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SYNERGY OF SCIENCE AND TECHNOLOGY: CURRENT STATE, CHALLENGES, AND PROSPECTS

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PROBLEMS AND PROSPECTS FOR THE DEVELOPMENT OF MARKETING STRATEGIES IN CONTEMPORARY RESEARCH

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Marketing strategy has been among the most intensively cultivated fields in management scholarship for more than half a century, and the volume of work published under its heading continues to grow. Yet the field displays an unusual asymmetry. Publication output has never been greater, while the confidence with which the discipline can answer elementary strategic questions has, if anything, weakened. Which channels generate incremental rather than merely attributed revenue? How should a communications budget be divided? What positioning is defensible when the interface between a brand and its market is an algorithm rather than a page? Practitioners increasingly report that academic marketing offers limited guidance on the decisions that consume their attention, while academics observe that practice has moved into territory for which no validated theory exists.

This paper argues that the apparent crisis is more accurately described as a dislocation. The problems now visible in research on marketing strategies are not, in the main, failures of diligence or of statistical technique; they are the predictable consequence of a rapid change in the object of study itself. Between approximately 2020 and 2026 the mechanisms by which firms reach, persuade and retain customers were substantially re-engineered: by artificial intelligence in both its analytical and its generative forms, by repeated reconfiguration of the digital identity infrastructure on which measurement had depended, and by the partial displacement of link-based retrieval by generative answer systems. Research instruments calibrated to the earlier environment continue to be applied to the present one, and much of what the literature experiences as a problem is the residue of that mismatch.

The aim of the study is accordingly twofold: to systematise the principal constraints now bearing on research into marketing strategies, and to identify the directions along which the field may develop most productively. The paper is a conceptual synthesis. It draws on peer-reviewed literature published between 2019 and 2026 and triangulates it against current survey and clickstream evidence, since several of the phenomena at issue are documented in practitioner data years before they appear in refereed journals. That reliance on non-academic sources is deliberate and is itself part of the argument, because the publication lag characteristic of the discipline is one of the mechanisms producing the dislocation described here. Section 2 characterises the change in the object of inquiry, Section 3 sets out five problems that follow from it, Section 4 identifies the corresponding prospects, and Section 5 concludes.

The canonical formulation of marketing strategy - segmentation, targeting and positioning, executed through a controllable marketing mix - presupposes that the firm

selects a segment, formulates a proposition, and delivers it through channels whose behaviour, while imperfectly predictable, is stable enough to be modelled. Strategy so conceived is a problem of choice under uncertainty, and the research programme built upon it is largely concerned with identifying which choices accompany superior performance.

Artificial intelligence was initially assimilated to this framework as an instrument. Huang and Rust [1] offered what remains the most influential formalisation of that assimilation, distinguishing mechanical AI, which automates repetitive functions, from thinking AI, which supports data-driven decisions, and feeling AI, which interprets emotion and interaction; each type is then mapped onto the successive stages of marketing research, strategy and action. The framework's durability rests on its refusal to treat AI as monolithic. What it does not anticipate - and could not reasonably have been expected to anticipate - is that AI would cease to be an instrument deployed within the strategy process and would instead become a constituent of the environment in which strategy is formed. That transition has occurred along three distinct loci, worth separating because each generates a different research problem.

The first is the discovery layer, the mechanism through which latent demand is expressed and intercepted. Clickstream evidence indicates that approximately 68% of searches on the dominant search engine concluded without a click to an external destination in 2026, against roughly 45% a decade earlier; on desktop only 20.4% of searches produce any external click [2]. AI-generated summaries now appear on more than a fifth of searches, and independent measurement finds users click through on 8% of searches when such a summary is present against 15% when it is not; within Google's AI Mode the referral rate falls to between 1.6% and 2.5% of queries, against 17-19% for conventional results [2]. Visibility is therefore ceasing to be a property of position within a ranked list and becoming a property of citation within a synthesised answer. Aggarwal et al. [3] demonstrate that this property is systematically optimisable, reporting visibility gains of up to 40% from structured adaptation of source content, and thereby establish generative engine optimisation as a legitimate object of strategic analysis rather than a practitioner fashion.

