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ABSTRACT

The digitization of Textile Intangible Cultural Heritage (ICH) is critical for its preservation and modernization. However, the mechanism by which digital storytelling enhances the communication effectiveness of traditional textile techniques on short video platforms remains underexplored. This study establishes a theoretical model based on the Stimulus-Organism-Response (S-O-R) framework to evaluate the impact of narrative structure, visual technology, and interactivity on user engagement and cultural identity. We utilized Python web crawlers to collect data from 1,240 textile-related videos on Douyin (TikTok China version) and conducted a questionnaire survey (N=458). Structural Equation Modeling (SEM) was employed to test the hypotheses. The results indicate that "Process-Deconstruction" narratives (focusing on technical parameters like weaving density and dyeing temperature) have a significantly higher positive impact on Perceived Usefulness ($\beta=0.42, p < 0.001$) compared to "Historical-Background" narratives. Furthermore, visual immersion mediated by macro-lens cinematography significantly influences the Intention to Disseminate. This research provides a data-driven strategy for optimizing algorithmic recommendations and content creation for textile heritage, bridging the gap between information engineering and textile preservation.

KEYWORDS

textile intangible cultural heritage, digital storytelling, short video algorithms, communication effectiveness, structural equation modeling

INTRODUCTION

Research Background

Textile Intangible Cultural Heritage (ICH), encompassing exquisite techniques such as Nanjing Yunjin brocade, Batik, and Kesi weaving, represents the pinnacle of historical manufacturing technology and aesthetic

philosophy[1-3]. These artifacts are not merely decorative objects; they are complex engineering systems involving material science (e.g., the chemistry of natural dyes) and mechanical engineering (e.g., the binary logic of Jacquard looms)[4]. However, the inherent complexity of these techniques, coupled with the decline of traditional apprenticeship systems, has precipitated a severe “crisis of inheritance” in the modern era[5]. In the context of Industry 4.0, the preservation paradigm for textile heritage has shifted from static museum displays to dynamic digital dissemination[6]. Short video platforms (e.g., TikTok, YouTube Shorts, Douyin) have emerged as the primary channels for information consumption among younger generations[7]. Unlike traditional documentaries which allow for long-form narration, short videos rely heavily on algorithmic distribution and fragmented narrative structures[7]. In this environment, the “communication efficiency” of the content—defined by how effectively the technical and cultural codes of the textile are decoded by the audience within seconds—becomes the critical metric for preservation success[8].

However, existing literature predominantly focuses on the aesthetic value of textile ICH or the chemical preservation of fibers[9]. There is a notable lack of empirical research on the “mechanisms of information transmission”: specifically, how different narrative structures variables affect the efficiency of information decoding by the audience. While museums digitize artifacts, they often fail to optimize the content for the algorithmic logic of social media platforms.

Problem Statement and Research Gap

Current studies in digital heritage largely rely on qualitative case studies or aesthetic criticism[10]. There is a significant deficit in quantitative data regarding which specific narrative elements maximize algorithmic performance and user engagement[11]. Current digital heritage content often prioritizes the ‘legend of the weaver’ (Historical Narrative). However, for a modern audience accustomed to ‘How-To’ content and algorithmic learning, such narratives may lack instrumental value. There is a need to understand if the audience engages more with the ‘mechanics of the loom’ (Technical Narrative) because it offers transparency into the production process, thereby satisfying a specific epistemic curiosity that historical context alone cannot address.

