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Research Article

AI-Driven Strategies to overcome Media-Planning Challenges in Retail Media Network (RMN)s

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Abstract:

Retail Media Networks (RMNs), have emerged as a pivotal channel through which brands can leverage first-party data and connect with consumers at the point of purchase. However, media planning that comes with RMNs has some unique challenges. These include fractured RMN environment, a changing data privacy regulatory environment, inconsistent performance measurement and organization misalignment, complicating critical areas of media planning such as budget allocation, audience , tactics planning, and strategic implementation. The literature review is a synthesis of knowledge on academic sources and industry reports to shed light on the identified obstacles in RMN media planning and how artificial intelligence (AI) and analytics drive solutions can be beneficial. Through the analysis of peer-reviewed research and the experiences of practitioners, we discover valuable AI use cases, including advanced segmentation, a better budget optimization, and built-in analytics environments to achieve cross-measurement. Our findings show that AI and analytics have the potential to significantly tackle the issues of fragmentation and measurement, in addition to making the targeting more accurate and enabling real-time decisions. We conclude with research gaps—particularly around AI ethics, integration complexities, and ROI transparency—and propose future directions to refine RMN media planning frameworks.

1. Introduction

The rapid emergence of Retail Media Networks (RMNs) (platforms operated by retailers such as Amazon, Walmart, and Target) has redefined the digital advertising landscape by offering brands direct access to consumers at the point of sale. Though global RMN Ad spending is expected to surpass $106 billion by 2027 ,the focus on strategic marketing budget planning is still lacking[1]. RMNs use first-party consumer data to facilitate precise advertising, unlike the conventional third-party networks. As promising as they appear, RMNs brings a lot of complexities into media planning. Brands face multiple challenges and complexities within fragmented walled gardens , each containing proprietary data segments, measurement standards and lack of data driven planning. Such challenges degrade marketing performance, makes it hard to allocate marketing budgets, and causes an inability to perform holistic measurement [1], [14]. Furthermore, increased customer privacy laws like GDPR have also limited the use of third-party data, as such organizations have been pushed to adjust to first-party data strategies, which many are still in the process of organizing [6]. At the same time, the absence of standardised RMN metrics results in the creation of measurement silos meaning that it is hard to understand how the brands are performing in relation to each other or in relation to other channels [1]. Furthermore, to worsen the matter are organizational silos and off-putting strategies that hindered cross-functional cooperation and harmonious media implementation. But to its rescue, Artificial intelligence (AI) and advanced analytics & automated solutions have been developed as the key remedy to automate the RMN media planning. AI driven segmentation, machine learning budget optimization, and integrated analytics dashboards can enable brands to overcome fragmentation and

offer more refined targeting, as well as transparent, real-time measurement [3], [5], [7], [13].

This review synthesizes peer-reviewed journal articles and industry sources and focuses on below research goals :

1. Details about Media Planning Framework in RMN
2. Detail the primary challenges in RMN media planning.
3. Survey how AI and analytics can help in addressing these challenges.
4. Identify research gaps and propose future research directions.

2. Methodology

2.1 Media Planning Framework in RMN

In RMNs, building on successful media plans and customized based on brand needs request a robust framework comprises of below five sequential stages:[8], [9] (Figure 1)

