



Sociology of Digital Use: An Ethnographic Study of Travelers'

Interactive Practices

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Abstract;

This study borrows the methodological tools of digital ethnography that contributed to uncovering the reality of the interactive use of media and interactive platforms based on the application of the principles of the Palo Alto school with the theory of the richness of the medium within the metaverse environment through research and analysis of patterns, methods and trends of communicative interaction resulting from the use of digital applications via the Internet in Mobile devices, methods and trends of communication interaction resulting from the use of digital applications via the Internet. On mobile devices, by studying the interactive communicative behavior of a sample of users of travel applications such as: Yassir, EPE SOGRAL spa, Wesseln, and analyzing the dimensions of this behavior based on focus groups for users of service applications for travelers within the virtual ethnographic approach. The current study resulted in several of the results are summarized as follows:

- *The participants in the qualitative research unanimously agreed that the virtual service applications are useful and effective for them.*
- *Research services contribute to addressing problems related to travelers by providing transportation services in record time and at competitive prices because of relying on these mobile service application*

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1. **Introduction**

The new communication media produced by information technology throughout its successive digital revolutions establish a specific system that ensures a unique communicative experience based on interactivity and participation on one hand, and the consolidation of individualistic practices with multifaceted and distinct social, cultural, and human dimensions on the other. Mobile phones, or smartphones, are considered the technological media most closely connected to humans since their invention, through their modernization and integration with hyper-intelligent technology that has enabled the imposition of a specific pattern of daily human communicative practices and consolidated the dominance of the technological relationship between humans and this technology. While numerous studies have sought to interrogate the essence and dimensions of the techno-social interconnections and entanglements that have permeated human life in its various paths and outcomes, they have simultaneously established a scientific trend that is nearly independent in approaching scientific and research issues, grounding its identity within interpretive epistemic frameworks concerning the nature of relationships and their various implications based on the fusion of the technological and the human.

As virtual ethnography has taken it upon itself to reveal the details of human life in its virtual dimension, it has also worked to open the horizons of qualitative research, ensuring the cognitive and scientific depth necessary to clarify the cultural and social reflections of communicative technology—primarily the internet within both its material and immaterial dimensions. Proceeding from this scientific vision, our research problem originates from an attempt to apply mobile virtual ethnography by understanding the reality of interactive communicative practices resulting from the interactive uses of virtual mobile applications for travelers in Algeria. This qualitative study—relying on the triangulation method through the combination of quantitative and qualitative analysis and utilizing scientific observation and focus groups for data collection, processing, and analysis—seeks to interrogate a specific type of daily life practice within two essential dimensions, real and virtual, related to virtual applications for travelers, to achieve the following objectives:

- Understanding the nature of the roles assigned to mobile virtual travel applications preferred by participants.
- Deconstructing the relationship between the interactive use of virtual mobile applications and the communicative contexts of travelers.

- Identifying travelers' interaction methods with virtual travel applications and their preferences for them.
- Understanding the nature of permanent reliance on mobile travel applications in daily life.

Study Concepts

Virtual Ethnography The ethnographic approach to studying new media users is referred to by several terms, including Cyberspace Ethnography, Digital Ethnography, Webnography, Netnography, and Internet Ethnography. This diversity in nomenclature arises from differences in their respective research fields, given their overlap to a degree where distinguishing their boundaries becomes difficult (Bassis & Gueddi, 2022).

Researchers Ali Gassaissia and Abdellatif Bouzir argue that ethnographic studies in virtual space enable the collection of data regarding behaviors, beliefs, cultural representations, motives, and individual interpretations. This can be approached either from their physical reality—through their interactions and relationships with the technical and communicative devices they use—or from the virtual reality resulting from individuals and groups entering networked virtual communicative relationships via new media and communication technologies.

Following the research conducted by Christine Hine titled Virtual Ethnography

and Internet Events: The Louise Woodward Case, ten principles for virtual ethnography were developed as follows (Bassis & Gueddi, 2022): Social Meaning: Ethnography can be used to investigate the ways in which internet use becomes socially meaningful, indicating multiple social goals for internet usage that merit scientific attention. Culture and Artifact: Interactive media, such as the internet, can be understood as both a cultural and a human artifact. Mobility: Studying interaction across media often requires researchers to be both virtually and physically mobile. Field Communications: Rather than going to specific physical sites, virtual ethnography relies on field communications, meaning researchers can gather data and conduct interviews electronically. Blurred Boundaries: The boundaries between the real and the virtual should not be pre-calculated, as there is a constant overlap between natural and virtual domains. Intermittent Participation: Virtual ethnography is a process of intermittent participation rather than long-term immersion.

