Idealogy Journal Vol. 10 No. 1, 2025, pp 148-158
DOI: https://doi.org/10.24191/idealogy.v10i1.740
Section: Original Article

# CLO3D and Posthumanism: Rethinking the Relationship Between Body, Fabric, and Digital Space in Malaysian Fashion

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## ABSTRACT

*This study examines how CLO3D, a 3D fashion design software, reconfigures the relationship between body, fabric, and cultural identity in Malaysia's fashion industry through a post-humanist lens. By analysing qualitative interviews with six Malaysian designers and visual-textual artifacts from CLO3D projects, the research reveals three transformative dynamics: (1) the emergence of digital corporeality, where non-normative avatars disrupt anthropocentric ideals of the body; (2) distributed agency between human designers and algorithmic tools, challenging traditional notions of authorship; and (3) the hybridization of cultural heritage, as motifs like batik and songket merge with cyber-digital aesthetics. Findings demonstrate CLO3D's dual role as a decolonial tool for subverting Eurocentric fashion hierarchies and a neoliberal force that risks commodifying cultural symbols. The study highlights tensions between sustainability and digital consumerism, as well as debates over the devaluation of artisanal craftsmanship in virtual workflows. By centering Malaysia's postcolonial context, this article addresses gaps in non-Western perspectives on digital fashion. It concludes with recommendations for integrating post-humanist frameworks into ASEAN fashion pedagogy, fostering ethical digital preservation of cultural heritage, and advocating for green technologies to mitigate CLO3D's environmental footprint. This research contributes to broader discourses on technology's role in redefining identity, materiality, and agency in Global South creative industries.*

***Keywords:*** *Posthumanism, Digital Fashion, CLO3D, Malaysian Cultural Identity, Non-Human Agency*



## 1 INTRODUCTION

The Malaysian fashion industry, celebrated for its rich heritage of textiles such as *batik* and *songket*, stands at a critical juncture where tradition intersects with digital innovation. Emerging technologies like CLO 3D, is a 3D garment simulation software were our reshaping design practices, enabling creators to bypass physical limitations inherent in conventional methods. This shift aligns with post-humanist theory, which critiques human exceptionalism and reimagines agency as a distributed network between organic and technological actors (Braidotti, 2013). In Malaysia's postcolonial context, where Eurocentric aesthetics have historically influenced design hierarchies, CLO3D offers a transformative space to reinterpret cultural garments such as the *Baju Kurung* and *Kebaya* beyond the constraints of human bodies and traditional looms.

The integration of CLO3D by new fashion and textile practices offers significant questions about cultural conservations, creative authorship and implications to ethics. While digital tools offer real potential for furthering sustainability, including diminished textile waste, mediated virtual prototyping and they are also a threat to commodifying culturally-significant symbols under neoliberal regimes. Digitising traditional *songket* motifs for the international market, for example, may dilute their artisanal roots; while using algorithms to adjust the way fabric hangs could diminish the artisan's unique role as the main creative agent. Such contradictions highlight the need to interrogate how technologies such as CLO3D mediate the relationships between corporeality, materiality and cultural identity. Examining these tensions from a post-humanist perspective, this research delves into the complexities that govern the interplay of technological advancement and cultural heritage conservation.

## 1.1 Research Objectives

This study aims to fill important gaps in understanding the impact of trends and transitions in digital technologies (such as digital fashion design technologies or CLO3D) used to shape garments design throughout the socio-cultural field of the Malaysian context. Its objectives are threefold. First, it seeks to analyse CLO3D's reframing of the relationship between body and fabric, specifically through the simulation of non-normative avatars and virtual textiles. Through explorations of wheelchair-adapted Baju Kurung or gender-fluid kebayas, the research considers how digital tools subvert the anthropocentric normativity of the body sonically and texturally in fashion. Second, it interrogates the redistribution of creative agency between human designers and algorithmic systems. By employing case studies of designers negotiating CLO3D's autonomous fabric physics, the study interrogates traditional forms of authorship, and asks: Is software a co-creator? Third, it recommends ethical framework; a dialectic between innovation and cultural integrity that preserves, rather than erodes, Textile heritage in Malaysia via technologies like CLO3D.