Research Objectives

This study aims to bridge the gap between textile engineering and information science by achieving three specific objectives:

1. Quantify Narrative Elements: To utilize data mining techniques to categorize and quantify the narrative structures of Textile ICH videos.
2. Model Construction: To construct a theoretical model measuring the correlation between Digital Storytelling modes and Audience Interaction Metrics (AIM) using the S-O-R framework.
3. Practical Strategies: To provide distinct, rigorous recommendations for digital content engineering in the textile sector, shifting the focus from “storytelling” to “technical visualization”.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Digital Storytelling in the Textile Engineering Context

Digital Storytelling (DS) is conventionally defined as the practice of combining narrative with digital content, including images, music, and voiceovers[12]. However, in the specific context of textile engineering, DS transcends simple narration. It involves the visualization of abstract technical parameters—such as yarn twist (S/Z twist), fabric structural mechanics (plain vs. twill vs. satin), and dyeing thermodynamics—into accessible visual formats[13]. We define this specialized form of DS as “Technical Deconstruction.”[14] This approach treats the textile artifact not just as art, but as a “technology system” that needs to be decoded. The effectiveness of DS in this domain depends on its ability to make the “invisible” craft process (e.g., the internal friction of fibers) “visible” to the lay audience[15].

The S-O-R Framework Application

To analyze the psychological mechanism of user engagement and information propagation, we adopt the Stimulus-Organism-Response (S-O-R) framework. This model, rooted in environmental psychology, posits that environmental cues stimulate an individual’s internal state, which in turn drives behavioral responses.

- Stimulus (Input): The environmental variables present in the video content. In this study, these are identified as Narrative Structure (Historical vs. Technical), and Visual Technology (Immersion level). These represent the design elements of the digital content.
- Organism (Process): The internal psychological states of the viewer. We draw upon the Technology Acceptance Model (TAM) and Information System Success Model to identify Perceived Usefulness (epistemic value) and Perceived Enjoyment (hedonic value/flow) as the key mediators. “Cultural Identity” is also considered as a resonant state.

- Response (Output): The behavioral outcome, measured here as Communication Effectiveness, which includes quantifiable metrics such as Likes, Shares, Comments, and Completion Rate.

Hypotheses Development

Based on the S-O-R framework and the specific nature of textile engineering, we propose the following hypotheses:

- H1: Effect of Narrative Structure on Perceived Usefulness. Unlike general entertainment, Textile ICH involves complex engineering systems (material science and mechanical logic) that are often opaque to lay audiences, creating high information entropy. While historical narratives provide cultural context, they do not resolve the cognitive ambiguity regarding how the artifact is constructed. We posit that Technical Deconstruction acts as a cognitive tool that reduces this complexity. By visualizing abstract parameters, it transforms “tacit knowledge” into “explicit information”, thereby lowering the cognitive barrier to entry. Therefore, users perceive “Process-Deconstruction” narratives as more useful not merely because they are educational, but because they uniquely facilitate cognitive decoding of the craft’s complexity compared to historical storytelling.
- H2: Effect of Visual Technology. Textiles are tactile objects. In a digital medium, the sense of touch must be translated visually. We hypothesize that High-fidelity Visual Immersion (e.g., macro shots of fiber interaction, high frame-rate motion) has a positive effect on Perceived Enjoyment. This aligns with the concept of “Haptic Visuality,” where high-definition visuals trigger a sensory simulation of touch.
- H3: Drivers of Dissemination. While enjoyment is important for consumption, utility is the driver of propagation. We hypothesize that Perceived Usefulness of textile knowledge creates a stronger correlation with Sharing Behavior than Perceived Enjoyment. Sharing technical content is a social signal of intelligence and cultural literacy.

METHODOLOGY

To ensure scientific rigor and data robustness suitable for scientific standards, this study employs a Mixed-Method Research Design combining Big Data Content Analysis (Phase I) with Survey-based Structural Equation Modeling (Phase II). This dual approach allows us to corroborate subjective psychological data (from surveys) with objective behavioral data (from platform logs).

Phase I: Content Mining and Classification

Data Collection Mechanism

We developed a custom Python-based web crawler to harvest metadata from the Douyin (TikTok China) platform, which hosts the world's largest repository of short-form textile content. The data acquisition process was executed using the Selenium automation framework to handle dynamic JavaScript rendering and BeautifulSoup for HTML parsing.