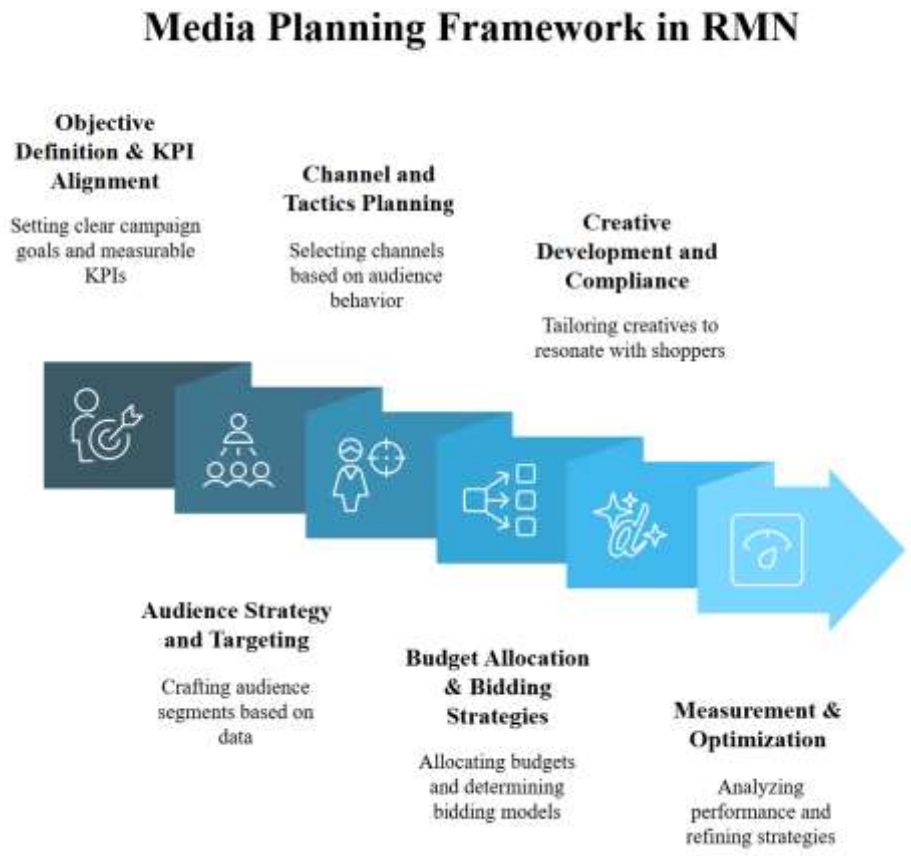

Figure 1 *Media planning framework in RMN*

2.1 Objective Definition & KPI Alignment

At this stage, the campaign's primary goals is clearly articulated—such as driving incremental sales, increasing category share, , driving awareness or launching a new product—and map each to specific, measurable KPIs (e.g., reach, frequency, incremental ROAS, in-store lift) [8].

2.2 Audience Strategy and Targeting

RMNs excel with first-party data. Effective planning involves crafting robust audience segments based on demographics, past purchase behavior (frequency, recency, category affinity), real-time browsing activity, and CLV, loyalty status—to enable precise targeting (e.g., competitor purchasers, lapsed customers, product viewers, high-value members). Some RMNs also offer AI-driven predictive audiences for propensity and look alike buyers. [2]

2.3 Channel and Tactics Planning

RMN channels (sponsored search, display units, on-site recommendations, in-store digital) are selected based on each segment's shopping behavior and expected incremental reach, balancing depth (high-intent, existing customers) and breadth (new-to-brand prospects) [1].

2.4 Budget Allocation & Bidding Strategies

Advertisers, often with RMN or agency partner support, forecast potential campaign outcomes based

on historical data and platform insights.Budgets are allocated across the selected channels and tactics, potentially using a structured approach like dedicating portions to core proven strategies, testing new approaches, and maintaining flexibility for in-flight adjustments. Pricing models like cost-per-click (CPC) or cost-per-mille (CPM) are considered.Campaign scheduling, including pacing, flight duration, and ad frequency, is also determined at this stage. [7][12][5]

2.5 Creative Development and compliance

Ad creatives are tailored to the specific format and placement within the RMN's environment. Messaging should resonate with the shopper mindset, often focusing on product features, promotions, or solutions relevant to their active shopping journey . A/B tests are set up refining messaging, imagery, and calls-to-action to evaluate the effectiveness of the creatives during measurement.. Creative are designed based on brand and regulatory compliance,ensuring adherence to guidelines and privacy policies [13][3][6]

2.6 Measurement & Optimization

Unified analytics dashboard that ingests data from all RMNs, standardizes KPI definitions, and surfaces real-time performance metrics [7], is developed.Incremental metrics are calculated wherever we have Test and control audience. Optimization—reallocating /adding more budgets, refreshing creative, and refining audience definitions—are done at a regular cadence based on the real time performance campaign insights[4].

