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Original Research Paper

Geography

DIGITAL INCLUSION AND YOUTH PARTICIPATION IN URBAN GOVERNANCE IN SUB-SAHARAN AFRICA: THE CASE OF SAINT-LOUIS, SENEGAL

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ABSTRACT This article investigates the influence of digital technologies on youth participation in urban governance within the Global South, with a specific focus on Saint-Louis, Senegal. Rapid urbanization in developing countries has intensified the need for inclusive governance, especially as youth constitute a significant portion of the urban population. This study examines how access to digital tools such as smartphones, internet connectivity, and social media shapes youth engagement in local decision-making processes. A mixed-methods approach was employed, involving a sample of 549 youth, of whom 55% were under the age of 20. Quantitative surveys with youth were complemented by qualitative interviews with key local governance actors and spatial mapping of digital infrastructure. The findings reveal substantial disparities in digital access and planning across neighborhoods. While 90% of the Northern districts and Guet Ndar exhibit high levels of digital infrastructure and urban planning, areas like Bango (65%) and Pikine (50%) remain predominantly informal and under-resourced. Notably, digital connectivity in Guet Ndar is overwhelmingly mobile-based (83%), highlighting the centrality of mobile data as the primary access point. However, local government initiatives to enhance digital inclusion remain limited, with only 4% of respondents identifying concrete efforts by municipal authorities. The study underscores the urgent need to address infrastructural gaps and to foster participatory governance frameworks that enable meaningful youth inclusion. It advocates for targeted policy interventions to create a more equitable digital environment, enhancing civic engagement and governance outcomes in rapidly urbanizing contexts. By situating the case of Saint-Louis within broader Sub-Saharan dynamics, the article offers insights into how digital inclusion can act as a lever for sustainable urban governance in the Global South.

KEYWORDS : Digital technology, Youth, Urban governance, Citizen participation, Saint-Louis

INTRODUCTION

In Africa, internet usage, predominantly mobile, has exploded over the past two decades. Located in the northwest of Senegal, Saint-Louis is a historic city listed as a UNESCO World Heritage site since 2000. Formerly the capital of French West Africa, it occupies a strategic position along the Senegal River and faces socio-economic challenges, including rapid urbanization, land management, and poverty, which particularly affects the youth (Ndiaye, 2018). With a predominantly young population (60% under 30), Saint-Louis embodies the challenges faced by Southern cities in managing urban youth (Ndione, 2017).

Over 50% of Senegalese have access to the internet (ITU, 2020), although disparities persist between urban and rural areas, as well as according to income levels. In Saint-Louis, these technologies provide a means for young people to organize and express their opinions despite limited access. Approximately 35% of youth do not have regular internet access due to high costs or infrastructure issues (Diagne, 2021). Structural challenges such as high unemployment, food insecurity, and lack of infrastructure exacerbate the social exclusion of youth, who struggle to access public services and decision-making processes. Often marginalized and ignored, these young people turn to social media and digital technologies to participate and make their voices heard. Information and Communication Technologies (ICT) offer an opportunity to overcome barriers to citizen participation. Castells (2012) and Jensen (2015) indicate that ICTs enable decentralization of information and facilitate direct participation in contexts where traditional channels are limited. The question of youth participation in governance is central to inclusive governance. Furlong (2017) emphasizes that their involvement is crucial for the sustainability of participatory governance. However, in many cities in developing countries, young people are often perceived as passive, limiting their influence (Thomson & Tapscott, 2018). In Saint-Louis, youth are frequently excluded from formal

