

Advanced Theoretical Foundations and Operational Frameworks in Strategic Marketing: Digital Ecosystems, Brand Architecture, and Sales Operations

Theoretical Foundations of Digital Ecosystems and Customer Journeys

Modern digital marketing has evolved from an assortment of tactical execution channels into an adaptive, technology-enabled strategic process. Under the conceptual framework formulated by Kannan and Li (2017), digital marketing is defined as an interactive mechanism wherein firms leverage digital technologies to co-create, communicate, deliver, and sustain value across complex stakeholder networks. This paradigm integrates digital platforms, connected devices, and algorithmic data flows into both the customer marketing process and overarching corporate strategy.

The longitudinal evolution of digital media research demonstrates a transition across several distinct historical phases. Early scholarly literature focused on channel-specific adoptability and clickstream tracking (Digital Marketing 1.0) before shifting toward social media network effects, user-generated content, and co-creation mechanics (Digital Marketing 2.0 and 3.0). Contemporary research examines unified platform ecosystems characterized by mobile ubiquity, programmatic media markets, creator economies (Digital Marketing 5.0), and machine-learning-driven personalization.

<i>Paradigm Phase</i>	<i>Historical Timeline</i>	<i>Core Technological & Structural Drivers</i>	<i>Dominant Marketing Focus & Value Dynamics</i>
<i>Digital Marketing 1.0</i>	1990s – 2004	Desktop web browsers, static HTML pages, banner ads, early search indexes.	Unidirectional broadcast of information, static display presence, organic search indexing.
<i>Digital Marketing 2.0 & 3.0</i>	2005 – 2010	Web 2.0, social media platforms, user-generated content, early smartphones.	Two-way customer interaction, social network capital accumulation, peer-to-peer brand co-creation.
<i>Digital Marketing 4.0</i>	2011 – 2015	Ubiquitous mobile connectivity, cross-device tracking, programmatic media exchanges.	Omnichannel trajectory tracking, dynamic retargeting, big data customer analytics.
<i>Digital Marketing 5.0</i>	2016 – Present	AI/ML automation, creator platform economies, predictive lead modeling.	Algorithmic personalization, multi-touch stochastic attribution, real-time value co-creation.

Managing customer experiences across digital channels requires a structured framework spanning the complete customer journey. Lemon and Verhoef (2016) conceptualize customer experience (CX) as a multidimensional construct comprising cognitive, emotional, behavioral, sensory, and social responses to a firm's offerings across pre-purchase, purchase, and post-purchase stages. The customer journey unfolds through an array of interconnected touchpoints that vary in management control and operational dynamics.

<i>Touchpoint Category</i>	<i>Ownership & Operational Mechanics</i>	<i>Strategic Function Across Customer Journey</i>
<i>Brand-Owned Touchpoints</i>	Owned and directly managed by the firm (e.g., corporate websites, mobile apps, loyalty portals).	High-control interactions designed to deliver functional messaging, direct conversions, and post-sale

<i>Touchpoint Category</i>	<i>Ownership & Operational Mechanics</i>	<i>Strategic Function Across Customer Journey</i>
		support.
Partner-Owned Touchpoints	Jointly managed media environments, affiliate networks, multi-publisher ad networks.	Expand market reach, facilitate multi-channel ad delivery, and manage shared conversion funnels.
Customer-Owned Touchpoints	Unsolicited customer actions, post-purchase consumption habits, individual usage choices.	Reflect authentic customer feedback, usage patterns, and unsolicited engagement across usage cycles.
Social/External Touchpoints	Third-party review sites, peer networks, organic social interactions, influencer platforms.	Shape brand reputation through social proof, word-of-mouth dynamics, and platform affordances.

As consumer purchase journeys become increasingly non-linear and multi-device, quantifying the economic contribution of each touchpoint becomes critical for optimizing marketing capital allocation.

Algorithmic Marketing Attribution Models and Pipeline Analytics

A primary challenge in strategic marketing analytics is channel attribution: assigning financial credit to individual touchpoints across the customer purchase journey. Despite widespread adoption of digital tracking, industry execution frequently relies on oversimplified methodologies. Industry survey data indicates that 44% of corporate advertisers and 58% of agency executives continue to use Last-Touch Attribution (LTA). Overall, 61.7% of enterprise organizations report an unclear understanding of how individual digital channels drive incremental revenue.

