The American Journal of Management and Economics Innovations
ISSN 2693-0811 | Open Access

TYPE Original Research
PAGE NO. 08-16
DOI 10.37547/tajmei/Volume07Issue09-02

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Valuation Waterfalls for Gaming Company In-App Purchases: An Integrated Strategic Approach

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OPEN ACCESS
SUBMITTED 21 August 2025
ACCEPTED 25 August 2025
PUBLISHED 19 September 2025
VOLUME Vol.07 Issue 09 2025

CITATION
Anjali Kale. (2025). Valuation Waterfalls for Gaming Company In-App Purchases: An Integrated Strategic Approach. The American Journal of Management and Economics Innovations, 7(09), 08–16. https://doi.org/10.37547/tajmei/Volume07Issue09-02

Abstract: In-app purchases (IAPs) have become the primary revenue stream in the mobile gaming industry, with complex valuation waterfalls determining how revenue flows through platform fees, publisher shares, developer royalties, and marketing costs. Accurate modelling of these waterfalls is essential for financial planning, investor reporting, and M&A negotiations. This research article introduces a structured framework for analysing IAP valuation waterfalls, focusing on gross-to-net revenue flows, platform commissions, bundling, and discounts. Traditional valuation models often fail to capture key dynamics like lifetime value (LTV), churn, and monetization cycles. To address this, we propose an enhanced approach that integrates user behavior analytics, cohort analysis, and probabilistic forecasting.

The paper examines stakeholder incentives developers, publishers, platforms, and investors and uses real-world examples to show how different pricing models (e.g., loot boxes, subscriptions) impact waterfall efficiency. Comparative insights from markets like the U.S., China, and South Korea underscore the global relevance of this method. A practical guide and spreadsheet template support implementation, making the framework useful for CFOs and strategic planners.

Keywords: Valuation Waterfall, In-App Purchases, Gaming Industry, User Lifetime Value, Cohort Analysis, Revenue Forecasting, Global Gaming Market, Strategic Finance.

1. Introduction and Background

1.1. Research Problem

Unlike traditional retail sales, IAP monetization involves multi-layered digital ecosystems where platforms such

as the App Store and Google Play claim substantial commissions before revenue is distributed to publishers, developers, and marketing affiliates. This generates a tricky and quirky valuation waterfall between gross consumer expenditure to final net receipts by developers that poses lots of problems in modelling and forecasting [1].

Financial analysts and investors need clear and precise waterfall models that help determine the probable revenue as well as profit ratios and future cash flows. User behaviour and retention patterns as well as constantly changing monetization strategies, are however very dynamic, complicating the creation of such models. The conventional valuation methods, such as Discounted Cash Flow (DCF), are not robust at optimizing such digital dynamics, and this fact results in incorrectly priced rounds of investment, incorrect financial calculations, and ill-fitted acquisitions and mergers. To deal with this complexity one needs a new, flexible strategy that takes account of the complexities of revenue systems in the gaming industry [1,2].

1.2. Context

The gaming industry has become worth more than 180 billion dollars across the world with most of this amount being generated by the mobile gaming industry alone [3]. The in-app purchases make almost three quarters of mobile gaming revenue that can go towards cosmetic and premium features. A new bid to determine IAP revenues with greater accuracy is the so-called valuation waterfall, this is a stratified analysis in which value creation is broken down in sequential streams of financials.

1.3. Participants in Online Gaming Sector

A high-level network of stakeholders supports the gaming ecosystem, and each of them represents a crucial component in the organization of interactions and their availability to an unlimited number of players worldwide. The central element of this ecosystem is a game developer, creative and technical people whose work is creating games, starting with the idea, and developing them. Their tasks include the code, the application of an artificial intelligence to characterise the behaviour of characters, the intensive testing, issuing patches, the elimination of bugs, the deep cooperation with the artists and the designers to model the bands of observation and the sight of the game.

When a game is created publishers come in to get it into the market [4]. These parties oversee various types of work, everything, starting with distribution, licensing, localization (the adaptation of the game to the languages and regions of the customers), creation of user manuals, and such, and even the physical or virtual packaging. Most of the publishing firms are now allying with other companies to spread the wings of the game and smooth distribution through various channels. The payment intermediaries assist in financial processes by taking part in such activities as credit card organizations, prepaid card services, online banking, and digital wallet services. These intermediators guarantee that payments of players will be processed and shipped securely to game publishers or developers [5].