Strategic Partiality: Virtual ethnography is necessarily partial; accounts can be based on strategic interest in specific research issues rather than a purely objective representation of facts (results are specific to the studied sample and cannot be generalized). Reflexivity: Intense engagement with mediated interaction adds an important reflexive dimension to

ethnography. **Immersion:** Through the virtual field, we learn about the internet by immersing ourselves in it and conducting ethnography using it. **Adaptability:** Virtual ethnography is adaptive, determining what fits according to the conditions it encounters across different media types and interactions.

Mobile Ethnography This is an innovative research technique that combines traditional ethnography with mobile research (Coville, 2023). In market research, it involves observing consumers in their natural environment to gain a reliable understanding of their behaviors, values, and beliefs. Technological growth and the increased adoption of smartphones provide opportunities to conduct ethnographic projects through mobile devices. Furthermore, consumers have become accustomed to sharing feedback via their smartphones, making mobile ethnography a discreet way to gather insights and gain a deep understanding of the consumer experience. UsesThe concept of "use" is adopted here as social patterns that emerge and appear regularly enough to form habits integrated into the daily lives of users—specifically adolescents—and impose themselves on the list of daily life practices (Reda, 2022).

The researcher bases the employment of the concept of use on the following considerations: **Practical Action:** The concept of use typically prompts the

question: "What do people actually do with technical tools and objects".

Social Appropriation: It involves the social appropriation of technologies, meaning the individual's relationship with technical objects and their content. **Accessibility and Adoption:** Use requires physical access to technology and its subsequent adoption by the user. Interactivity exists in all communication media to varying degrees, but it has become significantly important in instant communication environments, including multimedia, hypermedia, and digital convergence (Ali, 2018).

It is a two-way exchange between sender and receiver where the distinction between the two may become difficult. Interactivity can be synchronous or asynchronous, and "response" is the essence of interactive communication, without which interaction does not occur. Nasreddine Layadi defines interactivity as a concept initially created to denote a special relationship between the audiovisual medium and the viewer, aiming to transform the passive viewer into an active element that influences programming (Reda, 2022).

Over time, it has come to represent all types of recipient participation in a message, whether or not it produces a literal echo. It also refers to multi-directional communication between any number of sources and recipients, as well as the characteristics of devices and

software that allow for mutual actions in a dialogue mode in real-time. Virtual Travel Applications These are defined as a set of applications that can be downloaded from electronic stores (free or paid) which are compatible with smartphone operating systems. They provide various services related to transportation and movement in Algeria, most notably applications like Yassir, Mahatati (EPE SOGRAL), and Wesselni. Mobile/Smart phones the term Smartphones refers to phones that operate on a mobile operating system, making them comparable to small computers (Ali, 2018). They enable internet browsing, email, and the use of applications in addition to standard services like calls, SMS, and cameras. A smartphone offers features and characteristics not available in traditional mobile phones.

2. Methods and Materials:

2.1 Methodology

The current study belongs to the category of qualitative research, given its reliance on the ethnographic approach. This approach aims to provide an analytical description of social scenes, individuals, and groups to understand their feelings, beliefs, and practices. Furthermore, it serves as a study of interactive strategies in human life by collecting data that helps obtain clear perceptions of individuals' and groups' beliefs and behaviors across various situations and environments. Researchers employing the ethnographic

method focus on studying the culture or civilization of a specific group, aiming to describe their way of life by documenting meanings associated with different events and demonstrating their integration. Within this framework, the study relied on two primary tools: scientific observation and Focus Groups, which are considered among the most vital qualitative research methods. A focus group is defined as "a form of qualitative interview used by a researcher who manages a group discussion to generate qualitative data and obtain significant information for the research being conducted". The distinguishing element of this method is the use of researcher-led discussions as a technique for data collection. Jouda defines it as "a carefully and precisely planned research design aimed at reaching a group of individuals ranging from seven to ten people". This design is executed and managed by the researcher who leads the discussion circle, requiring the ability to effectively manage interaction and debate within the group. Research Design and Analysis research plan was developed involving three focus groups, each consisting of 10 respondents who utilize virtual travel applications via mobile devices. These discussions were conducted between March 15 and March 26, 2023. A set of questions was directed at the respondents, leading to the collection of raw data that was subsequently coded and processed using ATLAS.ti software, a specialized tool for

qualitative research analysis. In qualitative research, the term "participants" is used instead of "sample" because they share with and interact with the researcher either directly or indirectly during the study. Consequently, purposive sampling was utilized to achieve a deeper understanding of the phenomenon under study, based on methodological considerations that fulfill the objectives of the current research.

