Techno-Cultural Friction and Affective Repair: An Intercultural Communication Perspective on Digitized Service Encounters

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Abstract: As China speeds up its shift to a cashless smart society, digital systems have become ubiquitous and completely changed how service interactions work. This paper examines techno-cultural friction that happens when algorithm-driven efficiency meets different cultural expectations. Based on observational data collected in digital service environments, the study analyzes interactions between local service providers and international customers. Integrating Hall's context theory, Hofstede's cultural dimensions, and emotional labor sociology, this study demonstrates that digital dominance inadvertently erodes user autonomy and interpersonal warmth in service interactions. The study argues that solving these frictions requires a shift from system-centered rules to affective repair methods. Here, human initiative and Renqing (relational feelings) fill the gap between strict digital rules and the complex needs of cross-cultural hospitality.

Keywords: Intercultural Communication; Digital Service Encounters; Techno-Cultural Friction; Affective Repair; Renqing

1. Introduction

The digital transformation of daily life, seen through the platformization of consumption, has become a key feature of China's modernization. The fast growth of mobile applications, such as WeChat and Alipay has created a unique digital environment where social networking, financial transactions, and service use are no longer separate (Plantin & de Seta, 2019) [1]. While these mobile-first systems offer great efficiency and convenience for local users, they might also create a digital border for those outside the ecosystem (Liu, 2018) [2]. Similar issues of digital inclusivity are prevalent in other countries undergoing rapid digitalization, and this study takes China as a case study to offer insights for global digital transformation.

In intercultural communication, technology is rarely neutral. Based on the Social Construction of Technology (SCOT) framework (Pinch & Bijker, 1984) [3], technological tools carry the values, assumptions, and social logic of their designers. In China, digital infrastructure values speed, standardization, connection, and collective safety. However, international travelers may care more about independence, privacy, or authentic personal interaction. When these expectations clash with the above values, a phenomenon called "techno-cultural friction" arises.

This paper addresses an important gap in existing research: How does the technological requirement of smart cities interact with the human requirement of cross-cultural hospitality? While many studies focus on how people accept mobile payments (Davis, 1989; Chen, 2008) [4][5], few look at the symbolic and emotional problems these systems cause in intercultural service encounters (ICSE).

Through analyzing a typical service interaction example, we explore the tension between algorithm logic (strict, binary, efficient) and human relationship logic (flexible, nuanced, emotional). We suggest that successful cross-cultural public diplomacy in the digital age depends not on perfect technology, but on people's ability to perform affective repair, which involves strategically adding human warmth and cultural flexibility to automated processes to alleviate the sense of isolation caused by digital exclusion.

In today's globalized world, smart tourism and digital services are growing fast. International travelers often face unexpected difficulties when using local digital services, which affects their travel experience and views of the host country. For China, a major global tourist destination, such friction

could hurt its image as an open and welcoming country. Thus, understanding and solving techno-cultural friction is important for improving service quality, and equally vital for enhancing cross-cultural communication and national soft power.

2. Literature Review

2.1 The Digitization of Service Environments

The idea of servicescape (Bitner, 1992) used to refer to the physical place where a service happens [6]. However, it has evolved into the e-servicescape or phygital (physical + digital) environment. In highly digital societies like China, service interactions are more and more controlled by algorithms. Ritzer (2008) warned about the McDonaldization of Society [7], which is marked by efficiency, calculability, predictability, and control. Digital payment systems are the epitome of this trend, replacing the unpredictability of human interaction with the certainty of code. While this cuts economic transaction costs, it can increase social costs: the loss of small talk and nonverbal signals erodes the traditional foundation of trust among strangers.

In digital service environments, every step from ordering to payment is guided by technology. For local users familiar with the system, this process is smooth and fast. Nevertheless, international users, language barriers, different payment habits, and lack of access to local digital tools can make simple tasks like buying a coffee or taking a taxi very difficult. This difference in experience shows that digital service design often ignores the needs of cross-cultural users, leading to exclusion.

2.2 Intercultural Service Encounters and Digital Conflicts

Intercultural service encounters are interactions between customers and service providers from different cultural backgrounds (Sharma et al., 2009) [8]. These interactions often have "script differences" (Schank & Abelson, 1977) [9], where each side has different expectations about how things should go. In traditional face-to-face interactions, these differences can be fixed through conversation. But in digital interactions, the process is built into the software. When a foreign user's usual way (like paying with a credit card) conflicts with the local digital process (scanning a QR code), it causes not just confusion but a system-wide standstill.