Online shops such as App Store or Google Play serve as crucial business centres, on which games are presented, sold, and distributed. Such platforms facilitate both purchases and downloads, and additionally provide backend services such as payment processing and transactional detail reporting, which is important in the financial reporting and analysis of game companies [3,4]. Along with the traditional marketplaces, the social media platforms and gaming websites provide alternative distribution channels and modes of engagement. Through these platforms players can play charted games directly with no need of downloading games on their devices but instead through browser enabled play.

Besides the traditional market places, there are other platforms of distributing and engaging in social media and specialized gaming sites. Players can also utilize these platforms directly to play games either in browser-based term or by downloading the games to their respective devices thus avoiding the regular use of app stores. The online gaming experience relies on cloud service providers and online gaming servers that provide the technical foundations of the experience. Such providers provide the type of scalable infrastructure necessary to accommodate in-real-time multiplayer games, data storage, and connections that unobstructed span and penetrate networks across the globe to provide a sustainable and engaging gaming interface. Collectively, all these stakeholders create a network of interdependence, which helps in all phases of game lifecycle including development, delivery, monetization, and engagement.

1.4 Monetisation Models in Gaming

Monetization models employed in the gaming industry

have become more diversified to accommodate different types of games and player behaviours giving the gaming industry a multi-faceted revenue model. Advertisement revenue continues to be one of the major income generators especially with the casual games that have an extensive following due to free to play access. Such games monetize through the display of advertisement, so the income strongly depends on the number of impressions and interaction by and with the user, that is, the frequency of viewing or touching ads. More developers have been sprouting rewarded ads, a kind of ads where users can get rewarded watching them with features like extra lives or game money. Such strategy not only is useful in boosting user retention but it makes an ad engagement to rise [6].

Mid-core and hardcore games use in-app purchases (IAPs) as the primary source of income. These monetization tactics address the needs of those players who can spend virtual money on the cosmetic upgrades, potent items, battle passes, and top levels. IAPs provide a subscription scheme that developers can use to monetise the devoted gamers, and still retain the game where non-payers can continue to play. The next emerging model is subscription-based monetization where players pay a continuing fee (monthly to lifetime) to have access to a library of games or to receive exclusive content or an exclusive membership within a platform. This format will attract users who want to have a stable, wide gaming experience and do not want to make individual purchases regularly.

To a developer and platforms, subscriptions provide recurring and predictable income demonetization in certain areas of gaming such as Real Money Gaming (RMG) and Online Fantasy Sports (OFS) is dependent on commission-related models. The gamers pay the entry fee to take part in games or competitions that can result in the loss or gain of actual money. This process of essentially collecting the commission on each entry fee has enabled the platform to convert each gameplay moment into a source of revenue, and players enjoy real stakes and competition [7].

1.5. Anatomy of the IAP Revenue Waterfall

A typical IAP waterfall features the following tiers:

Gross Platform Spend: Total amount paid by users on App Store or Google Play.

Platform Commission: Standard 30% (or 15% for subscriptions >1 year) retained by the platform.

Publisher Fee: For third-party publishers, an additional share (10-20%) is allocated before remitting to the developer.

Development Royalties: Internal allocation to the development studio, often split between core teams and support services.

Marketing and UA Reimbursement: Deduction for user-acquisition incentives, affiliate commissions, and ad network fees.

Taxes and VAT: Regional taxes withheld by platforms or remitted by publishers (varies by jurisdiction, typically 5-20%).

Net Developer Revenue: The residual amount that accrues to the game studio for operational expenses and profit.

Each layer may include conditional adjustments: promotional discounts, refunds, chargebacks, and loyalty bonuses, which further complicate net calculations.

1.6. Stakeholder Perspectives and Incentives

Understanding stakeholder incentives is critical for waterfall design

(i) Platform Owners (Apple, Google)

Aim to maximize overall App Store liquidity and retain commissions to fund ecosystem development.

(ii) Publishers

Seek volume-based incentives and marketing support; negotiate revenue share tiers often tied to User Acquisition (UA) targets.

(iii) Developers

Focus on net take rate and predictability; prefer lower variable fees and transparent reporting.

(iv) Investors

Evaluate gross-to-net conversion ratios and trend stability; high refund or churn rates signal revenue quality issues.

Alignment across these stakeholders often requires contractual frameworks like Minimum Guarantee Floors, tiered commission schedules, and performance-based bonuses.