- **Sampling Frame:** The crawler targeted videos tagged with specific keywords: #TextileHeritage, #TraditionalWeaving, #Batik, and #NanjingBrocade.
- **Time Window:** Data was collected between January 1, 2024, and December 31, 2024.
- **Filtering Logic:** To ensure the analysis focused on high-impact content, we filtered for the top 10% of videos ranked by engagement metrics. This sampling strategy explicitly targets 'exemplary cases' to model best practices. By excluding the bottom 90%, we control for confounding variables prevalent in low-reach content—such as poor video resolution, unstable camera work, or irrelevant tagging—which would otherwise obscure the specific impact of narrative structure on engagement. After removing duplicates, commercial advertisements, and low-resolution uploads (<720p), a final dataset of 1,240 valid videos was retained.
- **Extracted Metrics:** The crawler extracted seven key engineering parameters for each video: Duration (seconds), Resolution, Frame Rate (fps), Likes, Shares, Comments, and Forwarding count.

Phase I: Content Mining and Classification

To transform unstructured video content into measurable variables, a manual coding process was conducted. Three independent researchers coded the videos into distinct narrative categories based on their primary visual focus. Inter-coder reliability was assessed using Kappa statistics ($k=0.88$), indicating high agreement. The videos were classified as follows :

- **Type A: Historical/Cultural (N=410):** Videos focusing on the lineage of inheritors, oral legends, or static museum displays. The camera work is typically static or focused on human faces.
- **Type B: Technical/Process (N=380):** Videos explicitly visualizing the engineering process. Key visual elements include the mechanical motion of looms, the chemical mixing of dyes, or the geometric logic of pattern formation.

- Type C: Aesthetic/Product (N=450): Videos focusing on the finished textile product, often featuring fashion shows or model walkthroughs.

Data Collection and Sampling

The survey was distributed online to a targeted audience of users who had previously engaged with textile-related content. To ensure data quality, attention check questions were inserted, and responses with completion times under 60 seconds were discarded.

- Valid Sample: A total of 458 valid responses were obtained.
- Demographics: The sample consisted of 62% female and 38% male respondents, with 45% aged between 18 and 25 (Gen Z). This demographic profile aligns with the primary consumption group for short video content

DATA ANALYSIS AND RESULTS

Reliability and Validity Assessment

The survey data was analyzed using SPSS 26.0 for descriptive statistics and AMOS 24.0 for confirmatory factor analysis (CFA). The measurement model demonstrated excellent psychometric properties.

- Internal Consistency: The Cronbach's Alpha (α) for all constructs exceeded 0.85, significantly surpassing the recommended threshold of 0.70.
- Sampling Adequacy: The Kaiser-Meyer-Olkin (KMO) measure was 0.912, and Bartlett's Test of Sphericity was significant ($p < 0.001$), confirming the data was suitable for factor analysis.
- Convergent Validity: The Average Variance Extracted (AVE) for each latent variable ranged from 0.614 to 0.756, all exceeding the 0.50 benchmark. The Composite Reliability (CR) values were all above 0.85. This confirms that the measurement items effectively converged on their respective constructs.

Content Analysis Results

The analysis of the 1,240 harvested videos revealed a significant "Engagement Anomaly" that challenges traditional assumptions about cultural content.

Table 1. Comparative Analysis of Narrative Types

Narrative Type	Count (N)	Avg. Likes	Avg. Shares	Avg. Completion Rate
Type A: Historical	410	12,500	450	42%

Table 1. Comparative Analysis of Narrative Types

Narrative Type	Count (N)	Avg. Likes	Avg. Shares	Avg. Completion Rate
Type B: Technical	380	28,300	1,200	68%
Type C: Aesthetic	450	18,200	320	55%

While “Aesthetic” videos (Type C) were the most numerous, they generated the lowest share count (320). In sharp contrast, Type B (Technical/Process) videos outperformed all others, achieving the highest average shares (1,200) and completion rate (68%). This finding is pivotal for textile engineering communication: it suggests that users treat Textile ICH videos as knowledge assets rather than merely entertainment. The high “Share” metric for technical content implies a desire to disseminate useful engineering knowledge, whereas aesthetic content is consumed passively.

