

AI, Culture, and Trust: A Global Look at User Confidence in Virtual Assistants

Hampo, JohnPaul A.C.¹, Onovughe Anthonia Okeme², Mega Ohis Grace³ and Umukoro Gift⁴

¹Lecturer, Rolof Computer Academy, Warri; Lecturer, Conarina Maritime Academy, Oria; and Data Scientist, Hamplus Technologies International [Hamplus Hub], Abraka

²Lecturer, Southern Delta University, Ozoro and Researcher, Federal University of Technology, Akure

³Lecturer, Delta State University, Abraka and Researcher, Federal University of Petroleum Resources, Effurn

⁴Lecturer, Delta State University, Abraka and Researcher, Delta State University

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ABSTRACT

Virtual assistants (VAs) that are driven and powered by AI such as Siri, Alexa, and Google Assistant are increasingly embedded in everyday life. Their adoption is critically a correlation of user trust, which is influenced not only by system performance but also by cultural context. This paper investigates the dynamics of trust in VAs by synthesizing empirical findings from recent studies ($n \approx 1,250$ participants across healthcare, consumer, and enterprise domains). We examine four principal antecedents—perceived competence, transparency/explainability, privacy and security, and anthropomorphism—and analyze how cultural dimensions moderate their influence. Findings indicate that competence and privacy consistently drive trust across contexts, but the weight of transparency and anthropomorphism varies by cultural orientation (notably, high uncertainty avoidance cultures demand transparency, while collectivist cultures emphasize social endorsement). We propose a conceptual model linking culture, trust antecedents, and adoption, and conclude with implications for design and governance.

Keywords: Trust, Virtual Assistants, Artificial Intelligence, Culture, Conversational AI, Responsible AI, AI Ethics

INTRODUCTION

The global market for AI-driven virtual assistants (VAs) has expanded rapidly, with over 4.2 billion people estimated to interact daily with at least one VA in 2024 (Gillespie et al., 2025). From consumer-facing devices such as Amazon Alexa to healthcare-focused conversational agents, VAs are now integral to personal, organizational, and even clinical workflows. Yet, adoption rates differ markedly across regions. While North American and Western European consumers report high daily usage, adoption remains uneven in parts of Africa, Asia, and the Middle East (Zhang et al., 2022).

A key driver of this divergence is trust. Trust determines not only whether users will try a VA but also whether they will continue relying on it even in critical domains (Sabouri et al., 2025). However, trust is not uniform; it is shaped by antecedents such as competence, privacy, and explainability, and moderated by cultural values such as Uncertainty Avoidance and Collectivism (Zhang et al., 2022; Hofstede, 2001).

Recent findings further highlight that privacy concerns vary significantly across regulatory environments. In regions with strict data protection frameworks—such as the European Union—users exhibit heightened sensitivity toward data collection, consent, and storage practices. Conversely, users in less regulated contexts may prioritize convenience over strong privacy guarantees. Accounting for these regional privacy expectations is essential for understanding how trust in VAs develops across cultures.

This paper seeks to answer three questions:

1. What are the main factors that influence trust in AI-driven VAs?
2. How do these factors differ across cultural contexts, and what implications follow for global deployment?
3. How can AI-driven virtual assistants be designed or adapted to effectively shape and strengthen user trust across different cultural regions?

To address these, we perform a cross-study synthesis of recent empirical research, integrating findings from psychology, human–computer interaction, and cross-cultural management.

RELATED WORK

Trust in Automation

Trust in automation has been studied extensively in contexts such as aviation, healthcare, and robotics. Lee and See (2004) defined trust as the “attitude that an agent will help achieve one’s goals under uncertainty.” Measurement approaches include psychometric scales (e.g., Jian et al.’s Trust in Automation), behavioral reliance measures, and longitudinal calibration analyses (Kohn, 2021). Recent reviews emphasize the need for multidimensional measurement that captures both cognitive and affective elements (Razín et al., 2024).

Trust in Virtual Assistants

Studies on VAs highlight several consistent antecedents of trust:

Perceived Competence: Users prioritize task accuracy and reliability. Errors in speech recognition or incorrect responses rapidly erode trust (Vimalkumar, 2021).

Transparency/Explainability: The ability to explain how responses are generated improves trust, particularly in contexts of uncertainty (Shan et al., 2022).

Anthropomorphism: Human-like voices and social cues can increase social presence, though effects vary across cultures (Dutsinma et al., 2022).

Privacy and Security: Concerns about data handling are especially salient in healthcare and finance applications (Zhan et al., 2024).