2. Objectives and Significance of this study

(i) Compare and contrast the current framework methodologies and shortcomings, study the current

financial models employed within in the gaming industry, highlighting any shortcomings to accuracy and scalability, particularly in terms of variable commission, churn and user segment modelling and evaluate how older more traditional financial models are failing to capture IAP revenue to a real-world level of accuracy.

(ii) Indicate a full-scale valuation model that comprises behavioural analytics, establish a multi-dimensional valuation model into a framework which combines Behavioural analytics (e.g., player spending behaviours, their propensity to churn), Probabilistic forecasting tools (e.g., Monte Carlo Simulations, Dynamic variables like campaign ROI, regional tax rates, and prices sensitivity.

(iii) Analyse global best practices and regional differences, conducting comparative analysis across key regions—such as the U.S., China, and South Korea, highlighting how local business models, tax structures, and consumer protection laws impact valuation waterfalls.

(iv) Offer actionable insights for top management aiming to translate its findings into practical guidance for executives, CFOs, and strategic planners. These include optimization strategies to reduce revenue leakage and improve net profitability, negotiation levers when dealing with platforms, publishers, or acquirers.

(v) Well-grounded and contextual definition and establishment of valuation waterfalls in the sphere of gaming where money is earned due to the involvement of several players that make deductions.

3. Methodology

3.1. Research Design

This is a mixed-method approach combining qualitative insights with quantitative modelling. The proposed model is developed using insights from financial modelling, user experience design, and behavioural economics.

3.2. Data Sources

(i) Industry reports from Newzoo, App Annie, and Statista.

(ii) Financial disclosures from public gaming companies (e.g., Zynga, Tencent, Netmarble)

(iii) Academic literature from Harvard Business Review, Journal of Digital Economics, and McKinsey Insights

(iv) User data analytics from platforms like SensorTower and GameAnalytics

3.3 Tools and Techniques

3.3.1. Cohort Analysis

Groups users based on when or how they started using the game (e.g., users who installed in Week 1 vs. Week 2). Tracks long-term behavior like retention, engagement, and monetization across cohorts. Helps understand how updates, campaigns, or seasonality affect different user groups. Identifies long-term revenue trends and user patterns critical for forecasting and optimizing the IAP revenue model [8].

3.3.2. Monte Carlo Simulations

It is a risk modelling technique that uses random sampling to simulate thousands of possible outcomes. The simulation runs thousands of scenarios to produce a distribution of possible revenue outcomes [9]. It Helps CFOs and strategists forecast revenue uncertainty. Supports decision-making in M&A, budgeting, and investment by showing best-, worst-, and most-likely-case outcomes.

3.3.3. Funnel Analytics

This breaks down the user journey into sequential steps (e.g., install → tutorial complete → in-app purchase). It shows where users drop off, helping identify bottlenecks or points of friction [10].

3.3.4. Predictive Behavioural Modelling

This involves applying machine learning or statistical models to predict future user actions based on historical behavior. Examples: Predicting which users are likely to churn, forecasting high-spending users (whales), Identifying users most responsive to offers or ads [11]. It improves revenue forecasting by enabling proactive engagement and personalized monetization strategies, increasing LTV and reducing churn.

3.3.5. Waterfall Charts

Waterfall Charts in Excel visually represent how a starting value (e.g., Gross Revenue) is affected by incremental deductions and additions. Revenue Attribution breaks down total revenue into its sources - Which user segments or channels contribute most? How much revenue is lost to platform fees or refunds? This provides a clear and customizable visual model of revenue flow and useful for communicating financial dynamics to stakeholders or during due diligence [11].

4. Valuation Waterfall Model for IAPs

4.1 Framework Structure

User Acquisition → Conversion Funnel → Retention Rates → ARPU → LTV → Total Revenue Projection → Risk-Adjusted Value

4.2 Description of Components

(i) User Acquisition (UA): Cost and efficiency of acquiring users.

(ii) Conversion Funnel: Ratio of users converting into paying customers.

(iii) Retention Rates: Daily, weekly, and monthly active user metrics.

(iv) Average Revenue Per User (ARPU): Segmented by region and product line.

(v) Lifetime Value (LTV): Sum of projected future revenues, discounted.

(vi) Revenue Projections: Aggregated across cohorts and time.

(vii) Risk-Adjusted Value: Final valuation using probabilistic weights.