Rule-based attribution heuristics—including First-Touch, Last-Touch, Linear, and Time-Decay models—introduce structural biases that misallocate capital. Last-Touch models attribute 100% of conversion value to the final interaction point, systematically over-funding bottom-of-funnel conversion channels (such as branded search) while under-funding upper-funnel discovery channels (such as display advertising, social media, and content marketing).

<i>Attribution Model Class</i>	<i>Underlying Analytical Mechanism</i>	<i>Theoretical & Operational Strengths</i>	<i>Core Structural Limitations</i>
Last-Touch Attribution (LTA)	Assigns 100% conversion credit to the terminal interaction point ($w_N = 1, w_{\{i < N\}} = 0$).	Simple execution, low data overhead, widely supported in basic web analytics.	Ignores upper-funnel touchpoints; inflates bottom-of-funnel budget allocations.
First-Touch Attribution	Assigns 100% credit to the initial discovery touchpoint ($w_1 = 1, w_{\{i > 1\}} = 0$).	Highlights initial customer acquisition channels and discovery sources.	Disregards mid-funnel nurturing and lower-funnel conversion triggers.
Linear Attribution	Distributes credit uniformly across all recorded journey touchpoints ($w_i = 1/N$).	Easy to compute; acknowledges every touchpoint within the path to purchase.	Assumes equal contribution across all touchpoints regardless of engagement quality.
Higher-Order Markov Chains	Models journeys as stochastic processes via transition probability	Captures sequential path dependencies and path-removal incremental	Requires rich, user-level event logs and higher computational processing

Attribution Model Class	Underlying Analytical Mechanism	Theoretical & Operational Strengths	Core Structural Limitations
	matrices.	effects.	capacity.
Shapley Value (Game Theory)	Allocates credit based on marginal contributions across all channel coalitions.	Axiomatically fair allocation; accounts for cross-channel synergistic effects.	Computational complexity scales exponentially ($O(2^n)$) with channel count.
ML-Integrated Markov Model	Merges predictive lead scoring (p_{lead}) with higher-order Markov chains.	Incorporates non-converted pending pipeline leads into ROMI calculations.	Requires integration across CRM systems, web analytics, and machine learning pipelines.

To overcome the analytical limitations of rule-based heuristics, data-driven algorithmic attribution applies stochastic modeling and cooperative game theory to measure channel performance.

Markov Chain Attribution Frameworks

Markov chain attribution structures the customer journey as a directed graph where nodes represent marketing channels and edges represent transition probabilities between states, culminating in either Conversion (C) or Null/Drop-off (N). In a higher-order Markov model, the transition probability P_{ij} depends on the preceding sequence of k touchpoints rather than the current state alone, accommodating sequential path dependencies:

$$P_{ij} = P(\text{start_span})(\text{end_span})(X_{t+1} = j \mid X_t = i, X_{t-1} = i_{t-1}, \dots, X_{t-k+1} = i_{t-k+1})$$

Channel credit is evaluated using the Removal Effect (R_k), which measures the proportional reduction in total system conversion probability when channel k and its associated transition paths are removed from the network:

$$R_k = \frac{V(S) - V(S \setminus \{k\})}{V(S)}$$

Where $V(S)$ represents the baseline conversion probability across the complete set of available channels S , and $V(S \setminus \{k\})$ represents the system conversion probability after removing channel k . The normalized attribution weight W_k assigned to channel k is calculated as:

$$W_k = \frac{R_k}{\sum_{m \in S} R_m}$$

Shapley Value Game-Theoretic Attribution

Derived from cooperative game theory, Shapley value attribution treats marketing channels as players in a coalition game, allocating financial revenue based on each channel's marginal contribution across every possible channel combination. For a set of channels N , the Shapley value

$\phi_i(v)$ allocated to channel i under characteristic function $v(S)$ —which represents the total conversions produced by channel subset S —is specified as:

$$\phi_i(v) = \sum_{S \subseteq N \setminus \{i\}} \frac{|S|! (|N| - |S| - 1)!}{|N|!} [v(S \cup \{i\}) - v(S)]$$

This formulation satisfies four essential axioms of fair allocation:

1. **Efficiency:** The sum of allocated channel credits equals total coalition conversion value ($\sum_{i \in N} \phi_i(v) = v(N)$).
2. **Symmetry:** Channels contributing equal marginal value across all coalitions receive equal credit allocations.
3. **Dummy Player:** Channels adding zero marginal conversions across all coalitions receive zero credit allocation.
4. **Additivity:** Combined contributions across independent marketing campaigns sum linearly.

