

Evaluation of Telecommunications Service Quality Using the SERVPERF Model: A Case Study of Fourth-Generation (4G) Mobile Phone Subscribers in Algeria

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Abstract: This empirical study investigates the perceived service quality of fourth-generation (4G) telecommunications services among mobile subscribers in Algeria, operationalizing the performance-only SERVPERF model across its five core dimensions: tangibles, reliability, responsiveness, assurance, and empathy. Employing a descriptive-analytical methodology, primary empirical data were gathered via a dual-channel (paper-based and electronic) structured questionnaire administered to a representative sample of $N = 607$ active 4G subscribers across the three licensed national operators (Mobilis, Djezzy, and Ooredoo). Data were analyzed using descriptive statistics, one-sample t-tests, and One-Way Analysis of Variance (ANOVA) in SPSS (v.25). The findings reveal that subscribers evaluate overall 4G service quality at a moderate level ($M = 3.38$, $SD = 0.622$). Dimensionally, assurance ranked highest ($M = 3.682$), followed by empathy ($M = 3.652$) and tangibles ($M = 3.620$), whereas responsiveness ($M = 3.187$) and reliability ($M = 2.918$) registered the lowest scores due to persistent bandwidth fluctuations, network latency, and physical agency congestion. Hypothesis testing confirmed statistically significant differences in perceived service quality attributable exclusively to monthly income ($p = 0.029$), whereas operator type, subscription tenure, gender, age, educational attainment, and occupational activity exhibited no statistically significant effects. Strategic recommendations are formulated to assist telecommunications operators and regulatory authorities in optimizing network reliability and customer care frameworks.

Keywords: Service Quality, SERVPERF Model, Telecommunications Services, 4G LTE Technology, Customer Perceptions, Mobile Network Operators, Algeria.

1. Introduction

The telecommunications sector in Algeria has experienced transformative expansion following the state's strategic deregulation and market liberalization policies enacted at the dawn of the third millennium. This structural deregulation dismantled historical state monopolies and facilitated the competitive entry of three primary mobile network operators (MNOs)—Mobilis, Djezzy, and Ooredoo. By establishing nationwide terrestrial wireline and wireless telecommunications infrastructure, these operators have emerged as critical drivers of economic growth, contributing substantially to gross domestic product (GDP) formation, employment, and societal digitization (Dokhane, 2019).

Within this intensely competitive commercial environment, mobile operators vie to deliver superior communication technologies, aiming to maximize geographical footprint, retain subscriber volume, and maintain dominant market shares. Consequently, mobile service providers have integrated comprehensive quality management frameworks designed to harmonize organizational processes, optimize operational expenditure, and fulfill subscriber expectations to secure enduring customer satisfaction and brand loyalty (Al-Mahyawi, 2006).

Given that telecommunications services represent intangible, perishable, and technologically dynamic offerings, evaluating service quality and diagnosing operational deficiencies are indispensable managerial imperatives. While early evaluative paradigms relied heavily on expectancy-disconfirmation models—principally the SERVQUAL gap model (Parasuraman et al., 1985, 1988)—methodological consensus has increasingly favored the performance-only SERVPERF framework formulated by Cronin and Taylor (1992). By measuring perceived performance directly, SERVPERF avoids the psychometric redundancy and conceptual ambiguities inherent in assessing pre-consumption expectations.

1.1. Research Problem and Questions

Notwithstanding substantial capital investments in mobile broadband and the formal commercial rollout of Fourth-Generation Long-Term Evolution (4G LTE) networks in late 2016, consumer feedback continues to highlight recurring deficiencies regarding throughput stability, signal latency, and customer service responsiveness. Therefore, this study addresses the following central research question:

What is the level of perceived service quality for fourth-generation (4G) telecommunications services provided by mobile phone operators in Algeria from the perspective of active subscribers?

To examine this central problem comprehensively, the research investigates the following sub-questions:

- What are the foundational theoretical underpinnings and core multidimensional constructs governing telecommunications service quality?

- How does the SERVPERF framework function as a rigorous diagnostic tool for measuring actual service performance?
- What is the empirical evaluation level of 4G service quality across the dimensions of tangibles, reliability, responsiveness, assurance, and empathy among Algerian subscribers?
- Do subscriber demographic characteristics (operator type, length of SIM card usage, gender, age, occupation, educational attainment, and monthly income) generate statistically significant variations in perceived 4G service quality?