decision-making, and this marginalization is reinforced by traditional hierarchical structures that prioritize elders or local elites in certain neighborhoods. In response, young people use social media as an alternative to mobilize around issues of urban planning, employment, sports, and the environment. An example of this is the "sama goh sama yité" initiative in Balacoste. Saint-Louis serves as a relevant case study for examining the dynamics of political participation due to its history as a colonial capital and a site of civic resistance. Although not a megacity, it shares similar challenges regarding urban growth and social inclusion (Awuah, 2016). The city presents an interesting contrast between tradition and modernity, with an educated, connected youth aspiring to more inclusive forms of governance (Gueye, 2020). Furthermore, digital tools could play a crucial role in participatory governance. Fung (2015) highlights that these platforms allow youth to express themselves and interact with decision-makers. However, their effectiveness in Saint-Louis is limited by challenges such as the lack of coordination between digital initiatives and formal governance channels, as well as the digital divide, which still excludes many young people from online processes. This article aims to address the following questions: How does access to digital technologies influence youth involvement in urban governance in Saint-Louis? What are the specific barriers and opportunities they face in using these technologies to influence local decision-making? The main objective is to analyze how young people in Saint-Louis use digital technologies to participate in urban governance processes. Furthermore, the study seeks to identify the main obstacles they face and propose solutions to overcome these challenges.

MATERIALS AND METHODS

The following sections will present the study area, survey data collection techniques, and mapping methods.

Saint-Louis, a laboratory of decentralization, but vulnerable to the digital divide

Located in the northwest of Senegal, Saint-Louis is a historic city at the crossroads of West Africa, benefiting from a geostrategic position that fosters its economic development, notably through fishing, tourism, and regional trade. However, this former colonial capital, although a laboratory of decentralization in Senegal, faces major challenges. Saint-Louis is under pressure on its urban services. The city is characterized by significant socio-spatial diversity, including relatively well-equipped residential areas, densely populated popular districts, and fishing neighborhoods such as Guet Ndar, where economic activity is tied to the river (figure 01). This composition creates diverse needs, which local governance struggles to address in a balanced manner. The digital divide exacerbates these inequalities. Approximately 40% of young people do not have regular internet access, a constraint that limits their inclusion in the participatory processes that decentralization could promote. The lack of digital infrastructure in certain popular and fishing neighborhoods weakens access to economic and educational opportunities, amplifying social disparities. Thus, despite decentralization efforts, Saint-Louis remains marked by disparities that hinder the integration and development of its youth.

Figure 1: Location of study districts (source: UGB field survey, 2024)

A Methodology Based On Survey Data Collection And Mapping

The stratified random sampling method with two modalities was used to select a sample of 549 young individuals based on gender (M/F) and age (18 to 24 years). The number of respondents per neighborhood is closely linked to the demographics and the number of households in the neighborhoods: Pikine 274, Goxu mbaac 110, Guet Ndar 48, Ndiolofène 47, Bango 40, Nord 16, Cité Vauvert 14 (Figure 02).

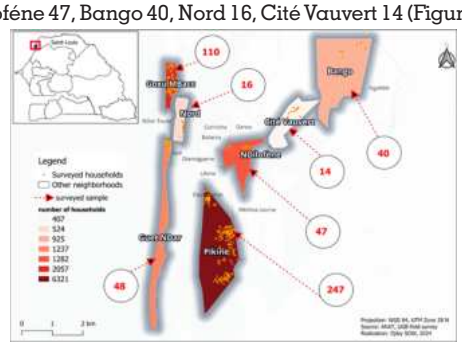

Figure 2: Distribution of the number of people surveyed in the districts of Saint-Louis (source: UGB field survey, 2024)

In the context of this study, the methodology is mainly summarized in three phases: documentation, data collection, and data processing.

Social science research tools and techniques are used through questionnaires, individual or group meetings. The questionnaires collected information related to the knowledge of the eco-geographical and socio-economic environments of Saint-Louis. Social surveys on the various stakeholders involved (young girls and boys aged 18 to 24, neighborhood delegates, municipal secretaries, youth associations, digital entrepreneurs, etc.) were conducted to understand the digital issues, policies, and infrastructure in the city of Saint-Louis. Observation and immersion were also very useful in this type of research field. This allowed for a better appreciation of the digital footprint of young people according to neighborhoods and its challenges, thus adopting a multiscale approach integrating tools from geomatics, geography, and sociology.