Cultural Dimensions and Technology Adoption

Hofstede’s cultural framework—particularly **Uncertainty Avoidance**, **Power Distance**, and **Individualism–Collectivism**—has been used to explain differences in technology adoption (Hofstede, 2001). For instance, high-Uncertainty Avoidance cultures demand stronger safeguards, while collectivist cultures are more influenced by social proof (Zhang et al., 2022).

METHODOLOGY

This paper adopts a **qualitative meta-synthesis** of existing empirical research on trust in VAs. Criteria for inclusion were:

1. Peer-reviewed or reputable industry reports published between 2019–2025.
2. Empirical measurement of trust in VAs through validated scales, behavioral proxies, or large-scale surveys.
3. Explicit attention to cultural differences or national comparisons.

- Exploratory study on how trust in AI-driven virtual assistants is shaped by cultural norms, values, or regional user expectations.

We identified 11 studies ($N \approx 1,250$ combined participants) spanning consumer (Vimalkumar, 2021), healthcare (Zhan et al., 2024), enterprise (AI-Kfairy, 2024), and global survey data (Gillespie, 2025). Data were extracted on antecedents of trust, effect sizes, and cultural moderators.

RESULTS

Antecedents of Trust

Synthesis across studies revealed four dominant antecedents:

Perceived Competence: Consistently the strongest predictor ($\beta \approx 0.40\text{--}0.55$ across studies). For example, in a 475-participant study on voice commerce, competence explained nearly half of the variance in trust (Vimalkumar, 2021).

Transparency/Explainability: Moderate positive predictor ($\beta \approx 0.20\text{--}0.35$). Particularly impactful in cultures high in Uncertainty Avoidance (Shan et al., 2022).

Anthropomorphism: Mixed effects; positive in contexts valuing social presence, neutral or negative where efficiency is prioritized (Dutsinma et al., 2022).

Privacy and Security: Negative predictor ($\beta \approx -0.25$ to -0.45). In healthcare contexts, privacy concerns were as strong as competence in predicting adoption intent (Zhan et al., 2024).

Table 1. Core Antecedents of Trust in Virtual Assistants (Synthesized Across Studies)

Antecedent	Description	Effect Size (β range)	Notes
Perceived Competence	Accuracy, reliability, task success	0.40 – 0.55	Strongest universal predictor of trust
Privacy & Security	Perceptions of data protection & control	-0.25 – -0.45	Strongest <i>negative</i> predictor
Transparency/ Explainability	Ability to clarify reasoning, error recovery	0.20 – 0.35	More salient in high Uncertainty Avoid.
Anthropomorphism	Human-like cues (voice warmth, social presence)	-0.05 – 0.25	Culture-specific, sometimes negative

Data synthesized from Vimalkumar (2021), Zhan et al. (2024), Shan et al. (2022), and others.

Cultural Moderation

Cultural values altered the weight of antecedents:

Uncertainty Avoidance: In Germany and Japan, explainability significantly boosted trust, while in the U.S., competence remained dominant (Zhang et al., 2022).

Collectivism: In India and Jordan, peer or institutional endorsement increased adoption intention beyond individual evaluations (AI-Kfairy, 2024).

Power Distance: Users in high Power Distance contexts trusted VAs more when endorsed by authoritative institutions (Zhang et al., 2022).