1.2. Research Hypotheses

To address the research questions empirically, two principal hypotheses were formulated:

- First Main Hypothesis (H1): Active subscribers evaluate the overall quality level of fourth-generation (4G) telecommunications services provided by mobile network operators in Algeria at a moderate level.
- Second Main Hypothesis (H2): There are statistically significant differences at the $\alpha \leq 0.05$ level in subscribers' evaluations of 4G telecommunications service quality attributable to demographic variables (operator type, length of SIM card usage, gender, age, occupational activity, educational level, and monthly income).

1.3. Significance and Objectives of the Study

The significance of this investigation stems from the vital strategic role of the telecommunications industry within the Algerian national economy and the pressing academic need to evaluate high-speed mobile broadband services amidst rapid demographic and technological transitions. The primary objectives are to: (1) elucidate the conceptual and methodological mechanisms of the SERVPERF framework in telecommunications; (2) gauge empirical subscriber perceptions regarding 4G LTE service performance across individual operators; and (3) deliver actionable, empirically grounded recommendations to assist telecommunications executives, network engineers, and regulatory bodies (specifically the ARPCE) in mitigating operational bottlenecks.

1.4. Scope and Limitations of the Study

The operational scope of the investigation is defined across four distinct boundaries:

- Thematic Scope: Confined to the five canonical service quality dimensions established by Cronin and Taylor (1992): tangibles, reliability, responsiveness, assurance, and empathy.
- Spatial Scope: Conducted across the national territory of Algeria, surveying active individual 4G subscribers interacting with commercial agencies and network infrastructure.
- Human Scope: Targeted active individual consumers subscribing to 4G LTE services provided by the three licensed operators (Mobilis, Djazzy, and Ooredoo).

- Temporal Scope: Field data collection and empirical investigation spanned the period from 15 January 2025 to 30 August 2025.

2. Literature Review and Theoretical Framework

2.1. The Conceptual Foundations of Service Quality

The conceptualization of quality within economic and management literature reflects diverse theoretical orientations. While manufacturing paradigms define quality primarily as conformance to predetermined technical specifications (Crosby) or the minimization of societal loss post-utilization (Taguchi), service quality requires an alter-centric, consumer-perceived definition. Services are fundamentally characterized by intangibility, inseparability of production and consumption, heterogeneity, and perishability. Consequently, the American Society for Quality (ASQ) and the International Organization for Standardization (ISO) define service quality as the totality of features and characteristics of a product or service that bear upon its capacity to satisfy stated or implied needs (Al-Mahyawi, 2006; Al-Sayrafi, 2008).

2.2. Dimensions of Service Quality: From SERVQUAL to SERVPERF

In their foundational 1985 study, Parasuraman, Zeithaml, and Berry identified ten evaluative criteria utilized by consumers: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding the customer, and tangibles. In 1988, these criteria were synthesized into the canonical five-dimensional SERVQUAL model (tangibles, reliability, responsiveness, assurance, and empathy), operationalized through a disconfirmation paradigm (Quality = Perceptions – Expectations) (Parasuraman et al., 1988).

Despite its widespread adoption, SERVQUAL encountered substantial psychometric and operational criticisms regarding the measurement of customer expectations (E), which are subject to retrospective cognitive bias and variance across pre- and post-consumption stages. To resolve these limitations, Cronin and Taylor (1992) developed the SERVPERF model, positing that service quality is a form of consumer attitude best represented strictly by perceived actual performance (P):

Service Quality (SQ) = Actual Performance (P)

SERVPERF retains the five foundational dimensions and the 22-item structure of SERVQUAL but evaluates only the performance score on a 5-point Likert scale. Empirical comparisons demonstrate that SERVPERF exhibits superior construct validity, higher explained variance (R^2), and greater operational efficiency, reducing respondent cognitive fatigue while providing clear diagnostic metrics for service providers (Cronin & Taylor, 1992).

2.3. The Fourth-Generation (4G LTE) Mobile Landscape in Algeria

In telecommunications, 4G LTE refers to wireless broadband technologies adhering to the International Telecommunication Union's (ITU) Advanced International Mobile Telecommunications specifications. In Algeria, commercial 4G deployment was officially licensed by the Post and Electronic Communications Regulatory Authority (ARPCE) in late 2016 to three mobile network operators: Mobilis (the mobile subsidiary of public incumbent Algérie Télécom), Djezzy (Optimum Telecom Algérie), and Ooredoo (Wataniya Telecom Algérie). Each operator delivers customized prepaid and postpaid packages encompassing high-speed mobile data, voice over LTE (VoLTE), enterprise connectivity, and value-added digital services (ARPCE, 2022).