The second locus is the measurement layer. Between 2020 and 2024 an entire literature, academic and applied alike, was built on the assumption that third-party cookies would be withdrawn from the dominant browser and replaced by a privacy-preserving successor. In April 2025 that plan was abandoned: the vendor confirmed it would neither deprecate third-party cookies nor introduce the announced user-choice prompt, and the principal Privacy Sandbox interfaces were subsequently retired following low adoption [4]. The outcome is neither the former regime nor the anticipated replacement, but a permanently fragmented one in which one major browser permits third-party cookies while the remainder restrict them. Identity resolution, remarketing and attribution consequently operate on incomplete, browser-dependent data, and measurement has shifted from user-level observation toward modelled and aggregated estimates [4].

The third locus is the production layer. Grewal et al. [5] distinguish generative from analytical AI and organise implementation along two dimensions - the specificity of

the input, general or custom, and the level of human augmentation, low or high - yielding four quadrants with distinct cost, speed and risk profiles. The framework is valuable precisely because it resists the assumption that more automation is uniformly better. The same authors report evidence complicating any simple efficiency narrative: in one study human-created advertisements generated 9.5 times as many leads as generative-AI-created ones despite the latter achieving higher click-through rates, while 68% of experiment participants given generative writing tools submitted the model's initial output unedited, with no observed correlation between editing effort and outcome quality [5]. Efficiency and effectiveness have come apart, and the metrics cheapest to collect are those that conceal the divergence.

Terms central to the field - digital marketing capability, AI marketing, personalisation, marketing agility - are used with insufficient definitional discipline. The bibliometric analysis by Koubaa El Euch and Ben Said [6], covering 1,100 articles indexed in Scopus and Web of Science, maps a field in which the typology of AI tools used in strategic marketing is still being established rather than applied. The systematic review by Elkhoudary et al. [7], which examined 38 studies published between 2015 and 2025 under PRISMA protocol and synthesised them through the TCCM framework, reaches a compatible conclusion from the opposite direction: the resource-based and dynamic capabilities perspectives dominate, yet both underemphasise entrepreneurial intentionality in resource-constrained settings.

A construct whose operationalisation varies across studies cannot support cumulative meta-analysis, because the reported effect sizes are not commensurable. A subtler difficulty is referential drift. The phrase "AI in marketing" denoted propensity modelling and recommendation in 2019; by 2026 it denotes autonomous content generation, agentic media buying and conversational interfaces, so comparing studies published under that heading compares different phenomena. The instability sits at the level of the construct, not the estimator, and no refinement of technique will repair it.

A related difficulty concerns the dependent variable. Most empirical work on digital marketing capability relies on perceptual, self-reported measures of firm performance from a single informant, which introduces common-method variance and invites retrospective rationalisation. The obvious remedy - objective performance data - has become harder rather than easier to apply, because the attribution infrastructure from which it would be drawn is itself unstable [4]. Multi-touch attribution, which presupposes an observable cross-site journey, now yields estimates whose bias varies by browser and jurisdiction, while platform-reported conversion figures increasingly rest on modelled rather than observed events, and the modelling is proprietary.

This matters because substantial resources are committed on the basis of these signals. Gartner's 2026 survey of 401 chief marketing officers, conducted between January and March 2026 across North America, the United Kingdom and Europe, records total marketing budgets at 7.8% of company revenue, of which 15.3% is allocated to artificial intelligence, rising to 21.3% among organisations that assess themselves as AI-ready [8]. Allocation decisions of that magnitude are being taken with instruments whose validity has declined, and the literature has not yet supplied a replacement.