These methods and tools must be presented precisely and clearly without exaggeration so that other researchers can re-examine or verify them. The author can describe the tools and methods used in the form of a scheme, table or diagram to explain methods used. This section is divided into sub-sections, where its contents vary according to the subject matter of the article.

3.2 Theoretical Framework

The theory was developed by Richard L. Daft and Robert H. Lengel and is utilized to classify and evaluate specific communication media. Daft and Lengel indicated that the primary objectives of any organization are to reduce message ambiguity by selecting messages that achieve a high degree of interaction with the audience. This is the core premise of Media Richness Theory, which differentiates between communication media based on their degree of "richness" in achieving the maximum possible

interaction between the medium and the audience.

The Media Richness Continuum

This theory is used to study the selection criteria between various technological media based on their level of information richness. It emphasizes that communication effectiveness depends on the extent to which the medium is utilized.

According to Media Richness Theory, all communication channels possess specific characteristics that make them more or less rich. One of the most important goals of selecting a communication medium is reducing message ambiguity:

- If the goal of a message is ambiguous, it becomes unclear.
- Unclear messages are more difficult for the receiver to decode and, consequently, harder to understand.
- The theory places communication media on a continuous scale (continuum) representing the richness of the medium and its ability to deliver complex messages efficiently.

Ambiguity and Uncertainty Framework

The theory includes a framework with axes for levels of ambiguity and uncertainty, extending from minimum to maximum:

- As the degree of ambiguity and uncertainty decreases, the situation becomes clear and well known.
- As the degree of ambiguity and uncertainty increases, events become vague and carry multiple meanings, requiring clarification from the communicator.

The theory asserts that the task or situation is the primary determinant of how media richness affects performance measures. The literature identifies two primary categories of task attributes that help determine the appropriate medium for use:

1. Task Uncertainty and Reliability: This determines the impact of media selection. Uncertainty is defined here as the difference between the amount of information required to perform a task and the information already available.
2. Task Equivocality (Ambiguity): This also influences media choice. Equivocality indicates that there are multiple and conflicting interpretations of a situation. In important situations where clear answers are unavailable, richer communication media are those that improve the quality of response to such situations.

Application to the Current Study

The application of Media Richness Theory contributes to measuring the interactivity of travelers with mobile service applications. This qualitative research seeks to understand this interactivity by investigating preferences and identifying the benefits of using the specific applications favored by the participants.

3. Results and discussion

Based on the qualitative study that relied on scientific observation and focus group tools, and after processing the raw data collected using the ATLAS.ti software, a set of scientific indicators related to the axes of the current research has been identified. These indicators can be categorized as follows:

Axis One: Socio-Demographic Characteristics

The first axis is concerned with presenting the detailed results of the socio-demographic characteristics of the focus group participants. These participants share the common characteristic of utilizing virtual travel applications via mobile devices. These results are presented as follows:

Table 1. the distribution of participants according to gender:

Gender	Frequency	Percentage
Male	22	73.33%
Female	08	26.66%
Total	30	100%

The data presented in the table indicates a higher prevalence of virtual travel application usage among males than females. This trend is explained by the

level of perceived reliability associated with these applications, which appears to be more established among male users than female users in this context

Age Groups of Focus Group Participants

Table 2. the distribution of participants across different age categories:

Age Group	Frequency	Percentage
Less than 27	11	36.66%
From 28 to 38	15	50.00%
Over 39	04	13.33%
Total	30	100%

The data indicates that the largest segment of users falls within the 28 to 38 age range, accounting for exactly half of the participants. This is followed by the younger demographic (under 27) at 36.66%. These results suggest that virtual

travel applications are most prevalent among the young and early middle-aged demographics, who are typically more integrated into digital ecosystems and mobile-first services.