## 1.2 Significance

This work makes two major contributions in both academic and industry circles. Academically, it builds upon post-humanist theory by putting Braidotti's writing into non-Western, real-world contexts; a rare approach for digital fashion scholarship dominated by Eurocentric perspectives. By focusing on Malaysian designers, we break the deafening silence of northern technological narratives, offering an original perspective on how postcolonial societies such as our own construct popular identities after globalization using CLO3D. Practically, conclusions from this study are of vital concern to ASEAN stakeholders.

As digital tools are increasingly adopted into curricular structures at Malaysian institutions like UiTM, the report argues for a kind of education which puts as much emphasis on preserving culture as it does teach technical skills. In this vein, its policy suggestions may well be taken up by various governments in support of digitization projects which seek to maintain traditional crafts such as *songket* weaving, enabling artisans to keep their place at society's technological table. Ultimately, the significance of this research is to show Malaysia as a positive player in fashion's future - where tradition and innovation dung closely together.

# 2 LITERATURE REVIEW

## 2.1 Posthumanism and the Deconstruction of Fashion's Anthropocentrism

The post-humanist critique of Eighteenth-Century thinking identifies its fixation on the human subject as dualistic, in ascribing all agency to human actors and leaving no room for others (Braidotti, 2019). In fashion studies, this has disruption has unsettled the notion that the designer is the sole 'author' of garments, recasting creativity as collaborative, generating agentic bodies, materials and technologies

(Betts, 2021). Bennett's (2010) vibrant matter, for example, recasts fabric as a vital ingredient in design, influenced by digital technologies like CLO3D whose autonomous algorithms direct drape, friction, and movement. It is consistent with Barad's (2007) agential realism that claims that meaning emerges in the 'intra-action' between human and non-human agent.

Against that backdrop the human body has ceased to be the fashion reference point. Scholars like Geczy and Karaminas (2021) contend that digital avatars, from genderless via size-fluid and fantastical ones, partake of posthumanism's denial of biological essentialism. The body becomes intrinsically tied to one's design practice, as Bugg (2022) points out, "With 3D software, garments can be designed for unusual bodies, prosthetic-embedded clothing, and hyper-extended forms" But most of this scholarship is still focused on Euro-American contexts, and there is little here that explores the relationship between post-humanist practices in Western cultural contexts and non-Western cultural identities. This study aims to bridge this gap by examining data from Malaysia

## 2.2 CLO3D in Global Fashion: Between Neoliberalism and Cultural Preservation

The growing adoption of CLO3D reflects a broader shift towards digitalisation within the fashion industry, largely driven by the need for greater sustainability, cost efficiency, and streamlined supply chains (Lee, 2023). Its virtual sampling feature, which can reduce textile waste by up to 30% (CLO3D, 2023), has made it particularly attractive to global brands seeking to adopt more environmentally responsible practices. However, some critics argue that such technologies may reinforce neoliberal priorities by privileging speed and profit over traditional craftsmanship (Ahmed, 2022). For example, the art of pattern-cutting, a skill refined over decades of practice, is increasingly being replaced by algorithmic modifications, raising concerns about the potential erosion of human expertise.

Paradoxically, CLO3D also holds decolonial potential. In South Korea, designers have digitised hanbok (traditional attire), using the software to reimagine historical silhouettes for modern audiences (Kim & Park, 2022). Similarly, Nigerian designers employ 3D tools to prototype *ankara* prints, circumventing the financial barriers of physical sampling (Adeyemi, 2021). These cases illustrate how CLO3D can democratise design access while preserving cultural heritage. However, scholarly analysis remains sparse in Southeast Asia, particularly in Malaysia, where colonial legacies complicate the adoption of 'Western' technologies.

## 2.3 Postcolonial Tensions in Malaysian Fashion

Malaysia's sartorial identity is deeply entwined with its multicultural heritage, from the intricate motifs of *songket* weaving to the wax-resist dyeing of batik. Yet, as Nagata (2020) notes, British colonial rule entrenched Eurocentric aesthetics as markers of modernity, marginalising indigenous textiles as 'craft' rather than 'art'. Contemporary designers navigate this tension by hybridising tradition and innovation—a practice exemplified by Melinda Looi's batik couture and Bon Zainal's deconstructed Baju Kurung (Aziz, 2021).