Structural Equation Modeling (SEM)

We constructed a path analysis model to rigorously test the hypotheses. The Structural Equation Model showed a satisfactory fit to the data: $\chi^2_{df} = 2.14$, $RMSEA = 0.048$, $DFI = 0.96$

Path Coefficients:

1. Technical Deconstruction → Perceived Usefulness(H1 Supported): The path coefficient is significant ($\beta = 0.42$, $t = 6.12$, $p < 0.001$). The structural path supports H1 ($\beta = 0.42$), confirming that the ‘engineering logic’ is the primary driver of utility. This finding clarifies the mechanism of engagement: users do not inherently view all cultural videos as useful; rather, they assign high utility specifically to content that demystifies the technical barrier of the craft. The ‘Process-Deconstruction’ narrative succeeds because it serves a functional role—translating the ‘black box’ of heritage skills into accessible logic—whereas historical narratives serve a primarily symbolic role. Users value the “deconstruction” of complex techniques over abstract cultural narratives.
2. Visual Immersion → Perceived Enjoyment (H2 Supported): The path coefficient is strong ($\beta = 0.58$, $t = 8.45$, $p < 0.001$). This confirms that high-fidelity visuals (e.g., macro shots showing thread twist and dye penetration) are essential for creating a sensory experience.
3. Usefulness vs. Enjoyment → Intention to Share (H3 Supported):
 - Path from Perceived Usefulness to Share: $\beta = 0.65$, $p < 0.001$.
 - Path from Perceived Enjoyment to Share: $\beta = 0.31$, $p < 0.01$. Critical Finding: The influence of Usefulness (0.65) on sharing behavior is more than double that of Enjoyment (0.31). This statistically validates that

the dissemination of textile heritage is driven by its informational value. Users share content because they learned a technique, not just because they enjoyed the visuals.

Moderating Effect of Video Duration

To provide precise parameters for content engineering, we introduced Video Duration as a control variable in our analysis. Given the fragmented nature of short video consumption, we hypothesized a non-linear relationship between duration and engagement. We modeled this using a quadratic regression equation:

$$Engagement = \alpha + \beta_1(Narrative) + \beta_2(Duration) + \beta_3Duration^2 + \epsilon \quad (1)$$

The analysis yielded a significant negative coefficient for the quadratic term ($\beta_3 < 0$), confirming a distinct Inverted U-shape relationship¹. This inverted U-shape confirms that 45–90 seconds represents the optimal ‘Cognitive Efficiency Window.’ It provides sufficient duration for Technical Deconstruction (allowing the mechanism to be fully shown) without triggering attention decay. This validates that engineering content requires a specific temporal structure distinct from the 15-second rhythm of entertainment trends. The “Complexity Paradox” (< 30s): Videos under 30 seconds showed a sharp decline in ‘Perceived Usefulness.’ We attribute this to ‘Narrative Fragmentation.’ Unlike aesthetic content, technical textile processes (e.g., the ‘passing warp and cutting weft’ technique of Kesi) require a minimum temporal footprint to be logically sequenced. When compressed into less than 30 seconds, the causal links between steps are severed, preventing the user from forming a coherent mental model of the technique.

The “Attention Decay” (> 120s): Videos exceeding 2 minutes suffered from significant drop-off rates. While longer videos allow for detail, they exceed the typical sustained attention span of short-video platform users. The cumulative cognitive load required to process continuous technical information on a mobile screen leads to fatigue, negatively impacting the ‘Response’ phase (completion rate).