Educational Level of the Focus Group Participants

Table 3. the distribution of participants based on their educational attainment:

Edu- Level	Frequency	Percentage
Secondary School	3	10%
University	20	60.66%
Post graduate	7	23.33%
Total	30	100%

The data indicates that most participants are highly educated, with 90% (27 out of 30) holding either a university degree or

postgraduate qualifications. This high level of education is a significant indicator within the study's sample.

Employment Status:**Table 4. the distribution of participants across different age categories:**

Employment Status	Frequency	Percentage
Employed	17	56.66%
Unemployed	13	43.33%
Total	30	100%

The findings reveal that most participants (56.66%) are employed. This group typically utilizes virtual travel applications due to their efficiency in fulfilling requests and providing comprehensive information regarding booking routes, processes, and

available capacity. The remaining 43.33% of participants are unemployed or non-working, which indicates that these digital tools are integrated into the daily lives of travelers across different professional backgrounds

Axis Two: Access to Virtual Travel Applications via Mobile**1. Networks Used for Mobile Internet Connection****Table 5. the distribution of participants across different age categories:**

App Name	Frequency	Percentage (%)
Yassir	25	59.52%
Mahatati (SOGRAL spa)	20	47.61%
Wesselni	12	28.57%
PickmeApp Tymô	03	7.14%
TemTem	02	4.76%
Others	03	7.14%

The availability of a table internet network is the fundamental infrastructure that enables the entire "Digital Presence" of travelers in Algeria. Based on the study's framework, this section can be analyzed through the following dimensions:

1. The "Orchestral Model" of Connectivity

Considering the Palo Alto School approach, connecting to a mobile network

is not merely a technical act but the first step in "entering the orchestra". For a traveler to interact with apps like Yassir or Mahatati, they must first agree to the "rules of the game," which include having a functional internet connection and the necessary digital skills. The network serves as the "instrument" that allows the individual to play their part in the interactive communicative process.

2. Enabling the "Digital Presence": The study emphasizes that constant connectivity through mobile networks transforms the traveler from a passive observer into an active participant with a Digital Presence. This presence is what allows for: Real-time Interaction: Achieving immediate booking and tracking: Reliability and Trust: High usage of applications during turbulent weather or late hours is only possible if the network provides the necessary reliability to bridge the gap between the virtual and physical worlds.

3. Overcoming Spatial and Temporal Boundaries: Virtual ethnography suggests that the boundaries between the real and virtual are blurred. The use of mobile networks (3G/4G/5G or Wi-Fi) allows

travelers to maintain a "Virtual Mobility" that mirrors their physical movement. This is particularly evident in how participants rely on these networks to solve urgent transportation problems in record time.

4. Social Appropriation of Technology: The reliance on specific networks for internet access is a form of Social Appropriation. It reflects the individual's relationship with the technical object (the smartphone) and its content. The study suggests that for technology to be "used," it must first be physically available and then adopted into daily habits. The internet network is the medium that facilitates this adoption, turning app usage into a "Civilized Digital Behavior".

Duration of Travel Application Usage

Table 6. the distribution of participants across different age categories:

Duration of Usage	Frequency	Percentage (%)
From 1 to 3 Years	21	70.00%
Less than a Year	07	23.33%
More than 3 Years	02	6.66%

The data regarding the duration of application usage provides a deep insight into the "maturity" of the digital experience among the participants. This can be analyzed through the following ethnographic and sociological dimensions:

1. Stabilization of Digital Habits

The fact that 70% of participants have been using these applications for a period of one to three years indicates that these tools are no longer a "novelty" or a passing trend. Instead, they have evolved into stabilized social patterns that appear

regularly enough to be considered "habits integrated into the daily lives" of the users.

2. Evidence of Social Appropriation

In the theoretical framework of the study, "use" is defined as a process that requires both physical access and the subsequent "adoption" of technology. The dominance of the 1–3 year usage bracket suggests that much of the sample has successfully moved past the initial trial phase and into the stage of Social Appropriation. This means the participants have integrated these technical objects into their personal communicative contexts and daily routines.