Digital tools simplify service processes but also make them less flexible. For example, many digital ordering systems in China only support local payment methods and languages. This means international users who do not have a local bank account or cannot read Chinese are unable to use the service. Such design ignores the diversity of cultural and behavioral habits in intercultural communication, turning digital tools into a barrier instead of a bridge.

2.3 Technology as a Cultural Product

Technology is a product of culture. Winner (1980) discussed the "politics of artifacts," arguing that technical designs are a form of social order [10]. China's digital payment system is mostly closed, requiring identity verification linked to local banks. This reflects a high-context, high-uncertainty-avoidance culture that values social stability and traceability. On the other hand, Western countries prefer universal credit cards or cash, which reflects values of individualism and freedom of movement.

Different cultures have different views on technology use. For example, individualistic cultures value personal choice and independence, so users from these cultures may feel restricted by digital systems that only offer one payment method. In contrast, collectivist cultures may be more willing to accept standardized digital processes for the sake of efficiency and social order. These cultural differences mean that digital services designed based on one culture's values may not work for users from other cultures, leading to techno-cultural friction.

3. Methodology: Observational Research

This study adopts observational research to explore techno-cultural friction in cross-cultural digital service encounters. Data were collected through non-participant observations (i.e., researchers observed interactions without direct involvement) in international-facing service locations in Guangzhou, Guangdong Province, China.

The specific research site was cultural lounge areas in Beijing Road Pedestrian Street, a popular tourist site with high foot traffic of international visitors. The observation period spanned 1 month (September 2025), with researchers conducting 3 observation sessions per week. Each session lasted 3 hours, scheduled during peak customer hours to ensure sufficient interaction data. A total of 12 observation sessions were completed, accumulating 36 hours of on-site data collection.

During observations, researchers recorded key details of interactions between service providers and international customers, including: (1) intercultural communication barriers: linguistic issues (e.g., Chinglish, misunderstandings of culture-loaded terms) and contextual mismatches (e.g., high/low-context communication style misalignment); (2) service providers' intercultural responses & customer feedback: Bilingual code-switching, nonverbal compensation strategies, and customers' emotional/verbal reactions to cultural adaptation. Data were collected via real-time recording of key dialogues and interactions, then thematically coded to identify common patterns of techno-cultural friction and resolutions.

Ethical Considerations: All observations were conducted in public service areas where no reasonable expectation of privacy exists. To protect the privacy of the individuals involved, all personal identifying information has been anonymized in the data analysis and reporting.

4. Findings: A Case of Techno-Cultural Friction

To illustrate the mechanisms of techno-cultural friction, this section presents an incident analysis based on field notes collected during the observation session on September 15, 2025. While this specific interaction serves as the primary case study, the behavioral patterns exhibited by the participants were consistent with themes identified across 12 separate observation sessions.

4.1 Observation Excerpt

The following analysis focuses on a representative critical incident recorded at a cultural lounge in Beijing Road on September 15, 2025. The interaction involved a service provider and two international customers, referred to here as Client A and Client B to maintain anonymity.

During the observation, Client A attempted to purchase coffee but encountered a functional barrier. The QR-code-based ordering interface supported only Chinese text and local bank linkage. When Client A offered cash, the service provider hesitated, noting the absence of a cash register. Client A expressed visible frustration, characterizing the restriction as an inconvenience. Simultaneously, Client B appeared disengaged. After attempting to initiate a conversation about the menu, Client B was directed back to the QR code by the provider. Client B later commented to a companion that the lack of human interaction diminished the cultural experience.

4.2 The Affective Repair Strategy

Initially, the service provider adhered to the institutional script, explaining the system's convenience. However, upon observing the customers' continued distress, the provider initiated a human override. The provider invited the clients to sit and processed the payment using a personal account, framing it as a treat. This action diffused the tension immediately.

5. Theoretical Analysis

5.1 Efficiency vs. Personal Control: Cultural Values in Digital Systems

The friction in the case is rooted in semiotics, the study of signs and symbols. For the service provider and local customers, the QR code represents modernity, collective order, hygiene, and safety. It stands for a developed society where unnecessary delays are eliminated.