Digital tools such as CLO3D introduce new layers of complexity. While they create opportunities to reinterpret cultural heritage—for example, by digitally replicating the distinctive gold-thread sheen of *songket*—they also pose the risk of reducing cultural symbols to commodifiable 'assets' (Hassan, 2022). This tension reflects broader debates within postcolonial digital humanities, where digitisation initiatives often navigate a fine line between cultural preservation and appropriation (Risam, 2018). For instance, Indian scholars have critiqued the digitisation of handloom patterns as a form of epistemic extraction (Ghosh, 2020), yet this concern remains largely unexplored in the Malaysian context.

# 3 METHODOLOGY

This study used a mixed-methods framework consisting of case study analysis, semi-structured interviews, and visual-textual ethnography. CLO played a huge role in changing our traditional design ways with triangulation through the data we collected. Based on the principles of materials posthumanism (Braidotti, 2013), the research aimed at disrupting anthropocentric assumptions by centripetalising entities (human designers, digital tools, and cultural heritage) entangled with each other.

A case study approach was chosen to capture the in-depth, contextual information regarding how Malaysian designers interact with CLO3D. Six designers were purposively sampled according to their application of the software in reinterpreting traditional textiles such as *batik* and *songket*. This complementary focus on human narratives and material outputs resonated with Haraway's (1988) notion of "situated knowledges," which stresses how the context of our technological praxis matters.

Additionally, participant observation at three design studios within Kuala Lumpur further supplemented the data. Over the course of four weeks, the lead researcher recorded the ways designers engaged with CLO3D's interface, navigated algorithmic constraints, and incorporated Malaysian motifs. This immersion highlighted tacit knowledge that was missing from self-reported interviews.

## 3.1 Data Collection

Semi-structured interviews formed the core of the primary data. Each of the six designers participated in 60 to 90-minute sessions, conducted either in person or via video call. The interview protocol explored three themes:

1. Motivations for adopting CLO3D, including economic, creative, or cultural drivers.
2. Perceptions of agency, probing how designers attributed authorship to themselves, the software, or collaborative dynamics.
3. Cultural hybridity, focusing on strategies to preserve Malaysian identity within digital workflows.

Participants were recruited through professional networks and snowball sampling, ensuring they represented diverse demographics (ages 25–45; four women, two men) and design specialisations (e.g., modest wear, avant-garde fashion). Pseudonyms (D1–D6) were assigned to protect anonymity.

1. "D" stands for Designer (e.g., D1 = Designer 1, D2 = Designer 2).
2. Numbers (1–6) correspond to the six Malaysian fashion designers who participated in the study.

The visual-textual analysis involved deconstructing CLO3D projects through two lenses:

1. Materiality: How digital fabrics simulated the behaviour of traditional textiles (e.g., *songket* stiffness versus *batik* fluidity).
2. Corporeality: The diversity of avatars used, including non-normative body types and disabled forms. Screen recordings and project files were coded using NVivo to identify recurring patterns, such as algorithmic interventions in design outcomes.

## 3.2 Ethical Considerations

Ethical approval was secured from the institutional review board prior to data collection. Participants provided written consent for interviews to be recorded, transcribed, and anonymised. Visual data from CLO3D projects was included only with explicit permission, and identifiable cultural symbols (e.g., family-owned batik patterns) were pixelated upon request. A key ethical challenge centred on cultural appropriation risks. For instance, one designer (D3) utilised Indigenous iban motifs in a CLO3D collection. To address this, the researcher consulted with a Malaysian cultural historian to ensure analysis respected the motifs' origins.

## 3.3 Limitations

As it is with any sample study, its main limitation is a small sample size, which is the result of CLO3D's limited uptake in Malaysia. Although the six participants gave nuanced and detailed perspectives, their experiences may not be representative of broader industry patterns. Moreover, self-reporting bias might have impacted the responses brought to the interviews, as designers may have overstated CLO3D positive aspects to stay in the discourse of digital innovation. There were limitations with the visual-textual analysis as well. CLO3D's proprietary software made obtaining raw algorithmic data impossible, so Mostar had to rely on designers' screen captures.

And the study's emphasis on high-skilled users left out grassroots practitioners whose relationship with the software could be different. This methodology connects theoretical concepts of posthumanism and empirical analysis, providing a foundation to investigate how digital technology, e.g. CLO3D, transform cultural production. Emphasizing designer narratives and material outputs foregrounds the complex negotiations between human creativity, algorithmic agency, and heritage preservation.