3. Cumulative Trust and Reliability

The duration of usage is a strong indicator of the perceived reliability and effectiveness of the applications. Users typically do not maintain long-term usage of service apps unless they consistently fulfill their needs, such as providing transportation in record time or offering competitive prices. The high percentage of

established users (1–3 years and more) reinforces the study's finding that participants unanimously agree on the usefulness of these virtual services.

4. The "Orchestral" Learning Curve: From the perspective of the Palo Alto School, communication is like an "orchestra" that requires practice and skill. A usage duration of 1–3 years implies that participants have mastered the "tune" of the digital interaction—knowing how to choose the right "instrument" (app), respecting the "timing" (booking during peak hours), and interacting effectively with the service providers.

5. Market Growth and New Adoption: The presence of 23.33% of users who have been using the apps for less than a year indicates a continuous expansion of the digital traveler community in Algeria. This reflects an ongoing "digital presence" expansion and a narrowing of the digital gap as more individuals adopt "civilized digital behaviors" to manage their daily life activities.

3. Mobile Network Providers

Table 7. The following table summarizes the internet service providers used by the participants to access virtual travel applications

Network Provider	Frequency	Percentage (%)
Djezzy	12	40%
Ooredoo	09	30%
Mobilis	09	30%

Djezzy's Dominance: Djezzy emerges as the leading provider among the study sample, accounting for 40% of the

participants. Balanced Competition: Ooredoo and Mobilis share the remaining

market equally, with 30% of the respondents serving each.

Full Connectivity: Every participant in the sample (100%) has a reliable mobile internet connection, which is the foundational requirement for this study.

Axis Three: Communicative Contexts Framing the Interactive Use of Virtual Travel Applications via Mobile

The current study bases its interpretation of the results obtained from focus group data on the systemic approach of the Palo Alto School to understand the relational interconnection resulting from the increasing and permanent interactive use of travel applications between smartphones and travelers. This relational communication is founded on a contextual communicative system that can be explained by borrowing Gregory Bateson's "orchestra" concept, where he stated: "to communicate is to enter an orchestra (communiquer c'est entrer dans l'orchestre)". Bateson suggests that before broadcasting a message, it is necessary to ask to whom and with what instrument; hence, entering the orchestra requires the individual's consent to play on the musical scale, choose the appropriate instrument, respect the timing and rhythm, and listen to and speak with others, which requires practice, skills, and adherence to rules. Therefore, when applying this model to interactive communication with virtual travel applications on mobile, it likewise

necessitates communication intentionality as a comprehensive process initially, in addition to the availability of applications on smartphones, the internet network, skills in handling applications, making requests, and direct and indirect communication with the application or service owner; thus, it is an orchestral communicative model.

The dual articulations that investigate the nature of the relationship between the communicative content in virtual applications and the relationship existing among travelers using these applications within daily and realistic contexts tend to explain the volume of mutual interdependence between them, as established by the Palo Alto School in its discussion of communication levels (Content/Relationship). This matter can be understood through the word cloud illustrated below, which allows us as researchers to understand the communicative circulation of applications and the interactive use that truly expresses a special type of communicative practice within virtual spaces. It is a type that requires the traveler's networked presence first, thereby establishing a digital presence for them. This presence reflects the high volume of reliability discussed by the focus group participants, as shown by the cloud (extracted using the ATLAS.ti qualitative data analysis software) through the circulation of the Yassir application as the most interactive, present, and used application among participants.

Fig.1. Word Cloud (Lexical Inventory)



The source: Prepared by the two researchers using ATLAS.ti software

Communicative Contexts Framing Interactive Use

In the search for various communicative contexts, the collected data provided several scientific indicators that enable the analysis and deconstruction of the usage and relational context between virtual mobile applications and travelers. This results in three classifications of contexts surrounding the interactive communication process of virtual mobile applications, which can be presented as follows:

Daily (Temporal) Context: One of the most important scientific foundations for virtual ethnographic approaches within their virtual environment is understanding the nature of communication, integration, and immersion resulting from the relational interconnection between the user (traveler), the technical medium

(mobile), and the virtual applications. This creates a communicative dimension linked to the temporal space that establishes the virtual communicative act and practice temporally, in addition to occupying an important space in human life that contributes to building their "Metaverse" digital identity, as virtual boundaries are transcended in favor of post-realities.

Social Context: These technical media frame communicative practices and mold them socially through several social representations acquired in the context of social communication in its digital dimension. This is illustrated by the community of travelers in the Yassir application, which has 2 million virtual users, is present in 25 provinces in Algeria, and includes 40,000 partners.

