata, which represents a significant decrease compared to those who live in areas with less than 2,500 inhabitants.

However, when it comes to Internet adoption, differences between types of agglomerations can be explained by both structural and contextual factors. The former include the lack of network infrastructure and rapid growth in marginalized areas, while the latter are related to obstacles to the development of digital skills, as Correa et al point out. (2018) and Yu et al. (2018). It is important to note that these explanations are hypotheses that require future comparative and dedicated research.

When considering all the findings related to the sensitivity of the constructs of the research model, a clear influence of both the size of the localities and the socioeconomic strata on Internet access is observed. In this specific context, the size of the agglomeration seems to play a crucial role, with significant variations in the structuring of the constructs of material Internet access and development of experience in access, as defined in previous studies (van Deursen and Helsper , 2015; van Deursen and Solis Andrade, 2018). For other constructs in the research model, the influence of agglomeration levels and socioeconomic strata seems to follow a similar pattern in most cases, with circumstantial exceptions. In fact, Internet access and use skills are more impacted by the immediate sociodemographic context, as well as by the family and professional environment of the users, as indicated by Grošelj et al. (2021) and Yu et al. (2018).

6. CONCLUSIONS

The results of this research confirm the validity of the proposed research model and the nomological relevance of its hierarchical and multidimensional structure. It is highlighted that both material access to the Internet and experience in access play important roles in network accessibility. On the other hand, Internet use is mainly dominated by entertainment activities and commercial transactions, in contrast to activities dedicated to training, updating and interaction with electronic government. These findings underscore that the digital divide is not limited solely to lack of access to Internet service. To promote access to the benefits of the Internet, public policies must complement the provision of the service with strategies to develop both material access and the skills that influence the type of use.

From another perspective, this study reveals a significant sensitivity of the construct of Internet accessibility in all sizes of localities and socioeconomic strata. This indicates that the problem of Internet accessibility is not exclusively linked to areas with low population density or lower socioeconomic strata, as is often assumed in public policies aimed at improving Internet adoption. On the contrary, with some exceptions, Internet access and use skills show a generally uniform distribution according to the size of the agglomeration and the socioeconomic stratum.

Considering these findings, improving Internet accessibility could be addressed more effectively through public policies focused on the logic of agglomeration, while skills development and network use could benefit from a more sectoral approach. In this regard, an incentive policy such as a flat rate is contemplated, aimed at improving mobile or satellite accessibility in areas of low population density, benefiting especially the most modest socioeconomic sectors. At the same time, to promote the development of specific digital skills, it is advisable to act within the scope of socioeconomic activities that demand specific skills, preferably through tutorial programs and intermediation platforms.

Like other studies on the digital divide, this work highlights the need for a phased and comprehensive appropriation of ICT, which cannot be resolved solely through the availability of Internet service, which continues to be the main focus of many current public policies aimed at to address this problem.

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