(viii) SKU - A unique identifier for everyone in-app purchase item or bundle that is offered to users within a game.

(ix) Minimum guarantee floors: Pre-agreed baseline payments that a platform or publisher commits to pay a game developer or IP owner, regardless of how well the game performs.

4.3. Building the Waterfall Model

A robust waterfall model is typically constructed in a spreadsheet with the following steps:

1. Input Layer: Collect gross spend data split by SKU, country, and platform.

2. Commission Calculation: Apply platform-specific rate schedules, incorporating subscription tenure discounts.

3. Publisher Shares: Embed contract terms e.g., 15% for UA-funded installs vs. 10% for organic users.

4. Refund Modeling: Estimate refund rates by SKU (historically 2-5%) and subtract accordingly.

5. Tax Deductions: Apply VAT/GST and withholding taxes by region; platforms often remit on behalf of publishers.

6. Marketing Deductions: Account for UA rebates, affiliate fees, and cross-promotion costs.

7. Aggregation and Reporting: Summarize net revenue by cohort, SKU, and region; visualize the waterfall with bar charts. Advanced models integrate dynamic parameters e.g., varying refund rates during launch promotions and scenario toggles for commission negotiations.

4.4. Implementation Roadmap

Week 1: Data Collection

Integrate platform, publisher, and billing APIs.

Week 2: Model Design

Map waterfall tiers and define parameters.

Week 3-4: Prototype

Build spreadsheet prototype and validate with historical data.

Week 5: Automation

Develop scripts to ingest API data into the model.

Week 6: Scenario Analysis

Test commission negotiations and refund policies.

Week 7: Dashboarding

Visualize the waterfall in Power BI or Looker.

Week 8: Review

Stakeholder validation and iteration.

Week 9: Documentation

Create model documentation and user guides.

Week 10-12: Rollout

Train finance team, integrate into monthly close.

4.5 Case Studies

Case Study 1: Free-to-Play RPG Launch

Gross Spend: $4.5 million in first quarter

Platform Commission: $1.35 million (30%)

Publisher Fee: $450k (10%)

Refunds: $90k (2% of gross)

Taxes: $180k (4% VAT)

Marketing Rebates: $300k UA incentives

Net Developer Revenue: $2.13 million.

This model highlighted that promotional refunds and UA rebates accounted for 8% of gross, prompting the developer to optimize refund policies and negotiate higher publisher splits for UA-driven installs [12].

Case Study 2: Subscription-Based Strategy Game

Gross Subscriptions: $2 million with 12-month retention discount rate (15% commission).

Platform Commission: $300k (15%).

Publisher Share: $200k (10%).

Taxes: $100k.

No marketing rebates due to organic growth.

Net Developer Revenue: $1.4 million.

Subscription tenure discounts improved net take rate from 55% to 60% YOY, illustrating the

importance of subscription-based strategies in waterfall optimization [13].

4.6 Optimization Strategies

Several strategies can enhance net take rates:

Negotiated Commission Floors: Achieve 15% platform fees by committing to minimum spend tiers.

Direct Billing Outside App Stores: For web-based purchases, avoid app-store fees entirely (5-10% global card fees apply).

Localized Pricing and Tax Planning: Adjust SKU pricing to offset high-VAT regions, increasing net retention.

Refund Policy Engineering: Implement in-game refund pauses and loyalty thresholds to reduce refund rates.

Bundling Mechanisms: Offer currency packs with tiered bonuses to increase purchase sizes and average revenue per user (ARPU).

4.7 Comparative Analysis: Old vs. Proposed Models

Table 1: Old vs Proposed Model

Feature	Traditional DCF	Proposed Valuation Waterfall
Time Horizon	Fixed	Dynamic and cohort-based
User Behaviour Modeling	Limited	Advanced, behavioural analytics integrated
Regional Segmentation	Generalized	Granular, region-specific
Flexibility	Rigid assumptions	Adaptive with scenario analysis
Risk Adjustment	Generic WACC	Simulation-based probabilistic analysis

5. Case Studies: Global Approaches

5.1 United States: Zynga's Retrospective Cohort Analysis

Zynga uses a rolling cohort system to estimate LTV and uses predictive modelling to allocate marketing budgets. Their 2022 IPO documents included detailed user monetization forecasts, now a standard in U.S.-based gaming firms [14].