Hidayat et al. [9] provide a field-specific diagnosis of the reproducibility difficulties affecting marketing research, identifying selective reporting, hypothesising after results are known, and analytical flexibility exploited in pursuit of statistical significance, compounded by publication bias against null results, limited data sharing, and reliance on small or non-representative student samples. Deer et al. [10] set out the corresponding open science programme - preregistration, transparent reporting, and the sharing of data and code - and emphasise that it succeeds only through coordinated action by authors, journals, institutions and funding agencies. The remedies are not novel; their uneven adoption is itself the diagnostic finding.

A second and less discussed limitation is methodological homogeneity. Elkhoudary et al. [7] observe that the field relies overwhelmingly on cross-sectional surveys analysed with partial least squares structural equation modelling or regression, and that longitudinal research remains scarce. Given that capability development is a process unfolding over time, this is a serious constraint: a cross-sectional design can establish covariation between a capability score and a performance score, but cannot identify the process that produced either, nor exclude the reverse-causal reading in which high-performing firms are simply those able to afford capability investment. Where the underlying technology changes annually, such estimates also have a short shelf life.

The evidence base is narrower than the generality of its conclusions implies. Elkhoudary et al. [7] find the literature geographically concentrated in East Asia and Europe, with sparse representation of other regions despite active national digitalisation strategies there. The industry evidence carries a complementary bias: the Gartner respondents are drawn overwhelmingly from organisations with annual revenue above one billion United States dollars [8]. Conclusions about AI readiness derived from such a sample generalise poorly to small and medium-sized enterprises, which constitute the great majority of firms and face qualitatively different constraints - not merely less budget, but the absence of specialised analytical functions, of first-party data of usable scale, and of bargaining power with platforms. Theory built on large-firm evidence is thus applied prescriptively where its boundary conditions do not hold, since advice to build proprietary data infrastructure or custom models presupposes resources most firms do not command.

A final difficulty concerns the epistemic status of the forecasts research increasingly adopts as premises. In February 2024 a widely cited prediction held that traditional search engine volume would fall by 25% by 2026 as users migrated to AI chatbots and virtual agents [11]; informed commentary at the time cautioned that this was a forecast rather than a finding [12]. The 2026 evidence is genuinely ambiguous rather than simply confirmatory or disconfirmatory. Zero-click rates did rise steeply and the value of an organic ranking position did decline [2], yet the same period saw record search advertising revenue - 56.6 billion United States dollars in the third quarter of 2025 alone - attributed in part to AI features expanding the total volume of queries [2]. Displacement and expansion occurred simultaneously.

Both the disruption thesis and the continuity thesis can therefore be supported by selective citation, and the failure is instructive. What proved unreliable was not the direction of the trend but the linear extrapolation of a single indicator in a system where

several mechanisms operate at once. Research adopting practitioner forecasts as premises inherits their fragility without the hedging that accompanied them, and risks obsolescence at publication. Table 1 summarises the divergence between the conditions assumed by prevailing designs and those documented for 2026.

Table 1.
Divergence between the strategic environment and prevailing research designs

Dimension	Condition assumed by prevailing research designs	Condition documented for 2026	Source
Demand discovery	Ranked lists of links; visibility is a function of position	68% of searches end without an external click; AI Mode referral 1.6-2.5%	[2]
Identity and tracking	Cross-site identifiers, succeeded in orderly fashion by a privacy-preserving alternative	Cookies retained in Chrome, restricted elsewhere; Privacy Sandbox interfaces retired	[4]
Creative production	Human-authored assets; output volume constrained by cost	Generative output at near-zero marginal cost; efficiency decoupled from effectiveness	[5]
Effect measurement	Attribution recoverable from platform-reported data	Fragmented, browser-dependent data; measurement modelled or aggregated, not user-level	[4]
Organisational capability	Adoption modelled as a binary or unidimensional variable	70% aspire to AI leadership while 30% assess themselves as ready	[8]