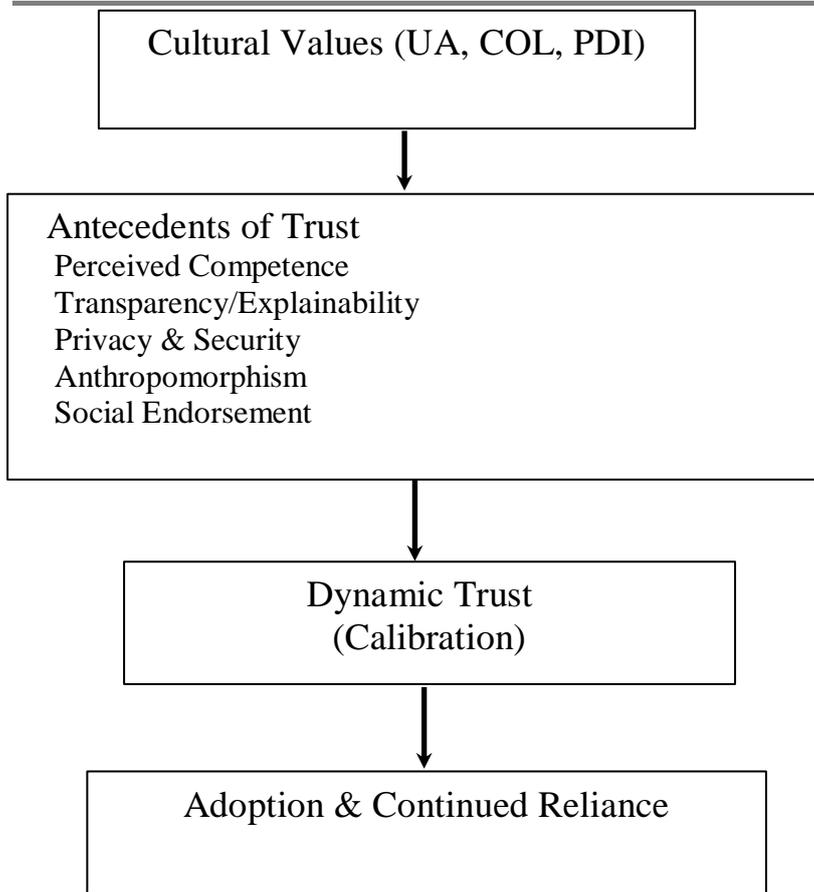


Figure 1. Conceptual Model of Trust Dynamics in VAs

UA = Uncertainty Avoidance, COL = Collectivism, PDI = Power Distance.

Cultural values moderate the strength of antecedents → Trust → Adoption.

Table 2. Cultural Moderation of Trust Antecedents

Cultural Dimension	Influence on Trust Antecedents	Example Contexts
Uncertainty Avoidance	Stronger emphasis on transparency & predictability	Germany, Japan
Collectivism	Social proof and peer endorsements critical	India, Jordan
Power Distance	Institutional endorsements substitute for interpersonal trust	Middle East, China
Individualism	Trust based more on personal evaluation	U.S.A., U.K.

Domain Sensitivity

Healthcare applications demand higher trust thresholds. In a study of Zhan et al. (2024) where 300 users were sampled, both competence and privacy accounted for over 60% of variance in trust, compared to 40% in consumer applications.

Dynamics Over Time

Sabouri et al. (2025) found that initial trust was often based on brand reputation, but subsequent experiences recalibrated trust—both positively (when assistants performed reliably) and negatively (when failures occurred). Hence, trust is dynamic and not static.

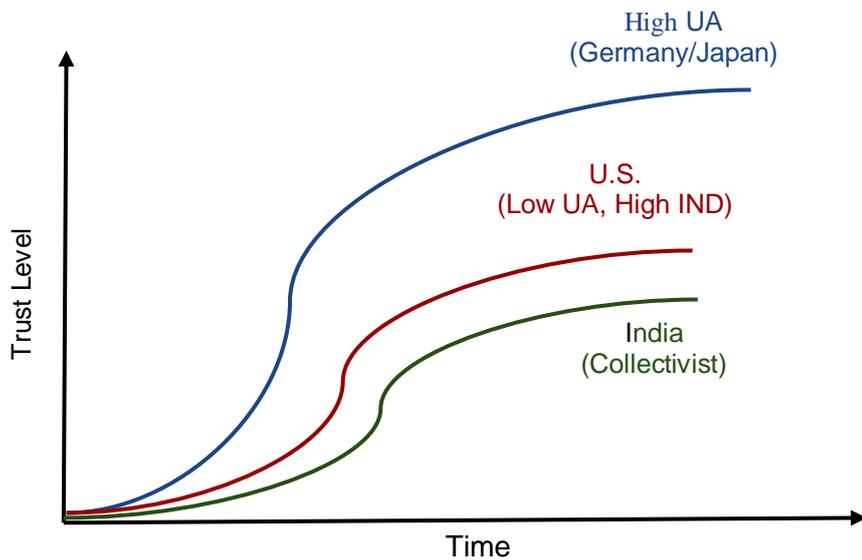


Figure 2. Trust Trajectories Over Time (Illustrative)

Different cultures show distinct “trust calibration curves” over repeated interactions with VAs.

DISCUSSION

The findings support a dynamic, multidimensional model of trust in VAs. Competence and privacy appear universal drivers, while transparency and anthropomorphism are culturally contingent. The expanded analysis of privacy further shows that its influence varies across regulatory environments, with users in stricter regions—such as the EU—demonstrating heightened sensitivity to data collection and storage practices. Importantly, cultural moderation suggests that a “one-size-fits-all” approach to trust-building is inadequate.