2.4. Synthesis of Previous Empirical Studies

Empirical evaluations of service quality across diverse service industries highlight the centrality of multidimensional modeling. Dehaghi et al. (2020) demonstrated that while technical accessibility is critical, reliability, empathy, and continuous post-service support represent the principal determinants of customer trust. Rakotovao and Rakotomahenina (2021) highlighted that internal marketing and frontline employee competencies directly drive perceived service quality and customer loyalty. In travel and transport hubs, Sun and Huang (2022) revealed that reliability, competence, and empathy carry the highest relative weights in consumer evaluations. Furthermore, Zhang et al. (2022) investigated technological mediation, confirming that while automated systems excel in mechanical reliability, human personnel remain essential for securing empathy and responsiveness. Building upon these empirical insights, the present study adapts the SERVPERF framework to diagnose mobile telecommunications in Algeria.

3. Research Methodology

3.1. Research Design and Population Sample

This study employs a descriptive-analytical quantitative research design. The target population comprises all individual subscribers actively utilizing 4G mobile telecommunications services across Algeria. Primary empirical data were collected through an electronic questionnaire distributed across digital communication channels and social platforms, complemented by field-administered printed questionnaires across representative commercial agencies. A total of 607 valid and fully completed questionnaires were recovered, constituting the final analytical sample.

3.2. Measurement Instrument and Analytical Scale

The survey instrument comprises three structured sections:

- Section One: Introductory letter detailing academic objectives, operator choice, and SIM card usage duration.

- Section Two: Core SERVPERF scale containing 22 statements mapped across the five quality dimensions: Tangibles (Items 1–5), Reliability (Items 6–10), Responsiveness (Items 11–14), Empathy (Items 15–18), and Assurance (Items 19–22). Evaluated via a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).
- Section Three: Demographic and socioeconomic profile: gender, age, professional activity, educational attainment, and monthly income.

To interpret mean scores, a standard three-tiered interval scale was utilized: Low Agreement / Quality (1.00 – 2.66), Moderate Agreement / Quality (2.67 – 3.39), and High Agreement / Quality (3.40 – 5.00).

3.3. Instrument Validity and Reliability

Instrument construct validity was verified through peer review by academic experts in marketing and quantitative methods. Internal consistency reliability was tested using Cronbach's Alpha coefficient via SPSS (v.25). As presented in Table 1, the overall scale achieved a Cronbach's Alpha of 0.916 across the 21 evaluated items, significantly exceeding the conventional academic threshold of 0.70 and demonstrating high internal reliability.

Table 1. Reliability Analysis of the Study Scale (Cronbach's Alpha)

Construct Variable	Number of Items	Cronbach's Alpha	Reliability Level
Perceived Service Quality (SERVPERF)	21	0.916	High / Excellent

Source: Prepared by the authors based on SPSS outputs (v.25).

4. Empirical Results and Statistical Analysis

4.1. Demographic Profile of Respondents

The demographic and socioeconomic distribution of the sample (N = 607) is summarized in Table 2. In terms of operator distribution, Mobilis represents 53.5% (n = 325), followed by Djezzy at 27.0% (n = 164) and Ooredoo at 19.4% (n = 118), aligning with national market share distributions reported by the ARPCE. Subscription duration indicates high customer stability, with 64.1% (n = 389) maintaining their SIM card for over five years. Gender distribution is balanced: 53.2% female (n = 323) and 46.6% male (n = 283). Subscribers aged 18 to 45 comprise 87.0% of the sample, reflecting the youth-dominated demographic profile of high-speed mobile data consumers. Educationally, 86.7% hold university undergraduate (45.5%) or postgraduate (41.2%) degrees, ensuring competent comprehension of the survey metrics. Socioeconomically, respondents are distributed across upper-income (> 50,000 DZD, 38.1%) and lower-income (< 18,000 DZD, 35.7%) brackets.