5.2 China: Tencent's Multiverse Revenue Attribution

Tencent segments its games by demographics and region, using AI-based predictive tools to forecast LTV. Their approach focuses on behavioural metrics like session length and purchase timing [15].

5.3 South Korea: Netmarble's Funnel Optimization

Netmarble applies funnel analytics to each game release, using retention and conversion as core KPIs. Their valuation waterfall is directly linked to milestone-based revenue projections [16].

6. Opportunities and Challenges

Opportunities

(i) Enhanced investor confidence with data-driven forecasts

(ii) Better internal resource allocation

(iii) Improved M&A valuations and partnership negotiations

Challenges

(i) Tax Variability

Changing VAT rates and cross-border tax compliance introduce uncertainty.

(ii) Refund Volatility

Promotional periods and game updates can spike refund rates unexpectedly.

(iii) Platform Policy Changes

Sudden commission changes (e.g., Apple's Small Business Program) require model updates.

(iv) Data privacy regulations (e.g., GDPR)

(v) Dependency on third-party analytics platforms

(vi) High volatility in user preferences

7. Discussion and Managerial Implications

For top management, particularly CFOs, CMOs, and Heads of Strategy, adopting a valuation waterfall model enables:

(i) Informed capital allocation

(ii) Real-time performance monitoring

(iii) Improved strategic decision-making

Table 2: Managerial Utility of Waterfall Components

Component	Relevant Department	Strategic Use
User Acquisition	Marketing	ROI measurement on ad spend
Conversion Funnel	Product	UI/UX optimization
Retention & ARPU	Analytics	Predictive modelling
Revenue Projections	Finance	Budgeting and forecasting
Risk Adjustment	Strategy	Scenario planning

9. Future Directions

Looking ahead, the evolution of valuation waterfalls in the gaming industry will likely be shaped by emerging technologies and evolving stakeholder expectations. The integration of blockchain technology can enhance transparency and traceability within in-game economies by enabling tamper-proof tracking of digital asset transactions and royalty flows, thereby increasing trust among users and partners.

At the same time, the new changes in artificial intelligence can enable the real-time re-calculation of the lifetime value of a user (LTV) through the constant analysis of behavioral data, patterns of spending and engagement trends that enable the finance teams to make more dynamic and personalistic forecasts. To enhance precision and relevancy as far as strategy is concerned, calibration of waterfall elements in various countries like local tax system, platform policies or cultural idioms of monetization will become necessary especially those studios that deal with various markets internationally. Further on environmental, social, and governance (ESG) metrics are to be embedded to the valuation models, which will be helpful to measure the long-term sustainability and ethical impact of monetization strategies, as well as to synchronize financial planning with responsible business practice and expectations of investors.

10. Discussion

This case study points out that it is difficult to value revenue streams accurately in the gaming sector due to the number of stakeholders that are involved and the ever-changing deductions which results in complex valuation waterfalls. The amount of revenue is determined through customary financial models, whose input may be inadequate in realizing this unpredictability which is generated by player behaviour, commission system, and regional differences. This can be very well improved through introducing a multi-dimensional valuation system that will include behavioural analytics and probabilistic forecasting to improve the prediction usage and accuracy. Examining best practices worldwide, as well as the issues to reach around by the region's concessions, this study offers actionable advice to the executives who can unlock the key to the optimum revenue retention and enhancement of profitability, leading to more sustainable business models, taking place in the new gaming environment.

11. Conclusion

Waterfall valuation is an important value assessment managerial instrument that gains precision of valuation in-app purchases in the gaming sector, where dynamic parameters replace the traditional fixed finances form. As mobile games get progressively more data intensive and international, these are tiered structures that help organizations break down each revenue factor of gross user spend (the amount that the user spends) to the

commissions that the platform charges (a percentage of revenue to organize and manage the game store) to the fees that the publisher charges (a percentage of revenue to design the game) to taxes and other marketing expenses to the eventual net developer revenue. Besides improving the accuracy of financial projections, this level of granular visibility enables those making decisions to renegotiate platform contracts, refine monetisation policies and improve refund logistics as user behaviours and regulatory climates change.

Within an industry subject to such fast changing dynamics in terms of the cost of acquiring customers, life time value, platform dependency, implementing the valuation waterfalls methods, allows the gaming companies to be diligent, adaptable, and transparent with their investors. Eventually, integrating such models into fundamental practices of financial planning can help the studios position themselves strategically, make capital selections more efficiently, and remain profitable over the long term in a more competitive digital economy.

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