Client A's reaction, while triggered by a technical failure, follows behavioral patterns associated with high individualism (Hofstede, 2001) [11]. In cultures characterized by high individualism, consumer autonomy and the freedom to choose payment methods are often perceived as extensions of personal agency. Consequently, the rigidity of the digital system which offered no alternatives may have been interpreted not merely as a technical glitch, but as an infringement on personal control, triggering psychological resistance.

This conflict shows the "efficiency paradox" (Ritzer, 2008) [7] : when rational systems are overused, they produce irrational results (like customer dissatisfaction) by ignoring users' cultural need for control. Digital systems are designed to be efficient, but efficiency should not come at the cost of excluding users with different cultural backgrounds. Service providers should realize that convenience for everyone should include international users, not just locals.

5.2 High-Context Expectations in a Low-Context Digital Medium

Hall's (1976) context theory helps explain Client B's sense of disconnection [12]. Communication can be high-context (meaning comes from the environment, nonverbal cues, and relationships) or low-context (meaning is clearly stated in words or code).

Digital interfaces are low-context communication tools: binary, explicit, and devoid of nonverbal cues. Client B, however, expects high-context service. In many cultures, the service ritual (greetings, menu discussions, cash exchanges) is where value resides.

The provider's initial mistake was trying to fix a high-context emotional problem with a low-context rational explanation (teaching how to use the app). The conflict was only resolved when the provider abandoned the digital medium and re-established a face-to-face, high-context connection. This shows that digital tools cannot replace human interaction in cross-cultural service encounters, especially for users who value personal connections.

5.3 Affective Repair and Renqing in Conflict Resolution

The turning point in the case, the human override, shows how *Renqing* (human feelings/social responsibility) can resolve conflicts. In Chinese social theory, *Renqing* acts as a way to keep social harmony (Hwang, 1987) [13]. It means breaking strict rules to consider others' feelings. This is different from Western ideas of rule of law or bureaucratic fairness. When the provider paid for the coffee personally, they prioritized *Renqing* (relationships) over *Li* (rules/rituals).

This action is what we call "affective repair." This rule-bending, relationship-centered intervention is a construct distinct from Hochschild's (1983) "emotional labor" [14]. While Hochschild (1983) defined emotional labor as managing feelings to create a visible facial or body expression, affective repair goes further. It is not a display, but a structural fix. It involves strategically setting aside the technological requirement to save human connections. The provider changed from an algorithm enforcer to a cultural host, showing that the visitor's dignity is more important than the system's rules.

Consistent with Ting-Toomey's (1988) Face-Negotiation Theory [15], the digital system posed a threat to the clients' negative face (i.e., the inherent desire for autonomy) by limiting their options and imposing inflexible operational rules. By offering a gesture of goodwill (e.g., complimentary items), the service provider engaged in facework, which restored the clients' sense of dignity and bridged the "us versus machine" divide. Affective repair is not merely a temporary fix; it fosters cross-cultural trust and enhances international visitors' perceptions of the host culture.

Similar affective repair practices proved effective in other observed cases. For instance, a staff member at a museum gift shop assisted a Japanese tourist who was unable to use the digital payment system by processing the transaction manually and explaining the products in simplified English. The tourist subsequently left a positive review, noting that the staff's kindness made her feel genuinely welcome. These instances demonstrate that affective repair is a practical and robust strategy for resolving techno-cultural friction in cross-cultural digital service encounters.

6. Discussion: Toward Inclusive Digital Diplomacy

6.1 The Limitations of Digital Soft Power

Nye (2004) posits that soft power relies on attraction and persuasion rather than coercion [16]. However, digital systems that function as exclusionary barriers act as a form of technological coercion for international visitors. If a smart city infrastructure is accessible only to those with local digital identities, it creates an exclusive community that alienates outsiders. This alienation undermines the attraction component of soft power. Therefore, true soft power in the digital age depends not on the sophistication of the technology, but on the inclusivity of the interface.