Table 2. Sociodemographic Characteristics of the Study Sample (N = 607)

Variable Category	Classification	Frequency (n)	Percentage (%)
Mobile Operator	Mobilis	325	53.5%
	Djezzy	164	27.0%
	Ooredoo	118	19.4%
Length of SIM Usage	Less than 1 year	39	6.4%
	1 to 5 years	179	29.5%
	More than 5 years	389	64.1%
Gender	Male	283	46.6%
	Female	323	53.2%
Age Bracket	Less than 25 years	169	27.8%
	25 – 35 years	191	31.5%
	35 – 45 years	168	27.7%
	46 – 55 years	68	11.2%
	56 years and older	11	1.8%
Professional Activity	Self-employed	137	22.5%
	Public Employee	130	21.4%
	Student	110	18.1%
	Craftsman / Artisan	100	16.4%
	Private Sector Worker	70	11.5%
	Unemployed	50	8.2%
	Retired	10	1.6%
Educational Level	Primary	5	0.8%
	Middle School	17	2.8%
	Secondary	59	9.7%
	University (Undergraduate)	276	45.5%
	Postgraduate (Master/Doctorate)	250	41.2%

Variable Category	Classification	Frequency (n)	Percentage (%)
Monthly Income	Less than 18,000 DZD	217	35.7%
	18,000 – 40,000 DZD	75	12.4%
	40,000 – 50,000 DZD	84	13.8%
	More than 50,000 DZD	231	38.1%

Source: Prepared by the authors based on SPSS outputs (v.25).

4.2. Descriptive Analysis of the SERVPERF Service Quality Dimensions

4.2.1. Tangibles Dimension

The tangibles dimension assesses physical infrastructure, agency cleanliness, technological equipment, and staff appearance. As shown in Table 3, the overall mean for tangibles reached $M = 3.62$ ($SD = 0.730$), reflecting a high-to-moderate agreement level across operators (Mobilis $M = 3.64$, Djeczy $M = 3.61$, Ooredoo $M = 3.56$). Item 2 ('Employees maintain neat and professional attire') scored highest ($M = 3.88$), followed by Item 1 ('Agency waiting areas are clean, air-conditioned, and comfortable', $M = 3.74$). Conversely, Item 4 ('Agency geographical locations are convenient and easily accessible') recorded the lowest score ($M = 3.32$), reflecting geographic concentration in dense urban hubs and limited agency presence in peripheral districts.

Table 3. Descriptive Statistics for the Tangibles Dimension

Tangibles Scale Statements	Djeczy	Mobilis	Ooredoo	Total Mean (SD)	Level
Item 01: Clean, air-conditioned waiting areas	3.82 (0.939)	3.71 (0.960)	3.71 (1.062)	3.74 (0.957)	High
Item 02: Neat and professional staff attire	3.95 (0.801)	3.85 (0.801)	3.86 (0.866)	3.88 (0.814)	High
Item 03: Modern screens and interactive equipment	3.68 (0.930)	3.63 (0.978)	3.48 (0.976)	3.61 (0.966)	Moderate
Item 04: Convenient and accessible agency location	3.15 (1.265)	3.47 (1.112)	3.16 (1.164)	3.32 (1.174)	Moderate
Item 05: Attractive exterior agency appearance	3.44 (1.010)	3.55 (0.957)	3.60 (0.949)	3.53 (0.970)	Moderate

Tangibles Scale Statements	Djezzy	Mobilis	Ooredoo	Total Mean (SD)	Level
Overall Dimension Mean & Standard Deviation	3.61 (0.716)	3.64 (0.738)	3.56 (0.731)	3.62 (0.730)	Moderate (High)

Source: Prepared by the authors based on SPSS outputs (v.25).

4.2.2. Reliability Dimension

Reliability measures the operator's ability to execute promised services accurately, reliably, and without disruption. As detailed in Table 4, reliability recorded the lowest evaluation among all five dimensions, with an overall mean of $M = 2.91$ ($SD = 0.829$). Critical operational vulnerabilities emerged in network performance: Item 5 ('Fast throughput and uninterrupted mobile internet connection') recorded a low mean of $M = 2.22$, and Item 4 ('Voice calls continue seamlessly without dropping') recorded $M = 2.44$. While administrative execution and staff knowledge received moderate ratings ($M = 3.37$ and $M = 3.39$), core technical infrastructure struggles to meet subscriber expectations.

