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INNOVATIVE MARKETING BASED ON ARTIFICIAL INTELLIGENCE, BIG DATA, AND DIGITAL TECHNOLOGIES: A UZ-MIX CONCEPTUAL MODEL FOR ENTERPRISES IN UZBEKISTAN

Yuldashev Jamshid Abrarovich

DSc., docs. "Marketing" Departments

Tashkent State University of Economics

jamshid.yuldashev2121@gmail.com

Orcid: 0009-0004-2924-4401

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Abstract: The aim of the study is to develop an integrated conceptual model of innovative marketing that links data management, Big Data, artificial intelligence, and digital channels with organizational marketing capabilities and measurable customer and commercial results of Uzbekistan's enterprises. The methodology is based on a conceptual-analytical synthesis of research on marketing analytical capability, artificial intelligence in marketing, dynamic capabilities, and e-commerce in Uzbekistan. The UZ-MIX (Uzbekistan Marketing Innovation eXecution) model has been developed [1], which includes six blocks: data management; analytics and AI; market signal recognition; innovation design and experiments; omnichannel execution; value measurement, trust, and organizational training. Five sub-indices are proposed: data readiness and management (DGR), analytical and AI capability (AIC), innovative implementation (IDI), market and customer effect (MCI), trust and responsible application (TRI), and the integrated innovation marketing index (IIM), which is calculated using a geometric mean. The scientific contribution consists of combining technological resources, organizational mechanisms, experimental implementation, and responsible management into a single measurement framework. The practical significance lies in the possibility of using the model to design pilot projects in e-commerce, retail trade, and digital services. The work is conceptual in nature: data from enterprises in Uzbekistan was not collected to calculate the actual values of the index, and the proposed indicators and weights require empirical validation.

Keywords: innovative marketing; artificial intelligence; Big Data; marketing analytics; digital transformation; dynamic capabilities; e-commerce; Uzbekistan; integral index.

[1]UZ-MIX (Uzbekistan Marketing Innovation eXecution) is an original conceptual model of integrated innovative marketing developed for enterprises in the Republic of Uzbekistan. The model views innovative marketing as a sequential, interconnected process that includes six functional blocks: data management; application of analytics and artificial intelligence; identification of market signals; conducting marketing experiments and designing consumer value; omnichannel implementation of marketing solutions; evaluation of achieved results, and responsible management. A distinctive feature of the model is the systemic interconnection of technological resources, organizational marketing capabilities, and measurable market results.

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Abstract: Purpose: This study develops an integrated conceptual model of innovation marketing that connects data management, Big Data, artificial intelligence, and digital channels with organizational marketing capabilities and measurable customer and commercial outcomes in Uzbekistan. Methodology: The study applies a conceptual-analytical synthesis of research on marketing analytics capabilities, AI in marketing, dynamic capabilities, and e-commerce in Uzbekistan. Findings: The UZ-MIX (Uzbekistan Marketing Innovation eXecution) model consists of six interconnected blocks: data foundation and governance; analytics and AI; market sensing; innovation design and experimentation; omnichannel implementation; and value, trust, and organizational learning. Five diagnostic sub-indices are proposed: Data Governance Readiness (DGR), Analytics and AI Capability (AIC), Innovation Deployment (IDI), Market and Customer Impact (MCI), and Trust and Responsible Implementation (TRI). These are aggregated into an Innovation Marketing Index (IIM) using a geometric mean. Originality: The model integrates technological resources, organizational mechanisms, experimentation, and responsible governance into a single measurement framework. Limitations: This is a conceptual study. No firm-level dataset from Uzbekistan was collected; the proposed indicators, weights, and thresholds require empirical validation.

Keywords: innovation marketing; artificial intelligence; Big Data; marketing analytics; digital transformation; dynamic capabilities; e-commerce; Uzbekistan; composite index.

Introduction

Digitalization has changed the way enterprises interact with the market: digital channels allow for recording customer actions, analyzing transactions, and adjusting marketing proposals with high frequency. However, increasing the volume of data and purchasing software solutions alone does not guarantee increased competitiveness. Value arises when data is of sufficient quality, analytical conclusions are included in management decisions, and new actions are tested on customer and commercial results.

Research indicates that Big Data and marketing analytics can strengthen a wide range of an enterprise's marketing capabilities - from marketing planning and implementation to brand management, customer relations, and product development (Cao et al., 2022). Analytical ability is also linked to competitive marketing effectiveness, with holistic marketing decision-making serving as one of the mechanisms of this connection (Rahman et al., 2022). A systematic review demonstrates the expansion of the AI research field in marketing[2].

At the same time, the link between analytical capabilities and performance is not the same for all organizations and contexts. A meta-analysis covering 42 studies revealed the dependence of this relationship on the type of performance indicator and the country context. They link the capabilities of

[2] A systematic review of research on the application of artificial intelligence (AI) in marketing [7] reflects the expanding scientific interest in using intelligent technologies in marketing activities. Specifically, the research field encompasses areas such as consumer behavior forecasting, offer personalization, marketing process automation, intelligent analytics, customer relationship management (CRM), digital communications, and optimization of marketing decision-making. This indicates a transition from considering AI as a separate technological tool to studying it as a comprehensive factor in the transformation of marketing management.

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Big Data Analytics to the development of research and operational components of marketing ambidexterity, but the role of external environment dynamics varied between samples[3].

For Uzbekistan, the development of e-commerce is a significant context. The study, based on 172 user responses, showed the importance of individual characteristics of e-commerce quality, perceived utility, and satisfaction for purchase intent. These results refer to a specific sample and cannot be automatically transferred to all platforms and market segments. They analyze user assessments and development strategies of the Uzum.uz, Zoodmall.uz, and OLX.uz platforms, forming additional context for studying the local digital market.