3. Literature Review

3.1 Challenges and Complexity in RMN Media Planning

3.1.1 Multi-RMN Fragmented Landscape

Bartholomew and Williamson define RMNs as retailer-owned advertising platforms that utilize first-party data to connect brands with high-intent consumers [1]. As a result, brands must navigate multiple RMNs, each with its own UI, data structures, and targeting capabilities. This fragmentation leads to operational complexity: marketing teams juggle multiple dashboards, reconcile divergent data sets, and manually harmonize performance reports [1], [14].

Soberman (2005) highlights that media fragmentation—driven by the explosion of digital channels—has "significantly reduced the effectiveness of marketing unless firms harness information to allocate spending wisely" [10]. He emphasizes that experts in media buying have emerged to help brands navigate this complexity, but without standardized processes, fragmentation continues to hamper efficiency.

3.1.2 Channel Allocation Decisions

Deciding how to allocate budgets across RMNs involves balancing reach and conversion. RMNs disproportionately focus on high-intent audiences, yet brands must weigh whether to concentrate on a single high-performing RMN or diversify across multiple networks to maximize incremental reach [1]. Rudimentary rules of thumb often fail; sophisticated allocation must account for diminishing returns, cross-network overlap, and dynamic consumer behaviors.

3.1.3 Data Privacy Concerns

The demise of third-party cookies and evolving privacy regulations have forced brands to pivot toward first-party data strategies. Ham and Lee (2025) explore whether first-party data can outshine third-party data in digital advertising, concluding that first-party data offers superior accuracy but demands robust infrastructure and governance [2]. Under GDPR, publishers, especially RMNs need explicit consent before leveraging personal data, which complicates media planning in creating audiences and measuring the ROI [6].

3.1.4 Non-Standardized Metrics and Lack of Transparency

Unlike search and social channels, RMNs lack a universally accepted standard for key performance indicators (KPIs). Some define an "impression" as a page load; others count only viewable impressions. Conversion windows differ, and revenue attribution models vary across networks. Bartholomew and Williamson state, "The lack of standardized measurement across RMNs makes it difficult for brands to evaluate the effectiveness of their advertising spend. Brands often operate 'blind,' without clear insights into campaign performance" [1], [14].

In the broader media-planning context, Rubtcova and Pavenkov (2018) underscore that media planners struggle to determine coverage and frequency due to incomplete data on audience size, especially for non-traditional or emerging channels [8]. Without reliable benchmarks, planners cannot perform apples-to-apples comparisons across RMNs or against other channels.

3.1.5 Attribution Complexity in Measurement ROI

Demonstrating accurate attribution that a specific ad exposure drove incremental sales remains complex. Lewis and Rao (2015) highlight the difficulties in

isolating advertising's causal impact, noting that measurement economics often "overestimate campaign impact" unless robust experimental designs (e.g., holdout tests) are employed [4]. Many RMNs rely on last-click or last-touch models that ignore cross-network synergies, leading to biased ROI calculations.

3.1.6 Internal Silos in Cross-Functional Collaboration

Many organizations suffer from internal silos where media agency , marketing and analytics teams operate separately, leading to disjointed RMN strategies. Iankovets posits that "internal silos and strategy misalignment lead to inefficiencies and conflicting strategies, preventing a coherent approach to marketing across various retail environments" [7]. Aligning stakeholders around unified KPIs and processes is essential to avoid duplicated efforts and suboptimal resource allocation.

3.1.7 Gap in holistic Media Planning solution

The complexity of RMNs demands specialized expertise. Iankovets (2023) notes that digital media planning now requires integration of offline and online strategies, sophisticated analytics tools, and mastery of dynamic pricing models [7]. Absence of such a holistic solution in these areas lead to inefficient media buys and missed opportunities for optimization.

4. Role of AI & Analytics-Enabled Solutions in RMN Media Planning

3.1 AI-Driven Audience Segmentation and Targeting

3.1.1 Predictive Modeling and Segmentation

AI has the potential to enable brands to determine high-value audience groups within huge data sets and silos using machine learning algorithms. The paper by Gao et al. (2023) overviews AI developments in the advertisement area and highlights how machine learning models can improve targeting precision, personalize creative, and optimize bidding strategies [3]. In the case of RMNs these models consume first-party purchase history, digital behavior (engagement) and demographic fields and predict purchase propensity. The brands can then serve hyper-personalized ad experiences to the Target audiences with high propensity, eliminating wastage of impressions and increasing the conversion rates.