The Role of “Haptic Visuality”

The strong correlation between Visual Immersion and Perceived Enjoyment ($\beta=0.58$) supports the theory of digital materiality. In textile preservation, the axiom is “Seeing is Feeling.”

Since users cannot physically touch the fabric through a screen, the camera lens serves as a visual proxy for tactile information. When the video captures the fuzziness of wool or the sheen of silk at a macro level (high-definition close-ups), it evokes a psychological sense of a “haptic viscosity” response. Critically, this effect is

not diminished by the small size of mobile screens; rather, it is amplified by them. While wide-angle shots often lose detail due to platform compression algorithms, macro-lens cinematography fills the limited mobile viewport with high-contrast textural information (e.g., the specific twist of a fiber). This ‘visual saturation’ allows the texture to survive compression, effectively compensating for the lack of physical scale and ensuring the sensory simulation remains intact even on handheld devices. This implies that the “resolution” and “macro capability” of the recording equipment are not merely technical specifications, but essential narrative tools that bridge the physical-digital divide.

Algorithmic Implications for Content Engineering

Short video algorithms prioritize Completion Rate and Reshare Rate to determine content distribution. Since Technical Deconstruction videos drive these metrics (as shown in Table 1), content creators must align with these algorithmic preferences.

Engineering Recommendations:

1. High Frame Rates (60fps): We recommend recording at 60fps rather than the cinematic 24fps. Textile manufacturing involves rapid mechanical motions (e.g., the shuttle flying across the shed). High frame rates reduce motion blur, preserving the visual integrity of the technical process.
2. Semantic Tagging: Platforms should optimize recommendation logic to pair “Process-oriented” videos with users who have high “Curiosity” scores, rather than just “Art” interests.
3. The “Dual-Route” Strategy: While visual immersion attracts the user (Emotional Route), the technical explanation drives the sharing behavior (Utility Route). Effective content must satisfy both.

CONCLUSION

Main Findings

This study provides empirical evidence that the communication effectiveness of Textile Intangible Cultural Heritage on short video platforms is driven primarily by the informational value of technical processes.

- Process over Plot: Users are 42% more likely to perceive a video as “useful” if it focuses on technical parameters (weaving density, dyeing temperature) rather than historical background.
- Utility Drives Propagation: The intention to share content is driven twice as strongly by Perceived Usefulness ($\beta=0.65$) than by Perceived Enjoyment ($\beta=0.31$). This confirms that textile heritage spreads as a “knowledge asset.”

Practical Implications

For the textile industry and museums, these findings imply a critical need to invest in Macro-Cinematography and Data Visualization (e.g., animations of weave structures) when producing digital content. The “Black Box” of traditional craftsmanship must be opened via digital deconstruction. Museums should pivot from producing “documentaries” to producing “technical shorts” that fit the 45-90 second algorithmic window.

Limitations and Future Work

This study is currently limited to Chinese users on the Douyin platform. Second, the decision to sample only the top 10% of videos introduces a survivorship bias. While this ensures high data quality, it limits the generalizability of the findings to ‘successful’ content. Future studies should include low-engagement videos to test if Technical Deconstruction remains effective in the absence of algorithmic promotion. Future research should extend this model to international platforms (TikTok Global, YouTube) to test cross-cultural validity. Additionally, future work could incorporate biometric data, such as Eye-Tracking technology. Crucially, while this study posits a ‘haptic’ connection, our current methodology relies on self-reported psychological data. Future research using physiological sensors (e.g., EEG or skin conductance) is necessary to empirically validate the neural basis of this cross-sensory stimulation. By objectively measuring which parts of the textile pattern (e.g., the border vs. the center field) attract the most visual attention, researchers can provide physiological validation for the “Visual Immersion” construct, further tightening the link between human physiology and digital textile consumption.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Author Contributions

Yanlin Liu designed, collected and analyzed the data, and drafted the manuscript. Also, she conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Yanlin Liu participates fully in the work, takes public responsibility for appropriate portions of the content, and agrees to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of Interest

The author declares no conflict of interest.