Mapping, carried out using QGIS, allowed for the spatialization of some of the collected data. Young people were involved in the collection of geographical data to identify available digital infrastructures, as well as areas where access is limited or non-existent. This approach made it possible to visualize spatial disparities in access to digital technologies in the different neighborhoods of Saint-Louis.

The maps produced then served as a support to better understand the geographical barriers that hinder the involvement of young people in urban governance through digital technologies, especially in peripheral neighborhoods where infrastructures are often less developed. For processing, it will be a question of analyzing the various data collected during the survey using relative values. The data will be cleaned and analyzed using SPSS version 20 software, and the graphs will be made with Excel 2020. We will mainly focus on calculating the different indicators in the questionnaire axes (ages, genders, type of neighborhoods, level of urbanization, digital equipment, access and use of digital tools, youth participation in governance) and their modes of graphical representations, tables, smart-Art.

RESULTS AND DISCUSSIONS

Youth As Key Drivers Of ICT In Saint-Louis

The predominance of this age group in the survey is significant as it highlights their ease and familiarity with digital technologies, skills that become essential assets for urban governance. In a context of digital transformation, young people not only possess technical knowledge but also the ability to quickly adapt to new technologies. They are thus best placed to promote and adopt digital tools within the community, facilitating access to information, citizen participation, and the development of innovative solutions.

The DigiSen survey reveals interesting results about young people under 20 in Saint-Louis, with 55% of participants in this age group. Among them, 18-year-olds are the most represented (22%), followed by 19-year-olds (18%) and 20-year-olds (15%).(Figure 06) These figures not only show a strong presence of young people in the use of digital tools but also a particular engagement of 18-20-year-olds, who are at a turning point between adolescence and adulthood, which enhances their potential as agents of change. This young generation represents a pool of skills and a force for change in the digital transformation of Saint-Louis. They can not only contribute to modernizing urban governance but also positively influence practices and community engagement in Saint-Louis.

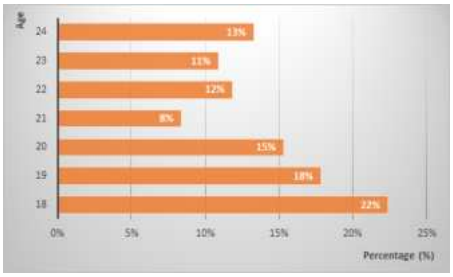

Figure 3: Age distribution of young people in Saint-Louis (source: UGB field survey, 2024)

When Socio-spatial Disparities Inhibit The Emergence Of Neighborhoods

The level of urbanization was measured in three modalities: Well-Developed, Well-Planned, and Spontaneous. Generally, the neighborhoods are relatively well urbanized. Specifically, trends reveal that Nord and Guet Ndar remain the best-planned neighborhoods with scores above 90%. In the Bango neighborhood, 65% of respondents indicate that the neighborhood is spontaneous. This trend (50% spontaneous) is also noted in Pikine. This latter neighborhood shows a dichotomy in the level of urbanization. A significant portion (49%) is well-established (Figure 04). This situation creates a rather hybrid living environment where popular and informal initiatives disrupt the living conditions. Furthermore, the DigiSen survey reveals a complex link between neighborhood urbanization, spatial disparities, and the use of digital tools in the city. Across the neighborhoods of Guet Ndar, Ndiolofène, Pikine, Goxo Mbaac, Cité Vauvert, Nord, and Bango, trends show that varying levels of urbanization influence spatial organization and access to digital technology. This contrast indicates a living space where informal initiatives and organized infrastructures coexist, creating a form of heterogeneous urbanization. This variability in levels of urbanization creates a living environment where planning and community initiatives meet, influencing living conditions.