Integrated Predictive Lead Scoring and Pipeline Attribution

Recent developments expand algorithmic attribution by incorporating open sales pipelines and non-converted leads into model calculations. Traditional attribution frameworks evaluate only historical converted paths, ignoring the future economic value of active leads in long sales funnels.

By training machine learning classifiers on historical behavioral event logs, organizations can compute real-time conversion probabilities ($p_{l[start_span](end_span)ead}$) for pending pipeline leads:

$$p_{lead} = \sigma \left(\sum_{j=1}^m \beta_j X_j \right)$$

Where $\sigma(\cdot)$ represents the logistic function, X_j denotes behavioral tracking metrics (such as whitepaper downloads, email engagement rates, and platform demo interactions), and β_j represents estimated feature weights. Estimated conversion expectations from open leads are integrated alongside historical completed transactions into a 4th-order Markov chain. This prospective attribution framework yields more accurate evaluations of Return on Marketing Investment (ROMI) over extended sales cycles. Advanced attribution frameworks must also account for dynamic market effects, including time-lagged carryover impacts (delayed conversions resulting from past ad impressions) and cross-channel spillover effects (such as offline television advertising driving online organic search traffic).

Strategic Brand Architecture and Customer-Based Brand Equity

Brand architecture specifies how an enterprise structures, names, and visually organizes its portfolio of brand assets. An optimal brand architecture establishes market clarity, maximizes cross-offering synergies, and protects parent brand equity from operational dilution.

The Brand Relationship Spectrum

Aaker and Joachimsthaler (2000) introduced the Brand Relationship Spectrum, establishing a strategic framework organized by the primary "driver role" each brand plays in consumer purchasing decisions.

The spectrum encompasses four primary portfolio strategies and nine distinct sub-strategies.

Strategic Spectrum Position	Sub-Strategy Variants	Primary Purchasing Driver Role	Portfolio Equity Dynamics	Financial & Risk Profile
Branded House	Single Identity; Same Identity.	Master Brand holds absolute driver role.	Concentrated entirely within the core master brand node.	Highest marketing investment efficiency; maximum spillover risk exposure.
Sub-Brands	Master Brand as Driver; Co-Drivers.	Shared driver role between master brand and sub-brand.	Reciprocal flow stretching parent equity into new categories.	High cross-offering synergy; moderate potential for equity dilution.
Endorsed Brands	Sub-Brand Endorsed; Linked Name; Shadow Endorser.	Product brand acts as primary driver; parent provides endorsement.	Asymmetric transfer granting organizational credibility.	Balanced scale leverage; low cross-brand risk contamination.
House of Brands	Independent Brands; Competing Brands.	Stand-alone product brand holds sole driver role.	Autonomous equity nodes isolated within individual offerings.	High launch and maintenance costs; absolute risk containment.

Under a Branded House strategy, the enterprise applies a single master brand across all corporate offerings using descriptive product designations (such as Virgin or FedEx). This model maximizes capital

efficiency by focusing brand-building investments on a single master identity. However, it increases exposure to brand spillover risk, where product failures or public crises in one unit can impair equity across the entire enterprise portfolio.

Sub-Brand strategies pair a master brand with distinct sub-brand identifiers (such as Apple iPhone or Sony PlayStation). The master brand and sub-brand share driver responsibility, allowing the core identity to adapt to new customer segments without severing ties to established parent equity.

Endorsed Brand strategies maintain individual, independent product identities backed by a visible corporate endorsement (such as Courtyard by Marriott or KitKat by Nestlé). The standalone product brand serves as the primary purchasing driver, while the corporate endorsement provides organizational trust and scale reassurance. Under the Shadow Endorser sub-strategy, the corporate connection remains unstated in consumer-facing communications but is widely understood in the market (such as Lexus by Toyota), providing organizational support while isolating parent equity.

A House of Brands strategy consists of autonomous, standalone brands targeted at specific customer segments or price points (such as Procter & Gamble's Tide, Pampers, and Gillette). This approach enables precise market positioning and isolates operational risks within individual brand nodes. However, it requires substantial marketing capital to build and maintain each brand independently.