6.2 Recommendations for Cross-Cultural Service Design

Businesses combining technology and tourism should adopt a Cultural Synergy approach (Adler & Gundersen, 2008) [17]. This means moving from ethnocentric design (forcing users to adapt to the system) to polycentric design (adapting the system to users). Specific recommendations include:

Technological Pluralism: Systems should have traditional backups. Resilience theory posits having multiple options is more efficient in the long run. Accepting cash or international credit cards is no step backward, but an accessibility feature. For example, cafes could keep a small cash register for users who cannot use digital payments, and ride-hailing apps could support international credit cards.

Empowering Frontline Staff: Service staff are often trained to operate machines, but they should be retrained as cultural brokers. They need the authority to bypass algorithms when cultural values are at stake. Businesses could provide cross-cultural communication training and clear guidelines on when to use human override. For example, staff could be allowed to offer alternative payment methods or manual services for international users.

Culturally Friendly Digital Design: User Experience (UX) design should consider cultural ergonomics. Interfaces should have visual hints and multiple language options to welcome users instead of confusing them. For example, QR code interfaces could automatically switch to English for international phones, and payment systems could clearly show accepted methods.

User Feedback Mechanisms: Businesses should collect feedback from international users to improve digital services. This could include online surveys, suggestion boxes, or direct conversations with customers. By understanding the specific difficulties international users face, businesses can make targeted improvements to reduce techno-cultural friction.

These recommendations are practical and feasible. Notably, positive progress has already been made in some Chinese cities: cafes in Shanghai have begun accepting international credit cards and providing English menus in response to foreign customer feedback, while WeChat Pay and Alipay have gradually expanded support for overseas bank card binding.

6.3 The Role of Affective Repair in Digital Diplomacy

Affective repair is not just a tool for resolving individual service conflicts; it also plays a key role in digital diplomacy. In an era where cross-border interactions are increasingly mediated by technology, small service encounters can shape national images. The service provider's act of offering a free coffee, though simple, sends a powerful message: the host culture values human connection over rigid systems. This kind of emotional engagement can counteract negative perceptions caused by digital exclusion and build positive cross-cultural relationships.

Digital diplomacy should not be limited to government-led initiatives; it also involves everyday interactions between citizens and international visitors. Frontline service staff are cultural ambassadors in digital service encounters. By training staff to perform affective repair, countries can turn potential conflicts into opportunities for cross-cultural understanding. For example, when a service provider takes the time to help an international user navigate a digital system or offers an alternative solution, they are not just solving a problem; they are promoting mutual respect and trust.

Moreover, affective repair can complement technological improvements. While designing inclusive digital systems is essential, there will always be situations where technology fails to meet cultural needs. In these cases, human flexibility and empathy become critical. Affective repair provides a safety net, ensuring that international visitors do not feel abandoned by the system. This combination of technological inclusivity and human empathy is the foundation of effective digital diplomacy.

7. Conclusion

Digitalization reshapes intercultural service encounters by delivering unparalleled efficiency, yet it also creates digital walls that exclude international users, giving rise to techno-cultural friction when algorithmic logic conflicts with cultural values (e.g., individual autonomy, high-context communication).

Resolving this friction requires a dual approach: inclusive technological design (e.g., technological pluralism, culturally friendly UX, empowered staff) to reduce friction, and affective repair rooted in empathy and *Renqing* to resolve conflicts and restore human connection.

Academically, this study enriches intercultural service encounter literature by highlighting digitalization's impact and expanding the role of affective repair. Practically, it offers actionable recommendations for tourism and service industries to enhance cross-cultural service quality. For smart cities and digitally modernizing nations, true progress hinges on balancing technological efficiency with inclusivity and human warmth, ensuring technology bridges rather than divides cultures.

It is important to acknowledge a limitation of this research: the observational data were collected solely from international-facing service locations in Guangzhou, Guangdong Province. As a major tourist and business hub in southern China, Guangzhou's digital service landscape and cross-cultural interaction patterns may not fully represent those in other regions with distinct cultural contexts, industrial structures, or levels of digital infrastructure development. This single-site focus may constrain the generalizability of the study's findings to a broader national or global context.

Future research may address this limitation by conducting multi-site comparative observations across different regions of China or other digitally advancing countries. Additionally, future studies could explore the long-term effects of affective repair, the efficacy of staff training programs, and cross-national comparative analyses to deepen the global understanding of techno-cultural friction.

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