3.1.2 Real-Time Bid Optimization

Recently, a multi-agent reinforcement learning solution has been proposed in the paper by Chen et al. (2025) to real-time bidding on multiple channels, showing that the reinforcement learning algorithms can coordinate bids across the decentralized ad exchanges to maximize the long-term ROI [5]. AI algorithms can also be used continuously in RMNs, which run on Programmatic platforms where bidding is done on an hourly or daily basis, to continuously optimise bids based on real-time performance indicators and budget pacing, to achieve an optimal spend distribution.

3.2 Optimization-Based Robust Budget Allocation

Sedlářová Nehézová et al. (2025) present a powerful optimization model, which incorporates fuzzy linguistic scales to deal with uncertainties in conversion cost coefficients in online marketing [12]. Developing the budget allocation as a linear program with strong constraints, brands can protect themselves against the changing costs and unpredictable performance, especially in RMNs where CPCs and CPMs fluctuate unpredictably. They find that strong solutions can trade nominal optimality in exchange for higher robustness in the face of volatile environments.

3.3 Unified Measurement and Analytics Platforms

3.3.1 Integration of Holistic Data

According to Iankovets (2023), analytics platforms aggregate the data of several RMNs into a single dashboard. These systems normalize KPI definitions, e.g. viewable CPM or 30-day revenue, and automate data ingestion, minimizing manual reconciliation [7]. This consolidated perspective imposes uniform measures and identifies the poorly performing channels in a short time.

3.3.2 Dynamic Scenario Planning

The most advanced AI-driven scenario planning tools allow running "what-if" scenarios, allowing marketers to predict how a change in budget or channel allocation would affect their performance. As an example, brands can test promotional pushes (e.g. a holiday sale campaign) and predict the results (incremental sales, ROI, reach) prior to making a spend commitment [14]. These dynamic simulations enhance agility and confidence in decision-making of RMN planning.

3.4 Automated Creative Optimization and Personalization

LLMs and deep-learning frameworks can generate, test, and optimize ad creative at scale. Aghaei et al.

(2024) demonstrate that AI frameworks combining explainable AI and LLMs (SOMONITOR) enhance campaign performance by generating contextually relevant copy and providing interpretable insights into what creative resonates best [13]. In RMNs, creative optimization must account for product attributes, retail context, and audience psychology. AI can iterate through thousands of creative permutations—headlines, images, calls-to-action—and identify top performers with minimal human intervention.

3.5 Privacy-First Analytics and Compliance

AI can help enforce privacy regulations by anonymizing user data and recommending compliance-driven targeting strategies. Wang, Jiang and Yang (2024) examine the early impact of GDPR on display advertising, showing that privacy-compliant publishers had to adapt data collection and segmentation practices [6]. AI can automate consent management, detect non-compliant data usage, and replace personally identifiable information with hashed identifiers to maintain robust targeting within legal constraints.

3.6 Cross-Functional Alignment and Decision Support

AI-powered collaboration platforms facilitate alignment among marketing, analytics, and finance teams. By providing a single source of truth and leavering AI-driven forecasts , scenario simulations, and ROI projections, organizations can break internal silos. A unified analytics platform ensures that all stakeholders operate on consistent data and KPIs, streamlining governance and reducing friction during RMN media planning [7].

4 Key Benefits of AI-Enabled solutions

- **Efficiency Gains:** Automated data ingestion and Ai -enabled workflows across RMNs help in dramatically reducing manual labor, enabling media planners to focus on revenue driving strategy rather than dealing with or organizing the spreadsheet [1], [8].
- **Improved ROI:** AI-optimized budget allocation models and real-time bidding algorithms helps in improving incremental return on investment [5], [12].
- **Enhanced Agility:** Dynamic scenario planning and continuous optimization allow brands to make decisions quickly in response to a competitor's promotion or a sudden shift in consumer demand [1], [3].
- **Privacy-First Targeting:** AI frameworks that enforce privacy regulations ensure that targeting remains both effective and compliant, preserving consumer trust and avoiding costly fines [2], [6].