Source of the table: author's development based on [2], [4], [5], [8]

The most immediately available advance is to abandon the treatment of artificial intelligence as a single independent variable. Both leading frameworks already supply the necessary decomposition: the mechanical-thinking-feeling typology [1] partitions AI by the nature of the task, while the input-specificity and human-augmentation dimensions [5] partition it by the configuration of its deployment. Combined, they define a design space in which a firm's AI posture is a portfolio position rather than an adoption dummy, and in which propositions become testable - whether returns to customisation are conditional on the breadth of information required and on the cost of error [5], whether feeling AI applications exhibit different performance elasticities from mechanical ones, whether portfolio balance rather than size predicts performance. The prerequisite is a validated instrument for portfolio composition - unglamorous work, but precisely the contribution the field lacks.

Since no single measurement technology now yields an unbiased estimate of marketing effect, the credible path is triangulation: geographic and holdout experiments to establish incrementality, econometric mix models to allocate effect across channels over longer horizons, and first-party data with server-side collection where individual-level personalisation is required. Each carries known weaknesses - experiments are costly and limited in the cells they support, mix models are sensitive

to specification and collinear media plans, first-party data is unrepresentative of non-customers. The opportunity lies not in advocating any one of them but in specifying when their estimates converge and diagnosing divergence when they do not - a genuinely academic contribution, since practitioners possess the data but rarely the identification strategy or the incentive to publish disconfirming comparisons.

If a growing share of demand is resolved inside a generative answer rather than on a destination page, share of citation becomes a strategically meaningful construct, analogous to share of voice but computed over model outputs rather than media inventory. Aggarwal et al. [3] establish that it is manipulable; what remains open is whether it is consequential - whether citation share translates into preference and choice, or only into awareness. The evidence on referral quality is suggestive but not causal: sessions originating from conversational assistants show markedly longer duration and higher conversion than search-originated sessions [2], a pattern equally consistent with selection on intent as with any property of the channel. Disentangling selection from treatment is a classic problem of marketing science, and would convert a practitioner heuristic into knowledge.

The finding that a majority of participants submit generative output unedited, and that editing effort bears no observed relation to outcome quality [5], indicates that the binding constraint on value capture is organisational rather than technical. Survey evidence points the same way. Seventy per cent of marketing leaders regard leadership in AI as a critical strategic goal, and the same proportion acknowledge that their internal processes are not mature enough to support it; only 30% assess their organisation as AI-ready, while 56% report insufficient budget and 54% insufficient resources to deliver the strategy set for 2026 [8]. Figure 1 presents these proportions together.

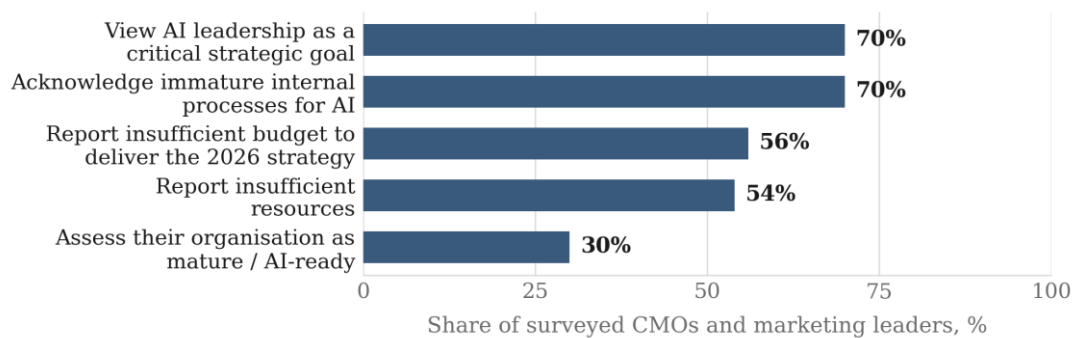


Figure 1. The aspiration-readiness gap in AI-enabled marketing strategy
Source of the figure: author's development based on [8]

The distance between the first and last bars is the interesting quantity: aspiration exceeds readiness by more than two to one, and the deficit is attributed to process rather than to technology. Research on the design of human-AI workflows - where review is inserted, how accountability is allocated when an autonomous system errs, what governance applies to customer-facing generation - therefore addresses the actual

bottleneck, and is amenable to the process-tracing designs the field currently underuses.