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Ethics Approval and Consent to Participate

This survey was conducted in compliance with the guidelines of the Ethics Committee of Hunan Mass Media Vocational and Technical College. Participants were informed of the study's purpose and data usage prior to participation, and responses were collected anonymously. No personally identifiable information was stored.

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REFERENCES

- [1] Xu L, Lu L, Liu M, Song C, Wu L. Nanjing Yunjin intelligent question-answering system based on knowledge graphs and retrieval augmented generation technology. *Heritage Science*. 2024;12(1). doi: 10.1186/s40494-024-01231-3
- [2] Yu L. Digital sustainability of intangible cultural heritage: The example of the "Wu Leno" weaving technique in Suzhou, China. *Sustainability*. 2023;15(12):9803. doi: 10.3390/su15129803
- [3] Saddhono K, Widodo ST, Al-Makmun MT, Tozu M. The study of philosophical meaning of batik and kimono motifs to foster collaborative creative industry. *Asian Social Science*. 2014;10(9):52. doi: 10.5539/ass.v10n9p52
- [4] Fernaeus Y, Jonsson M, Tholander J. Revisiting the jacquard loom: threads of history and current patterns in HCI. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 2012:1593-602. doi: 10.1145/2207676.2208280
- [5] Song X, Yang Y, Yang R, Shafi M. How are Chinese traditional handicraft skills inherited from master to apprentice? *International Journal of Technology and Design Education*. 2024;34(4):1543-59. doi: 10.1007/s10798-023-09867-1
- [6] Alviz-Meza A, Vasquez-Coronado MH, Delgado-Caramutti JG, Blanco-Victorio DJ. Biblio-metric analysis of fourth industrial revolution applied to heritage studies based on web of science and scopus databases from 2016 to 2021. *Heritage Science*. 2022;10(1):1-17. doi: 10.1186/s40494-022-00821-3
- [7] Gao Y, Liu F, Gao L. Echo chamber effects on short video platforms. *Scientific Reports*. 2023;13(1):6282. doi: 10.1038/s41598-023-33370-1
- [8] Hall S. Encoding and decoding in the television discourse. *CCCS selected working papers*. Routledge; 2007. p. 402-14. doi: 10.4324/9780203357071-35

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- [9] Li X, Romainoor NH. Explaining residents support to protect Gejia batik through the value-attitude-behavior model and theory of planned behavior. *Heliyon*. 2024;10(9). doi: 10.1016/j.heliyon.2024.e30205
- [10] Bekele MK, Pierdicca R, Frontoni E, Malinverni ES, Gain J. A survey of augmented, virtual, and mixed reality for cultural heritage. *Journal on Computing and Cultural Heritage (JOCCH)*. 2018;11(2):1-36. doi: 10.1145/3145534
- [11] Fisher D, Smith M, Welsch HT. You are who you talk to: Detecting roles in usenet newsgroups. *Proceedings of the 39th Annual Hawaii International Conference on System Sciences (HICSS06)*. 2006;3:59b-b. doi: 10.1109/HICSS.2006.536
- [12] Lundby K. *Digital storytelling, mediatized stories: Self-representations in new media*. Peter Lang; 2008.
- [13] Lomov S. WiseTex-A virtual textile composites software. *Advanced Weaving Technology*. 2022:293-318. doi: 10.1007/978-3-030-91515-5_7
- [14] Ryan M-L. *Narrative as virtual reality 2: Revisiting immersion and interactivity in literature and electronic media*. JHU press; 2015.
- [15] Partarakis N, Doulgeraki P, Karouzaki E, Zidianakis E, Zabulis X. Multimodal Presentations of the Tangible and Intangible Dimensions of Traditional Crafts. *Interactive Media for Cultural Heritage*. 2025:425-48. doi: 10.1007/978-3-031-61018-9_19