# 4 ANALYSIS & FINDINGS

The integration of CLO3D into Malaysian fashion design has catalysed a reconfiguration of traditional practices, revealing three core themes: (1) the emergence of digital corporeality, (2) distributed agency between humans and algorithms, and (3) the hybridisation of cultural identity. These themes, derived from interviews and visual-textual analysis, illustrate how post-humanist theory manifests in the interplay between technology, tradition, and creativity.

## 4.1 Digital Corporeality: Redefining the Body Beyond Physical Limits

CLO3D's avatar system frees designers from the limitations of biological and socio-cultural factors, rendering garments for bodies traditionally excluded from fashion. As an example, Designer D2 reformulated Baju Kurung — a songket (Malay traditional) tunic to be worn by wheelchair users by simulating fabric drape on a sitting avatar. As D2 explained:

> *'With CLO3D, I can test how silk songket drapes onto a seated body, which the physical mannequins can never deliver. But this isn't merely design — it's activism for disabled communities.'*

This disrupts the romanticization of the garment with normative 'good' bodies, and situates the garment in what Braidotti (2013) describes as the 'nomadic subject', a subject where identity cannot be quantified by the physical body. Likewise, Designer D4 created a gender-fluid kebaya line with gender-neutral projections, which they claim by working in CLO3D "breaks the tyranny of sizing charts" and therefore liberates design from heteronormative frameworks.

### 4.1.1 Post-humanist Interpretation

By prioritising digital avatars over human models, designers challenge anthropocentrism in fashion. The body becomes a malleable entity, reflecting posthumanism's rejection of fixed biological hierarchies.

## 4.2 Distributed Agency: Algorithms as Co-Creators

The delegation of creative authority to CLO3D's algorithms emerged as a recurring motif. Designer D1 recounted how the software's physics engine autonomously added pleats to a songket skirt—a 'digital serendipity' she retained in the final design. Similarly, Designer D5 described

CLO3D's fabric simulation as a 'stubborn collaborator' that 'resists' human intent. During one project, a batik sarong design 'collapsed' into an asymmetrical form due to algorithmic adjustments, which D5 reinterpreted as 'algorithmic improvisation'.

These examples underscore Latour's (2005) actor-network theory, where non-human actors (software) exert agency comparable to humans. As Designer D3 noted:

> *'CLO3D isn't a tool—it's a co-designer. Sometimes it teaches me new ways to drape fabric I'd never consider.'*

**Table 1** Examples of Human-Algorithm Collaboration in CLO3D Projects

| Designer | Project Focus | Algorithmic Intervention | Outcome |
|---|---|---|---|
| D1 | *Songket* skirt | Autonomous pleat generation | Enhanced texture complexity |
| D5 | *Batik* sarong | Fabric collapse simulation | Asymmetrical design retained as 'artistic' |
| D6 | Cyberpunk- inspired jacket | Automated *pucuk rebung* pattern scaling | Hybrid traditional-modern motif integration |

### 4.2.1 Post-humanist Interpretation

The blurring of authorship between designer and software dismantles Romantic ideals of the 'solitary genius', positioning creativity as a networked process.

## 4.3 Hybrid Cultural Identity: Glitch Batik and Cybernetic *Songket*

CLO3D's digital environment has become a site for reinterpreting Malaysian heritage through cybernetic aesthetics. Designer D3 created 'Glitch Batik' by overlaying CLO3D's distortion effects on classic patterns, framing it as a metaphor for 'the chaos of modern Malaysian identity'. Meanwhile, Designer D6 integrated *pucuk rebung* (bamboo shoot motifs) into neon-lit cyberpunk jackets, stating:

> *'Digitisation doesn't erase culture—it hybridises it. My designs are both Malay and metaverse.*

These hybrids resonate with Haraway's (1988) 'cyborg politics', in which the lines between organic and technological fade. However, tension simmers when traditional artisans are critical of such project considered 'disrespectful' to their handcrafted legacy. As Designer D2 acknowledged:

> *'Some batik masters will tell you that my work is a betrayal. But isn't evolution part of tradition as well?'*

### 4.3.1 Post-humanist Interpretation

Hybridisation reflects posthumanism's rejection of purity, embracing entanglement as a form of cultural survival in globalised techno-culture.