5. Results and Discussion

5.1 Synthesis of Key Findings

Our review reveals that RMN media planning faces multifaceted challenges, including fragmentation, privacy constraints, measurement inconsistencies, and internal misalignment. AI and analytics have emerged as powerful enablers to address these challenges. Below tables summarises our findings on how the media planning solutions can be addressed by robust Analytics and AI-Enabled solutions

Table 1. *Some challenges and related refs*

RMN Media Planning Challenge	Analytics and AI-Enabled Solution(s)	References
3.1.1 Multi-RMN Fragmented Landscape	● Holistic Data Integration will help in creating unify Analytics dashboards across RMN partners	[7], [1], [14]
3.1.2 Channel Allocation Decisions	● Robust Budget Allocation leaving AI ● Real-Time Bid Optimization to fine tune media plans ● Dynamic Scenario Planning can simulate consolidated outcomes	[12], [5], [1]
3.1.3 Data Privacy Concerns	● Privacy-First Analytics : consent automation, anonymization ● Predictive Modeling to improve the percentage of first-party data within compliance	[6], [2], [3]

3.1.4 Non-Standardized Metrics & Lack of Transparency	• Unified Measurement Platforms with standardize KPIs across RMNs • AI-driven Anomaly Detection for data quality	[7], [1], [4]
3.1.5 Attribution Complexity in Measurement ROI	• Experiment-informed Attribution: integrate holdout test inputs into models • Unified Analytics with transparent Multi-touch Attributed (MTA) frameworks	[4], [7], [1]
3.1.6 Internal Silos in Cross-Functional Collaboration	• AI-driven Dashboards & Natural-Language Summaries for shared insights on campaign performance • Centralized Data Platforms to break silos	[7], [1]
3.1.7 Gap in Holistic Media Planning Solution	• End-to-End AI-Enabled Platforms: combine segmentation, allocation, measurement, and creative optimization	[7], [14], [1]

6. Research Gaps and Future Work

Despite significant advances, several research gaps persist:

1. **Ethical AI and Bias Mitigation:** When AI models are trained on incomplete or skewed first-party data, they can inadvertently perpetuate biases—overemphasizing certain demographic segments or omitting underrepresented groups. Future work should explore fairness constraints and bias-detection frameworks tailored to RMN-specific AI models [3].
2. **Integration Complexity and Interoperability:** Integrating AI engines with legacy MarTech stacks and multiple RMN APIs remains a technical hurdle. Standardized protocols or middleware solutions are needed to simplify data flows across diverse systems [9], [10].
3. **Transparent Attribution Models:** Attribution remains a "black box" in many RMNs. Researchers should develop transparent, multi-touch attribution models that reconcile conflicting metrics (e.g., last-touch vs. holdout tests) and provide actionable insights across RMNs [4].
4. **Quantifying AI-Enabled Uplift in RMNs:** While case studies demonstrate AI benefits, systematic research—ideally randomized controlled trials—should quantify uplift attributable solely to AI interventions in RMN campaigns, isolating them from confounding factors [5].
5. **Consumer Perceptions of AI in RMNs:** As AI increasingly personalizes RMN experiences, it is crucial to understand consumer sentiment toward AI-driven targeting on retail sites. Future studies could examine how AI personalization affects brand trust and purchase intent in RMNs [2].

7. Conclusion

Retail Media Networks offer unprecedented opportunities to engage high-intent shoppers using first-party data. However, RMN media planning is beset by fragmentation, measurement gaps, privacy constraints, and organizational misalignment. This review demonstrates that AI and analytics—through predictive segmentation, robust budget optimization, unified measurement platforms, and automated creative optimization—provide powerful solutions to these challenges. AI not only mitigates complex fragmentation but also supports privacy compliance, enhances agility, and fosters cross-functional alignment. Nevertheless, research gaps remain: ethical AI, integration complexities, transparent attribution, and consumer perceptions warrant deeper investigation. As RMNs continue to proliferate, academic and industry collaboration will be essential to refine AI-enabled media planning frameworks that balance innovation with transparency and ethical stewardship.

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- **Ethical approval:** The conducted research is not related to either human or animal use.
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