Table 4. Descriptive Statistics for the Reliability Dimension

Reliability Scale Statements	Djezzy	Mobilis	Ooredoo	Total Mean (SD)	Level
Item 01: Error-free service execution by staff	3.48 (0.956)	3.39 (0.983)	3.19 (1.056)	3.37 (0.994)	Moderate
Item 02: Services match promotional advertisements	3.23 (1.112)	3.23 (1.087)	2.75 (1.293)	3.14 (1.151)	Moderate
Item 03: Staff possess sufficient technical knowledge	3.51 (1.036)	3.38 (1.014)	3.22 (1.016)	3.39 (1.023)	Moderate
Item 04: Voice calls connect without interruptions	2.63 (1.272)	2.39 (1.263)	2.32 (1.109)	2.44 (1.241)	Low
Item 05: Internet throughput is fast and stable	2.32 (1.360)	2.18 (1.255)	2.19 (1.242)	2.22 (1.281)	Low
Overall Dimension Mean & Standard Deviation	3.03 (0.822)	2.92 (0.837)	2.74 (0.792)	2.91 (0.829)	Moderate

Source: Prepared by the authors based on SPSS outputs (v.25).

4.2.3. Responsiveness Dimension

Responsiveness reflects employee readiness to deliver prompt service, assist customers, and resolve grievances. Table 5 indicates an overall moderate evaluation ($M = 3.18$, $SD = 0.840$). Interpersonal responsiveness by agency personnel scored highest (Item 2: 'Staff assist in selecting appropriate plans', $M = 3.43$). In contrast, customer service call center responsiveness recorded $M = 3.15$, while agency waiting times recorded the lowest score (Item 4, $M = 2.92$), driven by peak-hour overcrowding and staffing shortages relative to foot traffic.

Table 5. Descriptive Statistics for the Responsiveness Dimension

Responsiveness Scale Statements	Djezzy	Mobilis	Ooredoo	Total Mean (SD)	Level
Item 01: Call center responds promptly to complaints	3.28 (1.149)	3.13 (1.182)	3.04 (1.007)	3.15 (1.143)	Moderate
Item 02: Staff assist in selecting suitable offers	3.56 (0.940)	3.45 (1.013)	3.19 (1.023)	3.43 (1.002)	Moderate
Item 03: Sufficient number of frontline employees	3.34 (1.017)	3.23 (1.023)	3.07 (1.133)	3.23 (1.046)	Moderate
Item 04: Waiting time inside agency is short	3.14 (1.247)	2.84 (1.192)	2.85 (1.214)	2.92 (1.217)	Moderate
Overall Dimension Mean & Standard Deviation	3.33 (0.833)	3.16 (0.848)	3.04 (0.804)	3.18 (0.840)	Moderate

Source: Prepared by the authors based on SPSS outputs (v.25).

4.2.4. Empathy Dimension

Empathy evaluates individualized attention, respectful communication, and genuine care demonstrated toward subscribers. As reported in Table 6, empathy scored a favorable mean of $M = 3.65$ ($SD = 0.801$). Subscribers positively affirmed linguistic alignment (Item 3: 'Staff communicate in the subscriber's preferred language and local dialect', $M = 3.74$) and interpersonal courtesy (Item 1: 'Staff exhibit politeness and mutual respect', $M = 3.70$). Comprehension of customer requirements scored $M = 3.51$, confirming effective personal engagement.

Table 6. Descriptive Statistics for the Empathy Dimension

Empathy Scale Statements	Djezzy	Mobilis	Ooredoo	Total Mean (SD)	Level
Item 01: Polite and respectful frontline staff	3.75 (0.909)	3.71 (0.893)	3.61 (0.915)	3.70 (0.901)	High
Item 02: Employees understand specific subscriber needs	3.56 (0.934)	3.51 (0.947)	3.43 (1.049)	3.51 (0.964)	Moderate
Item 03: Communication in local language/dialect	3.82 (0.937)	3.76 (0.998)	3.56 (1.049)	3.74 (0.994)	High
Overall Dimension Mean & Standard Deviation	3.71 (0.729)	3.66 (0.793)	3.53 (0.909)	3.65 (0.801)	Moderate (High)

Source: Prepared by the authors based on SPSS outputs (v.25).