## 4.4 Synthesis of Findings

The interplay of these themes reveals CLO3D's dual role in Malaysian fashion: a decolonial force challenging Eurocentric norms and a neoliberal tool commodifying heritage. The following table summarises key contradictions.

**Table 2** Post-humanist Tensions in CLO3D-Driven Design

| Theme | Liberatory Potential | Neoliberal Risk |
|---|---|---|
| Digital Corporeality | Inclusive design for non- normative bodies | Standardisation of avatars for global markets |
| Distributed Agency | Democratised creativity | Erosion of artisan authorship |
| Hybrid Cultural Identity | Reinvigoration of heritage through innovation | Cultural dilution in digital marketplaces |

D4's gender-fluid kebaya is liberating in that it subverts heteronormativity, but its potential mass production through CLO3D's one-click export feature threatens to commodify cultural garments (neoliberal). CLO3D's effects on Malaysian apparel embody posthumanism's defining contradiction: the dual disruption and reinforcement of power dynamics. By allowing substrates to be apparent to the design process, the software advocates for innovation's potential while unintentionally conforming to capitalist logics of efficiency and standardisation. The challenge is to master the creative potential of CLO3D while preserving cultural integrity—that's the kind of critical work that calls for post-humanist ethics.

# 5 DISCUSSION

The results of this study shed light on how CLO3D inverts the relationship between virtuous human designers, cultural heritage and algorithmic tools in the fashion industry of Malaysia. Interrogating these dynamics through a post-humanist lens reveals three key tensions: (1) a paradox of liberation and erasure in digital cultural preservation, (2) the redistribution of agency between human and non-human actors, and (3) the ecological and ethical ambiguities of virtual design. These overarching themes, as summarised in Table 3, highlight a need for a nuanced understanding of CLO3D's role in postcolonial creative economies.

**Table 3** Key Themes from CLO3D Case Studies

| Theme | Example from Data | Post-humanist Interpretation |
|---|---|---|
| Digital Corporeality | D2's wheelchair-friendly *Baju Kurung* | Braidotti's nomadic subject; fluid identity |
| Distributed Agency | D1's "digital serendipity" in *songket* pleating | Latour's actor-network theory |
| Hybrid Cultural Identity | D3's "Glitch Batik" merging tradition with cyber aesthetics | Haraway's cyborg politics |
| Sustainability Paradox | Energy-intensive rendering vs. reduced textile waste | Bennett's vibrant matter; ecological ethics |

Designers like D2, who challenged the Euro-centricism of design through their reimagining of the Baju Kurung to include wheelchair users, show CLO3D's capacities of subverting entrenched norms in design. Displacing fashion from its techno-corporeal lineage rooted in the (post-)colonial project of bodily discipline (Ribeiro, 2018), CLO3D simulates fabric behaviour on non-normative avatars. But this liberation comes with a trade off at the risk of cultural erasure. D6's cybernetic *pucuk rebung* motifs were novel, but also denaturated the bamboo shoot pattern from its historical associations as a symbol of Malay strength (Mohamad, 2020). This duality points to some of the tensions that pervades post-humanist discourse: While design tools digitally democratised outwards, they also removed culturally significant artefacts from their socio-historical context and recast symbols as global- aesthetic commodities in bottom-up workflows.

This duality echoes Braidotti's (2013) contention of posthumanism being as a "critique and a utopian project." CLO3D, then, to a Malaysian designer, becomes a means of reappropriating agency from colonial fashion hierarchies that, for example, privilege Western silhouettes. But, with absent intentionality, digitisation risks reproducing neoliberal logics that favour marketability over cultural meaning. D3 explained: "Glitch Batik is my protest against batik becoming a tourist souvenir,"

reflecting the need for ethical frameworks that can guide digital cultural preservation.

## 5.1 Redistributing Agency: Human and Algorithmic Entanglements

The study's findings challenge conventional notions of creative authorship. Designers consistently reported that CLO3D's algorithms "co-designed" garments through unexpected fabric behaviours, such as autonomous pleating or drape distortions. For D5, these algorithmic interventions transformed the design process from a "solitary act to a dialogue with the software" (D5, 2023). This aligns with Latour's (2005) actor-network theory, which posits that agency is distributed across human and non-human actors.

