A Study on the Key Factors Influencing Consumers' Adoption of NFT Application Services from the Perspective of PPM Framework

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Abstract

As blockchain and digital assets evolve, NFT services are gaining prominence. This study applies the Push–Pull–Mooring (PPM) framework to examine factors influencing consumer adoption of NFT applications. Based on 574 responses from Taiwanese users, results show that push and pull factors boost adoption intent, especially pull factors, while switching costs hinder it. The findings validate PPM's relevance in digital services and offer practical strategies to enhance NFT adoption by improving usability, reducing barriers, and fostering community value. The study confirms the relevance of the PPM model in digital service adoption and addresses a research gap in the Asian NFT context. Practical suggestions include improving platform usability, strengthening community value, and reducing adoption barriers to drive NFT growth.

Keywords: Non-Fungible Token, Push–Pull–Mooring (PPM) Framework, Switching Intention

1   Introduction

With the rapid development of digital technology, NFTs (Non-Fungible Tokens) have emerged as a transformative innovation in redefining digital ownership and value exchange. Since the launch of CryptoKitties in 2017, NFTs have expanded beyond digital collectibles into art, music, gaming assets, and virtual real estate, becoming a key component of the blockchain ecosystem. Their uniqueness and indivisibility make NFTs ideal for digital asset storage and trading, with the global market projected to exceed $200 billion by 2030. The Asia-Pacific region, especially with its digital-savvy youth, is expected to lead growth [1].

Unlike traditional financial platforms, NFT services operate under distinct platform dynamics. While prior research has addressed technical, legal, and security aspects, few studies have examined the psychological and behavioral drivers of consumer adoption—particularly what motivates users to switch from traditional platforms to NFT-based services.

To address this gap, this study introduces an integrated framework using the Push–Pull–Mooring (PPM) framework to analyze consumer switching behavior. This model, rarely applied in NFT contexts, categorizes negative push factors (e.g., poor security, low usability), positive pull factors (e.g., asset uniqueness, transparent trading), and mooring factors (e.g., learning costs, service dependence). Through a quantitative survey targeting potential NFT users in Taiwan, the study empirically tests the impact of these forces on switching intentions.

The research contributes theoretically by applying PPM to a novel domain, methodologically by structuring measurable constructs across the three dimensions, and practically by offering insights into Taiwan's NFT market. The findings support strategic decision-making for NFT

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platforms and suggest broader applications in other emerging markets.

2   Theoretical Background

NFTs (Non-Fungible Tokens) are innovative digital assets built on blockchain technology, characterized by indivisibility, uniqueness, and irreplaceability. They effectively verify ownership and authenticity of digital content. In recent years, NFT applications have rapidly expanded into art, gaming, virtual real estate, and music, with the global market exceeding \$40 billion. NFT platforms also enable creators to tokenize and sell their works directly, enhancing value and protection. NFTs rely on blockchain's decentralized and immutable nature to ensure transparent and secure transactions, empowering user control. However, market volatility, speculation, and lack of valuation standards still pose risks and uncertainty. Therefore, widespread adoption depends not only on technology, but also on trust and reliability among ecosystem participants [2].

This study adopts the **Push–Pull–Mooring (PPM) framework** to explore consumer behavior in shifting from traditional digital platforms to NFT-based services. Originally developed to explain migration behavior, PPM theory has been widely applied to digital technology and service switching contexts, effectively capturing users' motivations, attractions, and resistance in adopting new technologies [3].

In terms of push factors, consumer dissatisfaction and perceived risks with existing platforms are key drivers prompting the search for alternatives. These include five indicators: perceived risk, privacy risk, security risk, environmental risk, and performance risk. Issues such as security vulnerabilities, low service efficiency, and market instability can erode trust and satisfaction, thereby increasing users' switching intentions.

Pull factors represent the inherent appeal of NFT applications that encourage users to adopt them proactively. Specific indicators include relative advantage, alternative attractiveness, enjoyment, peer influence, interactivity, policy support, and social media influence. NFT technologies demonstrate strengths in transparency, asset uniqueness, community engagement, and creator economy models. Coupled with regulatory backing and social media exposure, these features enhance users' perceived value and adoption motivation.

Conversely, mooring factors reflect constraints and psychological barriers users face when considering switching, with switching costs as the core indicator. These costs encompass cognitive burdens in learning new technologies, emotional attachment to existing platforms, and perceived risks or uncertainties. Even if NFTs appear attractive, users may still choose to remain with current services if they perceive the transition as too complex or risky, highlighting the restraining effect of mooring factors on switching intentions.

By integrating these three dimensions and 13 indicators, this study constructs a comprehensive model to examine Taiwanese users' switching intentions toward NFT services. The findings aim to offer empirical insights for NFT platform development, marketing strategies, and policy formulation.