4.2.5. Assurance Dimension

Assurance assesses subscriber trust, information security, and transaction integrity. Table 7 indicates that assurance achieved the highest ranking among all evaluated dimensions, with an overall mean of $M = 3.68$ ($SD = 0.628$). Subscribers expressed strong confidence in data confidentiality (Item 2, $M = 3.75$) and security infrastructure (Item 4: 'Operator deploys necessary technology to protect personal data', $M = 3.71$). Interpersonal reassurance and operational accuracy scored $M = 3.66$ and $M = 3.58$ respectively, confirming institutional credibility.

Table 7. Descriptive Statistics for the Assurance Dimension

Assurance Scale Statements	Djezzy	Mobilis	Ooredoo	Total Mean (SD)	Level
Item 01: Sense of comfort and reassurance with staff	3.74 (0.788)	3.63 (0.908)	3.64 (0.800)	3.66 (0.857)	High
Item 02: Operator maintains subscriber confidentiality	3.80 (0.766)	3.73 (0.792)	3.74 (0.656)	3.75 (0.759)	High
Item 03: Service providers execute tasks correctly	3.57 (0.879)	3.64 (0.857)	3.43 (0.831)	3.58 (0.860)	High
Item 04: Necessary cybersecurity/data technology	3.79 (0.755)	3.73 (0.822)	3.56 (0.767)	3.71 (0.796)	High

Assurance Scale Statements	Djezzy	Mobilis	Ooredoo	Total Mean (SD)	Level
Overall Dimension Mean & Standard Deviation	3.73 (0.641)	3.68 (0.693)	3.59 (0.575)	3.68 (0.628)	High

Source: Prepared by the authors based on SPSS outputs (v.25).

4.3. Hypothesis Testing

4.3.1. Testing the First Main Hypothesis (H1)

To test H1, a one-sample t-test was conducted against the scale midpoint. As shown in Table 8, overall perceived telecommunications service quality recorded an arithmetic mean of $M = 3.38$ ($SD = 0.622$, $t = 134.083$, $p = 0.000$). Because the mean falls within the moderate range [2.67 – 3.39], the first main hypothesis is confirmed: subscribers evaluate 4G telecommunications service quality at a moderate level, indicating that current operational delivery does not fully meet consumer expectations.

Table 8. Summary of Dimensions and One-Sample t-Test Results (H1 Testing)

Rank	Quality Dimension	Mean (M)	SD	t-statistic	p-value	Evaluation Level
1	Assurance	3.682	0.628	144.297	0.000	High (Rank 1)
2	Empathy	3.652	0.801	112.251	0.000	Moderate (Rank 2)
3	Tangibles	3.620	0.730	122.070	0.000	Moderate (Rank 3)
4	Responsiveness	3.187	0.840	93.413	0.000	Moderate (Rank 4)
5	Reliability	2.918	0.829	86.691	0.000	Moderate (Rank 5)
-	Overall 4G Service Quality	3.380	0.622	134.083	0.000	Moderate Evaluation

Source: Prepared by the authors based on SPSS outputs (v.25).

4.3.2. Testing the Second Main Hypothesis (H2: Demographic Differences)

To test H2, a One-Way Analysis of Variance (ANOVA) was executed across the seven demographic variables at $\alpha = 0.05$. The results are summarized in Table 9.

Table 9. One-Way ANOVA Summary of Perceived Service Quality Across Demographic Variables

Demographic Variable	Source of Variation	Sum of Sq.	df	Mean Sq.	F-statistic	p-value (Sig.)
Mobile Operator	Between Groups	2.477	2	1.239	3.221	0.091 (No Sig.)
SIM Usage Tenure	Between Groups	0.418	2	0.209	0.538	0.584 (No Sig.)
Gender	Between Groups	0.331	2	0.165	0.426	0.653 (No Sig.)
Age Bracket	Between Groups	1.465	4	0.366	0.945	0.437 (No Sig.)
Professional Activity	Between Groups	2.280	6	0.380	0.981	0.437 (No Sig.)
Educational Level	Between Groups	2.177	5	0.435	1.125	0.346 (No Sig.)
Monthly Income	Between Groups	3.471	3	1.157	3.017	0.029 (Significant)

Source: Prepared by the authors based on SPSS outputs (v.25).