Customer-Based Brand Equity Models

Brand portfolio strategies depend directly on underlying Customer-Based Brand Equity (CBBE) dynamics. Keller (1993) defines CBBE as the differential effect that brand knowledge has on consumer responses to marketing activities.

Brand knowledge is structured within consumer memory as an associative network composed of brand nodes and connecting mental links. CBBE is built on two fundamental structural dimensions:

1. **Brand Awareness:** The strength of the brand node in memory, evaluated through brand recognition (verifying prior exposure) and brand recall (unaided retrieval when prompted by product category signals).
2. **Brand Image:** The set of cognitive associations linked to the brand node in memory. These associations are defined by three key dimensions:
 - Favorability: Associations that satisfy customer needs efficiently.
 - Strength: Deeply processed cognitive links reinforced through consistent interaction.
 - Uniqueness: Differentiated associations that provide sustainable competitive advantage.

When extending a brand portfolio across new product categories, shared equity depends on whether core brand associations remain relevant and favorable in the target domain without diluting master brand positioning.

Sales Operations, Channel Governance, and Compensation Economics

Go-to-market strategies require aligning channel distribution architectures with performance incentive structures for front-line sales teams.

Transaction Cost Economics in Channel Governance

Transaction Cost Economics (TCE), developed by Williamson (1975, 1985) and applied to distribution channels by Anderson and Coughlan (1987), examines whether firms should establish direct internal sales forces (hierarchy) or outsource distribution to independent sales representatives (market/hybrid). Channel governance decisions follow the discriminating alignment hypothesis: aligning transactions (which vary in key attributes) with governance structures (which vary in cost and control properties) to minimize total governance costs:

$$\min \left[C_{\text{production}} + C_{\text{transaction}}(G) \right]$$

Where transaction costs $C_{\text{transaction}}(G)$ include ex-ante search, negotiation, and drafting

costs, alongside ex-post monitoring, enforcement, and governance adjustment costs.

Distribution Governance Mode	Core Structural Characteristics	Transactional Drivers (Asset Specificity & Uncertainty)	Operational Tradeoffs
Market Governance (Independent Reps)	Classical contracting, high autonomous incentives, non-proprietary channels.	Low asset specificity; low behavioral uncertainty; standard products.	High scale flexibility; zero administrative overhead; risk of rep opportunistic behavior.
Hybrid Governance (Franchising / Alliances)	Neoclassical relational contracts, shared investments, arbitration provisions.	Moderate asset specificity; specialized market distribution requirements.	Shared operational costs; moderate control; complex contract monitoring needs.
Hierarchical Governance (Direct Sales Force)	Direct managerial authority, central coordination, internal reporting.	High physical/human asset specificity; high market uncertainty.	Complete operational control; high fixed overhead; reduced high-powered incentive drive.

Three transactional attributes determine optimal distribution governance:

- **Asset Specificity:** Investments tailored to a specific commercial relationship that cannot be redeployed without substantial economic loss. Asset specificity includes human asset specificity (specialized technical expertise), physical asset specificity (dedicated equipment), and dedicated asset specificity (channel infrastructure investments). As asset specificity increases, market governance becomes vulnerable to opportunistic hold-up, favoring integrated direct channels.
- **Uncertainty:** Comprises environmental uncertainty (market volatility or rapid technological shift) and behavioral uncertainty (difficulty in observing rep activity directly). High uncertainty combined with high asset specificity raises contracting costs, favoring hierarchical managerial control.
- **Opportunism and Bounded Rationality:** Bounded rationality prevents writing fully comprehensive contracts, while opportunism creates risks of self-serving behavior. Internal hierarchy mitigates these risks by placing representatives under direct corporate authority.

Agency Theory and Salesforce Compensation Design

Once channel structures are defined, sales force performance depends on agent compensation design. Applying Agency Theory (Basu, Lal, Srinivasan, & Staelin, 1985), the firm acts as the Principal seeking to maximize expected net profits, while the salesperson acts as the Agent choosing effort levels (e) that are costly to execute and unobservable to the principal.