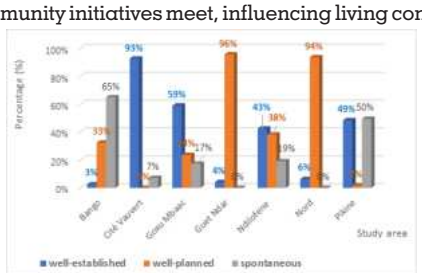

Figure 4: Diagnosis of the level of urbanization in Saint-Louis (source: UGB field survey, 2024)

Cross-analysis Of Spatial Disparities And Access To Digital Tools

The study reveals that levels of urbanization and planning do not significantly influence access to public services via digital tools, particularly in well-planned neighborhoods like Nord and Cité Vauvert, where access reaches 100%. These areas, being better organized, benefit from superior network coverage, which facilitates access to information and communication technologies. However, the awareness of digital administrative procedures remains limited in this secondary city of the country. Conversely, neighborhoods such as Bango (63%) and certain areas like Goxu Mbaac (27%) and Pikine (25%), where urbanization is largely spontaneous, likely face greater challenges in terms of digital infrastructure (Figure 5).

The findings reveal a significant correlation between urbanization, spatial disparities, and the use of digital tools in the studied neighborhoods. The coexistence of planned and spontaneous spaces, as seen in Pikine, highlights the challenges for urban infrastructure and digital access. Improved urban planning could promote greater digital inclusion, particularly in spontaneous neighborhoods like Bango, helping to reduce digital disparities.

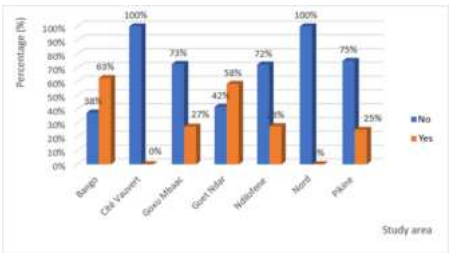

Figure 5: Does digital technology allow you to access public services? (source: UGB field survey, 2024)

The Equipment Index In The Digital Footprint Of Neighborhoods

The equipment index in the digital status of neighborhoods in Saint-Louis is a critical indicator reflecting the state of digital infrastructure and its accessibility across various areas. This index evaluates residents' ability to access essential digital services, such as high-speed Internet, computing devices, and communication technologies. The map below illustrates the strong correlation between the level of equipment, services, and access to digital tools within neighborhoods.

This disparity highlights the unequal distribution of the digital footprint among young people, influenced by differences in living standards, education, and socialization. Neighborhoods with better access to BTS antennas (such as Ndiolofène, Balacos, and Nord) and socio-economic infrastructure (like the Sor market) exhibit a stronger digital footprint.

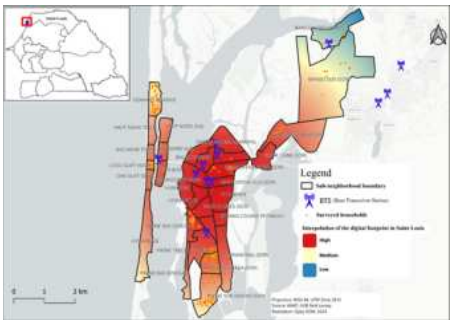

Figure 6: The equipment index in the digital footprint of neighborhoods (source: UGB field survey, 2024)

The analysis of the correlation between urbanization, equipment levels, and digital challenges in the neighborhoods of Ndiolofène, Bango, Guet Ndar, Pikine, Cité Vauvert, Nord, and Goxo Mbaac reveals significant disparities.

The Nord and Guet Ndar neighborhoods stand out with a 100% equipment level, indicating optimal digital infrastructure and widespread access to services. Conversely, neighborhoods such as Cité Vauvert (93%), Bango (68%), Goxo Mbaac (65%), and Pikine (64%) demonstrate less satisfactory equipment levels, underscoring inequalities in access to digital technologies. Although partially urbanized, these areas suffer from insufficient digital infrastructure.

Despite its strategic geographical location and economic significance, Ndiolofène shows an equipment level of only 49%, highlighting limited access to digital services (Figure 07). This observation underscores the connectivity and information access challenges faced by residents of these neighborhoods.