Detailed examination of the ANOVA results indicates:

- Operator Type: $F(2, 604) = 3.221$, $p = 0.091 > 0.05$. No statistically significant differences exist among Mobilis, Djezzy, and Ooredoo subscribers, reflecting uniform structural performance across the market.
- SIM Usage Duration: $F(2, 604) = 0.538$, $p = 0.584 > 0.05$. Tenured and newer subscribers exhibit homogeneous perceptions.
- Gender: $F(2, 604) = 0.426$, $p = 0.653 > 0.05$. Male and female evaluations do not differ significantly.
- Age Bracket: $F(4, 602) = 0.945$, $p = 0.437 > 0.05$. Evaluations remain consistent across age cohorts.

- **Professional Activity:** $F(6, 600) = 0.981, p = 0.437 > 0.05$. Occupational classification does not generate significant variance.
- **Educational Level:** $F(5, 601) = 1.125, p = 0.346 > 0.05$. Perceptions are homogeneous across academic qualifications.
- **Monthly Income:** $F(3, 603) = 3.017, p = 0.029 < 0.05$. Statistically significant differences emerge across income brackets. Higher-income earners ($> 50,000$ DZD) exhibit elevated expectations regarding network reliability and data throughput, whereas lower-income groups prioritize pricing and basic connectivity.

5. Discussion of Findings

The empirical findings demonstrate that active subscribers in Algeria evaluate 4G telecommunications service quality at a moderate level ($M = 3.38$). This confirms that despite substantial infrastructure investments, operator performance has not yet achieved subscriber expectations. A detailed review of the dimension rankings clarifies the operational dynamics governing subscriber attitudes:

1. **Assurance and Empathy as Competitive Strengths:** Assurance ($M = 3.68$) and empathy ($M = 3.65$) achieved the highest rankings. Subscribers express strong confidence in customer data confidentiality and cybersecurity, reflecting operator compliance with ARPCE data governance mandates. Similarly, frontline staff courtesy, cultural respect, and linguistic alignment with local dialects foster positive customer rapport.

2. **Tangibles and Agency Footprint:** The tangibles dimension ($M = 3.62$) indicates solid investment in modern commercial branches, interactive digital kiosks, and professional employee presentation. However, agency accessibility remains constrained ($M = 3.32$) due to commercial branch concentration in provincial capitals and urban centers, requiring peripheral and rural subscribers to travel considerable distances.

3. **Reliability and Responsiveness Deficits:** Reliability ($M = 2.91$) and responsiveness ($M = 3.18$) represent the primary operational vulnerabilities across all three operators. Low scores for connection stability ($M = 2.44$) and mobile broadband throughput ($M = 2.22$) reflect chronic bandwidth throttling, localized coverage gaps, and signal degradation. These technical shortfalls are compounded by call center delays ($M = 3.15$) and extended agency wait times ($M = 2.92$) caused by branch-level overcrowding during peak periods.

4. **Income-Driven Perception Disparities:** While perceptions remain uniform across operator choice, gender, age, and education, the statistically significant effect of monthly income ($p = 0.029$) highlights socioeconomic segmentation. Affluent subscribers purchasing premium data bundles exhibit lower tolerance for connection latency and demand continuous high-speed connectivity, whereas lower-income tiers focus primarily on affordable voice and data allowances.

6. Practical and Strategic Recommendations

Based on the empirical findings, the following managerial and operational recommendations are proposed:

- **Network Infrastructure Modernization:** Telecommunications operators must prioritize capital investments in 4G LTE base transceiver stations (BTS), expand fiber-to-the-tower backhaul connectivity, and minimize localized throughput throttling—especially in peripheral districts and transit corridors.
- **Branch Footprint Expansion:** Operators should decentralize their commercial presence by establishing localized sales kiosks, authorized agent partnerships, and regional service hubs across underserved districts (daīras) to alleviate agency overcrowding.
- **Omnichannel Customer Support Optimization:** Enhance call center capacity through automated interactive voice response (IVR) architectures and AI-driven chatbots to reduce response latency for routine inquiries.
- **Targeted Reliability Audits:** The regulatory authority (ARPCE) and operators should institute standardized quality of service (QoS) audits, benchmarking actual data throughput and dropped-call ratios against advertised marketing claims.
- **Frontline Staff Competence Development:** Implement continuous training in problem-solving and dispute resolution to empower commercial agency staff in resolving technical grievances at first contact.
- **Market-Segmented Offer Architectures:** Structure tiered service offerings that address the throughput and SLA expectations of high-income subscribers while delivering stable, cost-effective packages for budget-conscious demographics.

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