Total sales revenue S is modeled as a function of agent effort e and exogenous market noise $\theta \sim \mathcal{N}(0, \sigma^2)$:

$$S = f(e) + \theta$$

The firm establishes a compensation contract $w(S)$ consisting of a fixed base salary α and a variable commission rate β :

$$w(S) = \alpha + \beta S$$

The salesperson experiences effort costs $c(e) = \frac{1}{2} k e^2$ and exhibits constant absolute risk aversion (CARA) utility $U(w) = -\exp(-\gamma [w - c(e)])$, where γ represents the risk-aversion coefficient. The optimal commission rate (β^*) balances incentive alignment against risk-sharing: $\beta^* = \frac{f'(e)}{1 + \gamma \sigma^2 \cdot k \cdot \left(\frac{d^2 c}{de^2} \right)}$

Compensation Model Parameter	Directional Shift	Structural Impact on Optimal Incentive (β^*)	Operational Compensation Adjustment
Environmental Uncertainty (σ^2)	Increase ($\uparrow$)	Commission Rate Decreases ($\beta^* \downarrow$)	Shift toward higher base salary (α) to shield reps from market volatility.
Sales Rep Risk Aversion (γ)	Increase ($\uparrow$)	Commission Rate Decreases ($\beta^* \downarrow$)	Lower variable pay to minimize risk premiums demanded by agents.
Effort Productivity ($f'(e)$)	Increase ($\uparrow$)	Commission Rate Increases ($\beta^* \uparrow$)	Higher variable pay to drive revenue-generating rep activities.
Behavioral Uncertainty	Increase ($\uparrow$)	Commission Rate Increases ($\beta^* \uparrow$)	Higher output-based commissions when direct effort monitoring is unfeasible.

When market volatility (σ^2) or representative risk aversion (γ) increases, optimal commission rates (β^*) decrease to protect salespeople from uncontrollable pay variance. Conversely, when representative effort directly drives sales conversions ($f'(e)$), variable commissions increase to drive sales productivity.

Territory Alignment and Sales Effectiveness Frameworks

Optimizing sales operations requires structured territory design and resource allocation frameworks. The Sales Effectiveness Drivers (SED) framework organizes sales force productivity across five strategic pillars: market strategy alignment, organizational channel structure, operational support tools, leadership style, and sales talent development.

Territory alignment balances market opportunity against workload demands across geographic regions. Misaligned sales territories create operational inefficiencies that lower total sales force output. Mathematically, territory optimization minimizes variance across market potential and workload metrics:

$$\text{Territory Variance} = \sum_{i=1}^K \left(P_i - \bar{P} \right)^2 + \lambda \sum_{i=1}^K \left(W_i - \bar{W} \right)^2$$

Where P_i represents target sales potential in territory i , W_i represents required account workload hours in territory i , and λ balances opportunity equity against workload balance. Mathematically optimizing sales territories reduces travel overhead, eliminates channel cannibalization, and maximizes account coverage across sales organizations.

Strategic Synthesis and Enterprise Alignment

Aligning digital marketing, brand architecture, and sales operations creates an integrated commercial framework for sustainable growth.

Corporate Strategy & Value Creation Objectives

- └ Digital Ecosystems & Customer Journeys
 - └ Omnichannel CX Tracking (Pre-Purchase, Purchase, Post-Purchase)
 - └ Algorithmic Attribution (Higher-Order Markov & Shapley Value Credit)
- └ Brand Architecture & Portfolio Strategy

- └ Driver Role Allocation (Branded House vs. House of Brands)
- └ Equity Transfer & Memory Network Alignment (Keller CBBE Pyramid)
- └ Sales & Distribution Operations
 - └ Channel Governance (Transaction Cost Economics & Asset Specificity)
 - └ Sales Force Economics (Agency Incentive Contracts & Territory Alignment)

Strategic coordination across these three operational domains relies on three core integration mechanics:

1. **Attribution-Informed Go-to-Market Allocation:** Algorithmic attribution methods (Markov removal effects and Shapley values) provide objective channel productivity metrics. These analytical insights guide resource allocation across top-of-funnel brand investments and bottom-of-funnel conversion mechanics.
2. **Brand Architecture Governance:** Clear architecture frameworks establish driver roles and equity flow rules across digital channels. Coherent brand structures eliminate market confusion across multi-publisher campaigns, protect master brand assets, and support category extensions.
3. **Aligned Distribution Governance and Incentives:** Channel choices balance transaction cost efficiency against account coverage demands. Combining optimized territory alignment with agency-theoretic compensation contracts ensures sales team behaviors align directly with enterprise brand objectives and financial performance targets.

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