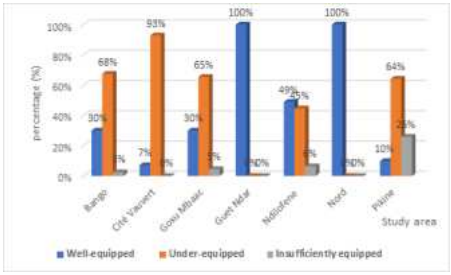

Figure 7: Assessment of the equipment level in the neighborhoods of Saint-Louis (source: UGB field survey, 2024)

Diagnosis of Integration and Interconnection Levels in Saint-Louis Neighborhoods

The neighborhoods of Saint-Louis exhibit varying levels of perceived integration, influenced by equipment availability and urbanization. For Bango (85%), Goxu Mbaac (53%), and Pikine (45%), integration is considered moderate. Without new initiatives, their integration could stagnate; however, additional infrastructure investments would enhance their attractiveness (Figure 08).

On the other hand, business-oriented neighborhoods such as Nord (100%), Cité Vauvert (86%), Guet Ndar (79%), and Ndiolofène (51%) with their wide range of services are likely to remain dominant in terms of perceived integration. Nonetheless, rapid growth in these areas could exacerbate existing disparities.

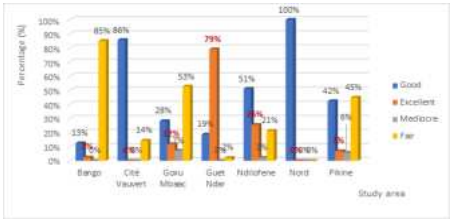

Figure 8: Perception of neighborhood integration in the urban governance of Saint-Louis (source: UGB field survey, 2024)

Today, urban planning aimed at fostering urban diversity and distributing essential services (schools, sports facilities) across different neighborhoods could help balance perceptions of integration. Community initiatives, such as cultural events like the Jazz Festival, the DigiSen project exhibition day, fairs, and FIARA, could further strengthen interconnections between neighborhoods.

In summary, a strategy combining accessible infrastructure, equitable service distribution, and community-driven initiatives could significantly enhance the perceived integration among Saint-Louis neighborhoods.

In Saint-Louis, mobile data is the primary source of internet connectivity, used in 53% of cases, peaking at 71% in the fishing district of Guet Ndar, where residents' mobility plays a key role (Figure 9). According to Senegal's Agence de Régulation des Télécommunications et des Postes (ARTP), approximately 70% of the population subscribed to mobile telephony services in 2022. This reflects a global trend of high reliance on mobile data due to its flexibility. However, with the enhancement of digital infrastructure, such as Wi-Fi and fiber optics, certain neighborhoods could soon shift toward more stable and faster connections. To improve internet access, several actions are required: Strengthening fiber optic infrastructure

Expanding fiber optic networks in residential and economic zones is crucial to reduce the dependence on mobile data. ARTP reports that fiber optic connections can offer speeds of up to 1 Gbps, far exceeding the typical 20–30 Mbps of mobile data. Developing public and private wi-fi networks Increasing the availability of public and private Wi-Fi networks could alleviate the burden on mobile data and enhance overall connectivity. Implementing Inclusive Digital Policies Subsidizing the installation of digital technologies in under-connected areas is vital to bridging the digital divide.

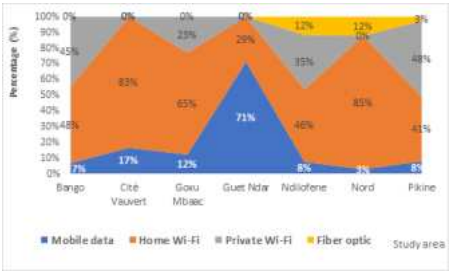

Figure 9: Scores of connection sources in the study neighborhoods of Saint-Louis (source: UGB field survey, 2024)

Investments in these areas, supported by targeted policies, would diversify connection options while improving internet access quality for all Saint-Louis residents.