The remaining prospects are structural. Adoption of open science practices - preregistration, data and code sharing, published replications - would raise the evidentiary value of the field's output at modest cost [10]. Diversification toward longitudinal case studies, action research within digital incubators, and comparative regional analysis would allow capability development to be studied as the process it is rather than inferred from one cross-section [7]. Extending the evidence base to small and medium-sized enterprises and to emerging economies would improve external validity while offering a theoretical dividend: resource constraint makes visible the capability trade-offs that abundance conceals. Table 2 sets out the resulting agenda.

Table 2.

A research agenda for marketing strategy under algorithmic mediation

Problem	Research question	Design best suited to it
Construct instability	How should an AI capability portfolio be operationalised to keep estimates commensurable?	Instrument development; measurement invariance tests
Measurement fragmentation	When do experimental, econometric and platform estimates of one effect converge?	Paired geo-experiments and mix models on shared data
Displacement of discovery	Does citation share in generative answers drive choice, or only awareness?	Field experiments; choice modelling with citation exposure
Human-AI configuration	Which workflow configurations convert generative efficiency into effectiveness?	Longitudinal firm-level and process research
Contextual narrowness	How do capability-performance relations differ under resource constraint?	Comparative case research in SMEs and emerging economies
Reproducibility	Which core findings survive direct replication under preregistration?	Preregistered multi-site replications with open data

Source of the table: author's development

Research on marketing strategies is not in crisis in the sense of having exhausted its subject matter or lost its methods. It is dislocated: the object it studies has been reconstituted faster than the instruments used to study it have been recalibrated. The three loci of that reconstitution - the discovery layer, where visibility is migrating from ranked position to citation within synthesised answers; the measurement layer, where the identity infrastructure underpinning attribution has fragmented rather than been cleanly replaced; and the production layer, where the marginal cost of creative output has collapsed while its effectiveness has not - account for most of the difficulties catalogued above. Five follow in particular. Central constructs are unstable in operationalisation and drift in reference, which prevents cumulation. The dependent

variable has become harder to measure precisely as the sums allocated on its basis have grown. Methodological homogeneity leaves the field poorly equipped to study an inherently processual phenomenon, while reproducibility practices remain unevenly adopted. The evidence base is narrow geographically and skewed toward large firms, yet its conclusions are stated generally. And practitioner forecasts are imported as premises without their attached uncertainty, as the gap between the 2024 prediction of a 25% contraction in search volume and the ambiguous 2026 outcome illustrates.

The corresponding prospects are not speculative. Reconceiving artificial intelligence as a capability portfolio, using decompositions the literature already contains, would restore commensurability across studies. Treating the convergence and divergence of experimental, econometric and platform-reported estimates as itself a research object would address the measurement deficit with methods the field already possesses. Establishing whether citation share in generative answers is consequential for choice, rather than merely manipulable, would convert a practitioner heuristic into knowledge. Taking human-AI workflow configuration as the unit of analysis would target the organisational constraint the survey evidence identifies as binding, and methodological and contextual diversification would improve both internal and external validity.

A common thread runs through these proposals: in each case the move is away from asking whether a technology improves performance and toward asking under what configuration, in what context, and measured how. Questions of the first kind have generated a large literature of limited cumulative value; those of the second are harder to answer but are precisely where academic research retains a comparative advantage over practice. The dislocation described here is, on this reading, less a threat to the field than an unusually clear specification of the work before it.

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