3   Research Methodology and Hypotheses Development

This study investigates the key behavioral factors influencing Taiwanese consumers' adoption of NFT application services, using the Push–Pull–Mooring (PPM) framework as the core analytical model. While previous NFT research has largely focused on technical and regulatory aspects, little attention has been paid to consumer behavior, psychological perceptions, and switching intentions. This study addresses that gap by applying the PPM model to the NFT context, offering

an integrated explanation of switching behavior and extending the theory's application in digital transformation research.

As illustrated in Figure 1, the research model comprises four constructs: push factors, pull factors, mooring factors, and switching intention. All three influencing dimensions are hypothesized to directly affect switching intention—defined as the consumer's willingness to shift from traditional digital platforms to NFT-based asset management and interaction. Although some literature suggests a mediating or moderating role for mooring factors, this study adopts a simplified structure where all three have direct effects, facilitating clearer comparison and practical application. By validating this framework, the study aims to systematically analyze how specific drivers under each dimension influence NFT adoption. The findings provide strategic insights for businesses and policymakers to reduce switching barriers and enhance adoption willingness, while also contributing to the broader application of PPM framework in emerging digital service domains like smart retail, blockchain applications, and consumer behavior research.
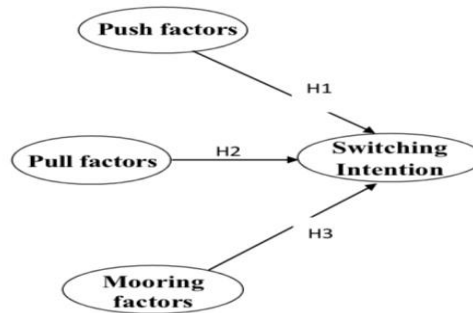

Figure 1: Research model

Based on PPM framework, push factors such as perceived risk, poor performance, and security concerns with current digital platforms can lead to dissatisfaction, encouraging users to consider alternatives like NFTs [4].

H1: Push factors positively influence consumers' intention to switch to NFT services.

Pull factors refer to the attractiveness of NFTs, including technical advantages, immersive experiences, social influence, and policy support, which enhance perceived value and motivate adoption [5].

H2: Pull factors positively influence consumers' intention to switch to NFT services.

Mooring factors, especially switching costs, psychological attachment, and uncertainty, may create resistance. Even with strong pull effects, high switching barriers can reduce adoption intention [6].

H3: Mooring factors negatively influence consumers' intention to switch to NFT services.This study proposes the following hypotheses:

After finalizing the questionnaire, a formal survey was conducted using paper forms, email, and face-to-face distribution. A total of 1,200 questionnaires were distributed, with follow-up calls by research assistants to improve response quality. Ultimately, 600 responses were collected, and after removing 26 invalid ones, 574 valid samples were obtained, yielding a valid response rate of 47.8%. Demographic analysis of the valid samples showed: 58% were female; 45% aged 31–40; 61% had a university degree; 32% earned NT\$30,001–40,000 monthly; and 45% worked in the service industry. The sample largely comprised individuals with stable socio-economic backgrounds and digital literacy, making them well-suited for analyzing behavioral switching in

NFT adoption.

4 Data Analysis and Results

To examine consumer switching behavior toward NFT services, this study applied the Push–Pull–Mooring (PPM) model using PLS-SEM with SmartPLS 3.2.8 [7]. This method is suitable for predictive and theory-building research with moderate sample sizes.

Measurement model results showed strong reliability and validity. All factor loadings were above 0.5, CR and Cronbach's α exceeded 0.7, and AVE values met the 0.5 threshold. Discriminant validity was confirmed via the Fornell–Larcker criterion [8].

Structural model analysis revealed that the model explained 46.3% of the variance in switching intention ($R^2 = 0.463$). All hypotheses were supported:

H1: Push factors (e.g., risk, dissatisfaction) significantly increased switching intention.

H2: Pull factors (e.g., benefits, engagement) had the strongest positive effect.

H3: Mooring factors (e.g., switching costs) had a significant negative effect.

These results confirm that push, pull, and mooring factors are significant predictors of consumers' intention to adopt NFT services. The validated PPM model demonstrates both theoretical relevance and practical applicability, offering actionable insights for NFT platform developers and policymakers aiming to boost adoption, reduce entry barriers, and enhance user engagement.

5 Discussion and Implication

5.1 Discussion of Findings

Using the Push–Pull–Mooring (PPM) framework, this study empirically examined factors influencing Taiwanese consumers' switching intention toward NFT services. PLS-SEM results confirmed that all three dimensions—push, pull, and mooring—significantly affect switching intention, supporting the applicability of PPM in the NFT adoption context.

Among the three, pull factors had the strongest influence ($\beta = 0.543$), followed by push factors ($\beta = 0.316$), and mooring factors showed a significant negative effect ($\beta = -0.264$). This suggests that the attractiveness of NFT platforms (e.g., innovation, social value) is the main driver of adoption, while dissatisfaction with traditional platforms also promotes switching. Conversely, perceived switching costs act as a barrier.