Field surveys reveal alarming findings about the impact of Saint-Louis City Hall's initiatives on access to digital infrastructure. Despite theoretical efforts to enhance internet access, the data shows a near absence of tangible actions, leaving many areas increasingly affected by the digital divide. For example, only 4% of respondents in Guet Ndar, 3% in Nord, 2% in Ndiolofène, 1% in Pikine, and none in other neighborhoods reported benefiting from concrete municipal initiatives. These figures highlight a significant gap in the strategy to ensure equal internet access, essential for youth and community digital development. In contrast, the overwhelming majority of respondents reported no visible municipal actions. For instance: Guet Ndar: 90% of residents observed no initiatives. Goxo Mbaac: 65% reported no action. Pikine and Cité Vauvert: 50% reported no action. Bango and Ndiolofène: 43% reported no action (figure 10). This lack of visibility and impact exacerbates the digital divide, limiting development opportunities for young people in these neighborhoods.

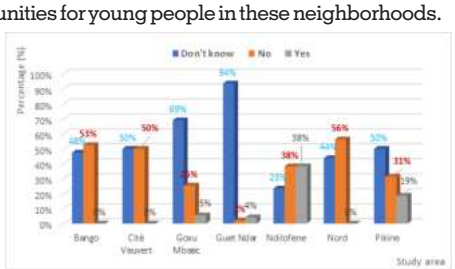

Figure 10: Presence of initiatives implemented by operators (source: UGB field survey, 2024)

The frequency of digital tool usage in Saint-Louis varies significantly by neighborhood, revealing stark disparities. Cité Vauvert and Nord lead with a 100% daily usage rate, followed by Goxu Mbaac (71%) and Ndioloféne (60%), indicating good accessibility and likely familiarity with digital tools. In contrast, Bango reports no daily usage (0%) but a high rate of multiple weekly uses (98%), comparable to Guet Ndar (100%). This pattern suggests restricted access or differentiated digital habits in these areas. Low rates of usage, such as those observed in Bango (3%), Pikine (2%), and Ndioloféne (9%), point to barriers in accessing technologies or a lack of digital adoption (figure 11). These trends highlight how infrastructure, socio-economic factors, and the specific needs of each neighborhood significantly influence usage frequency.

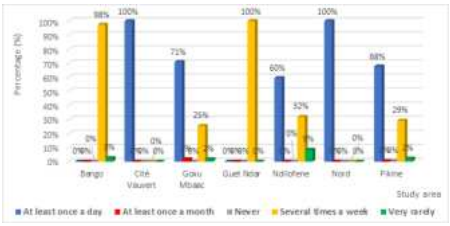

Figure 11: Frequency of digital tools usage in the city of Saint-Louis (source: UGB field survey, 2024)

DISCUSSION

The results of the study on the use of digital tools in Saint-Louis are part of a similar dynamic to other works exploring the interactions between spatial disparities, urbanization and access to technologies. For example, Pick and Sarkar (2015) highlight how digital infrastructure and the distribution of resources influence social and economic integration in developing cities. In Saint-Louis, neighborhoods such as Nord and Cité Vauvert, with 100% daily access, illustrate the benefits of structured urban planning on technology adoption. This observation is reinforced by Castells ' theory (1996), which links digital connectivity to urban competitiveness in the information economy.

Conversely, spontaneous areas, such as Bango or Pikine, show similar barriers to those observed in studies on digital divides in sub-Saharan Africa (James, 2021). High rates of sporadic use (3% in Bango, 2% in Pikine) reveal limitations in infrastructure and technological appropriation. This reflects a global dynamic where spatial inequalities exacerbate the digital divide.

Finally, the role of young people, especially those aged 18 to 20, as key actors in digital transformation, is consistent with the findings of Helsper and Van Deursen (2017), who show that this age group is the most proactive in integrating ICTs in emerging urban contexts.