However, this redistribution raises ethical questions. If CLO3D's algorithms inadvertently shape design outcomes, who bears responsibility for the final product? While designers like D1 embraced "digital serendipity," others expressed frustration at the software's unpredictability. Such tensions highlight the inadequacy of intellectual property laws, which remain anchored to human-centric authorship models (Boyle, 2008), in governing posthuman creative workflows.

## 5.2 The Sustainability Paradox and Ecological Ethics

CLO3D is often lauded for promoting sustainability by minimising textile waste. Yet, this study reveals a critical oversight: the environmental cost of digital rendering. A single CLO3D project requiring high-resolution simulations can consume up to 3.8 kWh of energy—equivalent to streaming 40 hours of HD video (Andrae, 2020). None of the interviewed designers acknowledged this trade-off, reflecting a broader industry tendency to frame digital tools as inherently "green."

This paradox resonates with Bennett's (2010) concept of "vibrant matter," which attributes agency to both organic and inorganic entities. Just as physical textiles exert influence through material resistance, digital fabrics "act back" via energy consumption. Thus, sustainability in digital fashion demands a holistic approach that addresses both physical and virtual environmental impacts.

## 5.3 Reconciling Craft and Code: The "Handmade" in a Posthuman Era

The study's most provocative finding lies in designers' redefinition of craftsmanship. D2's assertion that "my mouse movements are my *tangan emas*" (golden hands) challenges romanticised notions of artisanal labour. Here, the "handmade" evolves from tactile skill to digital dexterity—a shift that parallels posthumanism's rejection of Cartesian mind-body dualism (Hayles, 1999).

Yet, this redefinition remains contentious. Traditional weavers interviewed in a parallel study (Ismail, 2022) argued that CLO3D dilutes the spiritual significance of *songket*, which is traditionally imbued with prayers during weaving. This conflict underscores the need for inclusive dialogues between digital designers and custodians of heritage crafts.

# CONCLUSION

This combination of the CLO3D software into Malaysia's fashion ecosystem showcases the substantial impact that post-humanist theory can have in reshaping the relationship between bodies, fabrics, and digital space. By carefully avoiding kinaesthetic limits, this program subverts human-centred design, encouraging creators to develop digital embodiments through non-normative avatars and deconstruct culturally ingrained approaches to gender, disability, and ancestry. At the same time, the reorganization of agency among human creators and algorithmic tools speaks to a posthuman condition, in which creativity is a product of entangled human-machine collaborations, rather than the

substance of the solitary, human intent.

But this shift in technology is not without paradox. While CLO3D enables Malaysian designers to undermine Eurocentric qualifications of fashion hierarchies, such as the hybridisation of songket motifs and cybernetic aesthetics, it also poses the danger of commodifying the very heritage upon which they're premised and reframing it into super-exports in digital space. The software's potential to democratise design and help preserve an endangered textile vernacular is at odds with its tendency to restore neoliberal workflows where efficiency takes precedence over cultural richness. Moreover, the environmental costs of energy-intensive digital rendering at every step undermined the narratives of sustainability.

Addressing these complexities requires stakeholders to take an ethics-based approach. 1h Educational institutions need to develop post-humanist approaches to fashion studies and embed critical engagement with digital tools in their curricula. Funding for digitising Malaysia's textile heritage should certainly top the policymakers' list, as well as supporting artisans as co-partners in this process. Finally, industry partnerships with CLO3D developers might develop culturally nuanced asset libraries, which would embed local narratives into universal platforms.

In effect, then, CLO3D is a paragon of both the promise and the peril of posthumanism in fashion: a tool that can liberate design from biological and colonial conditions, but one that requires careful and rigorous stewardship to prevent cultural erasure. As Malaysia's designers continue to navigate this digital frontier, their work serves as a reminder of the need for technological innovation to be matched by ethical, culturally rooted praxis.

## RECOMMENDATIONS

In order to leverage CLO3D's potential and navigate its ethical, mathematical and conceptual complexities, stakeholders in Malaysia's fashion ecosystem must take a multi-faceted approach. For the first, a fashion curriculum needs to be established at educational institutions, e.g. UiTM, Raffles College Kuala Lumpur that would include post-humanist theory alongside digital design tools. Courses could also investigate the tension between non-human agency in software like CLO3D and Southeast Asian craft traditions, creating designers who don't just adopt technology passively, but actively engage with it on their own terms. Working with software developers may be instrumental in adapting tutorials to suit local contexts, e.g. to emulate traditional textile such as batik or *songket*.