Key pull factors included peer influence ($\beta = 0.325$), social media ($\beta = 0.221$), and interactivity ($\beta = 0.144$), showing the importance of community engagement. Meanwhile, performance risk ($\beta = 0.328$) and environmental risk ($\beta = 0.261$) were dominant push factors. The sole mooring factor, switching cost, significantly reduced adoption intention.

Moderation analysis revealed that switching cost not only had a direct negative effect but also weakened the impact of both push and pull factors on switching intention. Notably, it had a stronger moderating effect on pull ($\beta = -0.127$) than on push ($\beta = -0.098$). This implies that even attractive NFT features may be less compelling if users perceive high switching burdens, while dissatisfaction with current platforms may still drive action despite such costs.

Overall, the findings highlight that while innovation attracts users, lowering switching barriers is crucial for actual adoption. NFT platforms should focus on simplifying onboarding, reducing learning curves, and addressing user concerns to enhance adoption outcomes. This study

confirms the PPM model's theoretical value in emerging tech contexts and offers practical guidance for platform design and strategy.

5.2   Theoretical Contributions

This study applies the Push–Pull–Mooring (PPM) model to analyze consumers' switching intentions toward NFT services, offering four main contributions: 1. Theory Extension: It is the first to apply PPM in the NFT adoption context, confirming its explanatory power for emerging digital technologies beyond traditional use cases. 2. Measurement Framework: The study develops a structured set of behavioral indicators—covering risks, social influence, enjoyment, interactivity, and switching costs—suitable for analyzing NFT and similar tech adoption. 3. Interdisciplinary Integration: By bridging concepts from psychology, marketing, and innovation, the model supports research across Web3, blockchain, and digital consumer behavior. 4. Moderation Insights: Switching costs not only directly reduce adoption intention but also weaken the effects of both push and pull factors, emphasizing mooring's critical moderating role in adoption behavior.

In summary, this research advances theoretical understanding of NFT adoption, strengthens the foundation for future interdisciplinary studies, and validates PPM framework as a robust tool for analyzing behavior in emerging digital platforms.

5.3   Managerial Implications

This study developed an NFT switching intention model based on push, pull, and mooring forces, and confirmed the moderating role of switching costs. Based on the findings, five key strategic recommendations are proposed for NFT platforms:

1. Address Push Factors: Reduce Risk and Improve Experience
   To counter dissatisfaction with existing platforms, NFT services should enhance security and performance using blockchain transparency, smart contract audits, and user-friendly infrastructure. However, high switching costs may weaken the impact of user dissatisfaction—thus, ease of transition is essential [9].

2. Strengthen Pull Factors: Build Value and Community Engagement [10]
   NFT adoption is driven by peer influence, social participation, and platform interactivity. Platforms should invest in gamification, creator tools, UI/UX simplicity, policy compliance, and influencer marketing. Yet, even strong appeal is ineffective without lowering user entry barriers.

3. Minimize Mooring Effects: Lower Switching Barriers
   Switching costs are the main inhibitors of adoption. Platforms should simplify onboarding, support asset migration, and offer incentives (e.g., discounts, airdrops) to encourage adoption. Educational campaigns can also help shift short-term effort into long-term perceived value.

4. Integrate Advanced Technologies
   NFT applications should go beyond blockchain by integrating AI, AR/VR, and machine learning to offer personalized, immersive, and secure experiences across sectors like entertainment, education, and e-commerce.

5. Leverage Data for Relationship Management
   User retention is as vital as adoption. Platforms should apply data analytics to personalize services, track behavior, and implement lifecycle marketing strategies—boosting loyalty, repurchase rates, and long-term competitiveness.

In short, even the most attractive NFT features won't drive adoption if switching remains difficult. Success depends not just on innovation or marketing, but on reducing psychological and

technical frictions. Platforms should focus on risk mitigation, incentive design, and transition-friendly strategies to truly scale adoption.

6   Limitations and Future Research

While this study validates the PPM model's applicability to NFT adoption, several limitations may affect the generalizability of the findings: 1. Regional Sample: The study focuses on users in Taiwan. Cultural and market differences may limit cross-cultural applicability. Future research should include cross-regional comparisons to assess PPM's global relevance. 2. Cross-Sectional Design: The study captures behavior at a single time point. Given the dynamic nature of NFT adoption, longitudinal studies are recommended to explore behavioral changes over time. 3. Single-Theory Framework: Using only the PPM model may overlook other psychological or cognitive factors. Future research could integrate models like TAM, IDT, TRI, or UTAUT for broader explanatory power. 4. Individual-Level Focus: The study emphasizes user behavior but excludes platform-level variables such as design, gamification, or community incentives. Future work should incorporate platform factors using multi-level modeling (e.g., HLM) for deeper insights.

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