For designers, this implies that trust-enhancing features should be localized: for instance, emphasizing transparency in Germany, anthropomorphism in India, and privacy guarantees in the U.S.A. For policymakers, it highlights the importance of context-specific regulation, particularly in healthcare where trust thresholds are higher. These insights reinforce the need for privacy-aware design that reflects regional expectations, ensuring that trust-building strategies remain both culturally and regulatory aligned.

Privacy Concerns in Virtual Assistant Adoption

Privacy Concerns and Regional Sensitivities

Privacy remains one of the strongest determinants of user trust in Virtual Assistants (VAs), with global data indicating that 65% of users express concern over continuous data collection, storage, and potential misuse of personal information. These concerns are heightened by the fact that VAs operate through persistent listening, behavioral logging, and cloud-based processing — all of which increase the perceived vulnerability of sensitive information.

A significant portion of this distrust arises from the opacity surrounding how VA providers collect, process, and retain user data. Users often lack clarity regarding the extent of surveillance, the purposes for which their data is used, and the third parties that may gain access under certain conditions. As a result, privacy concerns become tightly linked to perceived risk, thereby suppressing trust even when functional performance is high.

Regional Differences in Privacy Expectations

Privacy expectations vary widely across geographical and cultural contexts:

European Union (EU): Users in the EU show particularly elevated sensitivity due to strong regulatory frameworks such as **GDPR**, which emphasize user consent, data minimization, and strict penalties for misuse. Consequently, EU users expect greater transparency, robust privacy controls, and clear justification for data collection. Any deviation from these expectations imposes a significant trust penalty.

North America: Users in the U.S. and Canada exhibit moderate privacy concerns but tend to tolerate more data collection when the functional value of the VA is high. Trust is often conditional: users are willing to trade some privacy for convenience, speed, and personalization.

Asia and the Middle East: In several Asian and Middle Eastern contexts, privacy expectations are shaped by collectivist norms and stronger institutional trust. Users may express comparatively lower anxiety about data sharing, especially when VAs are endorsed by reputable institutions or integrated within widely trusted ecosystems.

Implications for Trust Development

The relationship between privacy and trust is not linear. High-performing VAs may still suffer trust deficits if their data-handling processes remain opaque. Conversely, transparent data governance — including clear explanations of what is collected, why, for how long, and under which security controls — can significantly improve user confidence.

Developers must therefore prioritize privacy-by-design, region-specific transparency features, and user-controlled privacy settings to mitigate trust erosion. In essence, addressing privacy concerns is not simply a legal requirement but a critical component of culturally responsive trust formation.

Table 3. Design & Policy Recommendations

Dimension	Design Implications	Policy Implications
Transparency	Provide clear error-recovery & explanations	Require minimal explainability standards
Privacy & Security	Privacy-by-design, encrypted storage	Enforce data protection audits for VAs
Anthropomorphism	Tailor to cultural expectations	Guidelines for socially appropriate VA design
Social Endorsement	Use testimonials & institutional partnerships	Support public trust campaigns in collectivist societies
Domain Sensitivity	Higher safeguards in healthcare & finance	Regulatory sandbox for domain-specific VA use

Conceptual Model

We propose a conceptual model:

Culture × (Competence + Transparency + Privacy + Anthropomorphism + Social Endorsement) → Trust (Dynamic) → Adoption & Reliance.

Culture moderates the weight of antecedents, while time moderates the stability of trust.

IMPLICATIONS

Design Implications

- Localized Transparency: Provide explainability features in high-Uncertainty Avoidance regions.
- Privacy by Design: Essential for healthcare and finance domains.
- Contextual Anthropomorphism: Adjust voice and social presence cues to cultural expectations.
- Social Proof Integration: Useful in collectivist societies where adoption depends on peer endorsement.

Policy Implications

- Global Standards, Local Enforcement: Regulatory bodies should adopt baseline privacy standards but allow for cultural tailoring.
- Cross-Cultural Benchmarking: Policymakers should fund comparative studies to inform localization strategies.

Limitations

The synthesis relied on secondary data; heterogeneity in measurement instruments limits comparability. Most included studies were cross-sectional; few longitudinal datasets exist. Cultural effects may also interact with socioeconomic variables not captured here.

CONCLUSION

Trust in VAs is both universal and contextual: universal in its reliance on competence and privacy; contextual in how transparency and anthropomorphism function across cultures. Understanding and leveraging these dynamics is crucial for the responsible global scaling of AI-driven assistants.

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