Second, policymakers must prioritise funding digital cultural preservation. The Ministry of Tourism, Arts and Culture should set up grants for projects digitising these endangered artisanal methods, be it *tekat* embroidery or ikat weaving, via 3D tools. Simultaneously, inter-peering with tech companies must safeguard that CLO3D's repository of assets is inclusive of culturally-revered Malaysian motifs, to preclude their erasure with global digital workflows.

Finally, industry leaders must establish ethical frameworks to prevent further neoliberal exploitation. When digitising traditional patterns, there should be fair attribution in place, so design collectives and Non-Governmental Organisations (NGOs), for example, Craft Council Malaysia, can be part of that conversation. Sustainability audits are also needed to assure CLO3D's environmental footprint, and demand green rendering technologies used to off-set energy consumed. Malaysia can strike a balance between innovation and cultural stewardship to position itself as an advocate for ethically grounded, post-humanist fashion.

## ACKNOWLEDGMENT

We are very grateful to the designers and industry professionals who gave us valuable insights for this research. Their insights and expertise were pivotal to the study's findings. We also acknowledge the support of our respective institutions, which provided us an academic infrastructure to explore

digital fashion-as-posthumanism. We extend our deepest gratitude to our colleagues and peers for constructive comments that improved our arguments.

## FUNDING

This research is self-funded.

## AUTHOR CONTRIBUTIONS

All authors played equal contributions towards the production of this paper.

## CONFLICT OF INTEREST

The author declares no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

## REFERENCES

Ahmed, S. (2021). Neoliberalism and the digital commodification of cultural symbols. *Global Fashion Studies, 5*(3), 112–130.

Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.

Bennett, J. (2010). *Vibrant matter: A political ecology of things*. Duke University Press.

Betts, L. (2020). Algorithmic agency in fashion design: The role of 3D software in creative workflows. *International Journal of Fashion Design, Technology and Education, 13*(3), 287– 299.

Braidotti, R. (2013). *The posthuman*. Polity Press.

Bugg, J. (2021). Digital fashion: The new industrial revolution. *Fashion Practice, 13*(2), 123–145. Chua, L. (2020). Crafting modernity: Artisanal labour and technology in Southeast Asia. *Journal of Material Culture, 25*(4), 432–450.

CLO3D. (2023). *Virtual fashion design software*. https://www.clo3d.com

CREST. (2023). *Digital transformation in Malaysia's fashion industry: Challenges and opportunities*.

Collaborative Research in Engineering, Science and Technology.

Deleuze, G., & Guattari, F. (1987). *A thousand plateaus: Capitalism and schizophrenia*. University of Minnesota Press.

Fletcher, K. (2014). *Sustainable fashion and textiles: Design journeys* (2nd ed.). Routledge.

Haraway, D. J. (1988). Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies, 14*(3), 575–599.

Hassan, R. (2019). *Songket: The royal heritage of Malaysia*. Institut Terjemahan & Buku Malaysia.

Ismail, A. (2021). Reimagining Baju Kurung in the digital age: A postcolonial critique. *Asian Journal of Cultural Studies, 14*(4), 89–105.

Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

Lee, H. (2022). Digital hanbok: Tradition meets technology. *Journal of Asian Design, 9*(1), 45–67. MATRADE. (2021). *ASEAN digital fashion report: Opportunities for Malaysian designers*. Malaysian External Trade Development Corporation.

McKinsey & Company. (2021). *The state of fashion 2022: Navigating uncertainty*. McKinsey Global Fashion Index.

Ministry of Tourism, Arts and Culture Malaysia. (2022). *National craft policy 2022–2030*. Government of Malaysia.

Mohamed, N., & Ahmad, S. (2020). Batik digitisation: Preserving Malaysian heritage through 3D technology. *Journal of Southeast Asian Arts, 8*(1), 22–40.

Quijano, A. (2007). Coloniality and modernity/rationality. *Cultural Studies, 21*(2-3), 168–178. Said, E. W. (1978). *Orientalism*. Pantheon Books.

Tan, P. (2022). Digital innovation in ASEAN's creative industries: A case study of Malaysia and Indonesia. *ASEAN Economic Review, 18*(2), 75–92.
UNESCO. (2018). *Malaysian batik: Safeguarding intangible cultural heritage*. UNESCO Publishing.