To reduce the gaps, policies combining infrastructure investments and community digital training, as suggested by ITU (2022), are essential. For example, according to recent data from the Agence de Régulation des Télécommunications et des Postes (ARTP), 4G coverage in Saint-Louis remains below 50% in these areas, compared to over 85% in the city centre.

This lack of digital access undermines the inclusion of residents in municipal decision-making and reduces their ability to use online services offered by the municipality. Expanding digital infrastructure in peripheral neighbourhoods and reducing the digital divide are therefore priorities to enable more inclusive governance.

Digital governance in Saint-Louis involves collaboration between several stakeholders: local authorities, businesses, civil society and citizens. It is crucial that these actors work together to establish inclusive and effective digital environments, in order to strengthen transparency and promote participatory management of the city. A study conducted in 2023 by the Gaston Berger University of Saint-Louis shows that 72% of the city's citizens are in favor of the use of ICT in municipal management, but only 45% believe they have the skills necessary to navigate the city's online platforms.

Digital technologies also offer considerable opportunities to strengthen transparency and accountability in governance processes in Saint-Louis. Online platforms, coupled with the use of social media, can facilitate the dissemination of municipal information, enable better monitoring of public projects and promote citizen participation through online consultations or feedback platforms.

However, for these tools to be truly effective, appropriate regulations must be put in place to protect citizens' personal data and ensure the security of the information exchanged. The use of ICT must also be accompanied by increased vigilance in the face of the risks of manipulation of public opinion or misuse of digital tools for political purposes.

CONCLUSION

This study aimed to analyze access to digital technologies and youth involvement in urban governance in Saint-Louis, Senegal. The results show that, despite a gradual development of digital infrastructure in some neighborhoods, significant inequalities persist, limiting the civic participation of young people, particularly those from peripheral and working-class neighborhoods. The statistics from this research reveal several important disparities. Regarding access to digital technologies, approximately 68% of the young people surveyed own a smartphone with access to mobile internet. However, there are marked geographical differences: in the city center and residential neighborhoods, more than 80% of young people have regular access to the internet, while in fishing and working-class neighborhoods, this figure drops to approximately 45%. In addition, only 30% of young people in these peripheral areas have access to stable Wi-Fi, while the rest rely on expensive and limited mobile plans. In addition, regarding youth participation in urban governance, the results show that only 25% of the young people surveyed regularly participate in discussions on urban governance via digital platforms. This figure rises to 45% for young people in the city center, but remains low in working-class neighborhoods (15%). The majority of young people express an interest in citizen participation, but face obstacles such as the lack of effective participatory platforms, the cost of accessing the internet and distrust of local authorities. Out of a total population of approximately 220,000 inhabitants in Saint-Louis, digital infrastructures remain concentrated in the city center and residential neighborhoods. On average, in central neighborhoods, there is approximately 1 connected space for every 500 young people. In peripheral and fishing neighborhoods, this ratio is much higher, with 1 connected space for every 2,000 young people. In addition, more than 35% of young people in working-class neighborhoods report having regular difficulties accessing a quality internet connection. Regarding young girls, 46% of the survey participants were girls, reflecting their importance in the study. Among them, 38% have regular access to the internet, a figure lower than that of boys (60%). This disparity is particularly marked in working-class and fishing neighborhoods, where young girls face cultural and social obstacles that limit their access to digital tools. On the other hand, in the city center, nearly 55% of the girls surveyed have regular access to the internet and participate in online

discussions, particularly on social networks.

Ultimately, this study highlights deep inequalities in access to digital technologies and youth participation in urban governance in Saint-Louis. Young people in central neighborhoods, who are better connected and more educated, are able to influence decision-making processes, while those in working-class and fishing neighborhoods, particularly young girls, remain largely excluded.

For Saint-Louis, better digital inclusion of young people represents not only an opportunity to strengthen citizen participation, but also a way to reduce social inequalities and promote more equitable governance. Local authorities must act quickly to close the digital divide and empower all young people in the city, regardless of their geographic or socio-economic background, to actively engage in the management of their city.

Acknowledgements
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