Normative Context: This context relies on researcher Christine Hine's ethnographic approach to the internet, where she described the internet as having a cultural dimension. Consequently, various digital practices using technical media, primarily the mobile/smartphone, tend to root cultural and value-based concepts related to the volume of the relational interconnection that gives technology like the phone a special place in human life, to the point where it causes social and psychological phobia and anxiety upon its disappearance or stoppage.

Furthermore, communicative practices associated with virtual applications reflect what is described by some as "Civilized Digital Behavior". This is explained by the levels of motivation underlying the communicative act and interactive use, and the bridging of the digital gap in favor of life activities in their social manifestations within virtual environments.

Results of the Study

The study concluded with several key findings that highlight the intersection of technology and social behavior among travelers in Algeria:

- **Gender Preference:** Male focus group participants showed a higher preference for virtual travel applications compared to female participants.

- **Efficiency for Employees:** Employed individuals rely on these applications primarily for their speed in fulfilling requests and their ability to provide comprehensive information regarding travel routes, booking processes, and seat availability.

- **Peak Usage Contexts:** Most participants integrate these applications into their daily routines, with usage peaking during early morning or late-night hours and during adverse weather conditions when urgent, safe, and immediate transportation is required.

- **Trust and Security:** The primary driver for preferring virtual travel apps is the high level of reliability and security perceived by the users.

- **Framing of Interaction:** The specific "usage context" determines and frames the volume of interactive communication generated through these apps.

- **Intentional Communication:** Communication through these platforms is intentional and directed, leading to conscious communicative practices and calculated reactions where each party's role is clearly defined.

- **Utility as a Motive:** The ability of these apps to provide necessary utility and "sufficiency" is one of the most prominent motives for interactive use.

- **Digital Identity Formation:** Interactive use contributes to establishing

a "Digital Identity" for travelers, driven by communicative effectiveness and the wealth of information provided.

- **Indicators of Digital Presence:** Digital presence is manifested through various interactive indicators, including sharing content, "liking," booking, and engaging in both direct and indirect communication via the apps.

- **Sociological Patterning:** Virtual travel applications frame the sociological patterns of travelers, forming a specific social entity characterized by virtual practices that extend into real-world benefits.

4. CONCLUSION

Based on the findings, this study represents a scientific endeavor to explore the dimensions of "Virtual Ethnography" and its applications within the Algerian environment, focusing specifically on traveler behavior via mobile applications. The study reveals that the transition from traditional practices to interactive digital uses is not merely a technical shift, but rather a complex process of reconstructing the "Digital Identity" of the Algerian traveler within virtual "Metaverse" spaces.

The most prominent conclusions of the study can be summarized as follows:

- **Methodological and Theoretical Proficiency:** The study proved the efficacy of the Palo Alto School's

systemic approach in understanding digital interaction. The smart application has evolved from a mere technical tool into a partner within an integrated communicative "orchestra" that requires skill, intentionality, and continuous interaction. Furthermore, "Media Richness Theory" enhanced our understanding of how travelers select these applications based on their ability to reduce ambiguity and provide immediate, reliable information.

- **Sociology of Usage:** Field results indicated that reliability and security represent the cornerstone of adopting these technologies, particularly among the employed and male demographics, who found practical solutions for transportation and time management in applications such as "Yassir" and "Mahatati".

- **Digital Presence and Civilized Behavior:** The study revealed that permanent and intensive use of these applications, especially during late hours and adverse weather conditions—has generated a type of "Civilized Digital Behavior". This behavior seeks to bridge the digital gap and transform the mobile device into an indispensable travel companion, to the point where its absence may cause a form of social anxiety or "nomophobia".

- **The Formation of a Virtual Community:** The study concluded that travelers using

these applications currently constitute a specific social entity characterized by interactive patterns such as sharing and rating. This reinforces the concept of the "Social Appropriation of Technology" and its full integration into the details of daily life.

This study opens horizons for future research addressing the impact of Artificial Intelligence on improving the digital traveler's experience. It calls upon service institutions in Algeria to enhance the "richness" of their digital platforms to ensure the continuity of this constructive interaction and to achieve the maximum degree of utility for citizens in both physical and virtual environments.

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