The scientific problem lies in the insufficient operationalization of the link between technological resources (AI, Big Data, and digital channels), organizational marketing capabilities, and actual value for the customer and the enterprise. The purpose of the article is to develop a conceptual model for UZ-MIX and a quantitative diagnostic system for innovative marketing that adapts to the conditions of Uzbekistan's enterprises. Objectives: systematize the theoretical foundations; define the key blocks of the process; propose a subindex system; formulate hypotheses and the protocol for future empirical verification.

Research question: How can an enterprise transform data and AI into verifiable innovative marketing actions and sustainably improve customer and commercial outcomes, while ensuring data quality, trust, and the responsible application of technology?

Theoretical foundations of the study:

Big Data is considered not only as a large array of digital traces but also as a resource requiring collection, integration, purification, interpretation, and utilization, showing that the use of Big Data is linked to the application of marketing analytics, and analytics to the development of several functional marketing capabilities. Consequently, the intermediate link between data and result is the organizational ability to incorporate technology into marketing activities.

AI and enterprise dynamics

AI can be used to forecast demand and outflow, recommendation systems, segmentation, feedback analysis, communications automation, and campaign optimization. However, automating an existing operation is not necessarily a marketing innovation. Innovative nature arises when technology facilitates the creation of new customer value, the identification of a need, or the verifiable improvement of the customer journey. Therefore, the algorithm in UZ-MIX is considered a tool for supporting decisions rather than an autonomous replacement for managerial responsibility.

Dynamic capability theory explains how an organization identifies environmental changes, utilizes emerging opportunities, and restructures resources. They show that the capabilities of Big Data Analytics can support the research of new opportunities and the effective use of existing marketing

[3] A meta-analysis of 42 studies showed that the impact of Big Data Analytics on organizational performance depends on the type of indicators being evaluated and the country context. Other studies have confirmed the link between analytical capabilities and the development of marketing ambidexterity, but the influence of external environment dynamics was not identical across different samples.

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resources. Meta-analysis warns against universal conclusions: the type of outcome and the context matter.

The context of e-commerce in Uzbekistan

For the Uzbek market, it is important to consider the heterogeneity of the digital maturity of enterprises and consumers[4], differences in data availability, integration of payment and logistics processes, linguistic and regional context, as well as trust in digital platforms, allow for the inclusion of service quality, utility, and satisfaction indicators in the model, but do not provide universal coefficients for all enterprises in the country, describe the platform market of Uzbekistan, but do not confirm the specific financial effects of AI implementation in the mentioned companies.

Local publications are used as contextual guides. They do not replace the primary data of companies and do not allow us to assert that the proposed model has already been tested at enterprises in Uzbekistan.

Materials and Methods

The study has a conceptual-analytical design. A comparative method was used to compare the results of publications on marketing analytics, AI, and e-commerce; a systematic method to construct the logic for transforming data into marketing actions; conceptual modeling to define UZ-MIX blocks; and an operationalization method to develop indicators and integral assessment formulas. Statistical verification of hypotheses and calculation of actual index values were not conducted in this work.

The source base consisted of peer-reviewed publications, for which bibliographic information and DOI were verified. The review includes research on marketing analytics, AI in marketing, dynamic capabilities, meta-analytical results, and publications on e-commerce in Uzbekistan. The review is of a purely analytical nature and is not claimed to be a systematic review with exhaustive research.

The unit of future empirical analysis is proposed to be an enterprise or independent business unit possessing data on marketing campaigns and customer/commercial outcomes. For e-commerce, additional units may include a product category, a customer cohort, or a campaign. The time design includes the initial period, pilot, and post-pilot observation.

Randomized experiments at the customer, campaign, or store level are preferred for evaluating causal effects. If randomization is not possible, comparable control groups and quasi-experimental methods are applied with a clear description of the premises. Data should be extracted from CRM, web and mobile analytics, advertising systems, orders, returns, support inquiries, and financial reporting. Managers' self-assessments can measure organizational capabilities, but they should not be the only source of performance data.

Prior to analysis, metrics definitions, timeframes, attribution rules, customer deduplication, pass handling, and campaign exclusions must be recorded. For cross-firm comparison, it is required to ensure the comparability of the business model, scale, and availability of data.

[4] The digital maturity of Uzbek enterprises and consumers is characterized by significant differences, which must be taken into account when developing and implementing innovative marketing solutions.

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Results

UZ-MIX (Uzbekistan Marketing Innovation eXecution) presents innovative marketing as a closed management cycle: data → analytical interpretation → market solution → experiment → scaling → measurement of effect and learning. The model includes six interconnected blocks:

The principles of privacy, information security, explainability, and human control are the general conditions of all six blocks. They should not be postponed until the final assessment: improper data processing or incorrect segmentation may occur during the data preparation stage.

The proposed mechanism is not strictly linear. Data quality and integration enhance the availability of market signals; analytical capability transforms them into interpretation; cross-functional coordination and management authority transform interpretation into action; experimental design allows for the separation of intervention effects from seasonality and other factors; and scaling transfers proven solutions into regular practice. The results are returned to the data system and used to update analytical models and marketing rules.

The model identifies three groups of factors. Technological factors include data quality and completeness, system integration, computational resources, model accuracy, and the ability to detect drift. Organizational factors include employee competencies, management support, experiment budget, and coordination of marketing, IT, sales, and logistics. Market and institutional factors include digital maturity of customers, payment and logistics infrastructure, trust in platforms, linguistic and regional heterogeneity, competition, and data protection requirements.

To compare heterogeneous indicators, normalization is proposed in the range from 0 to 100. The following formula is used for the indicator-stimulator:

$$Ni = 100 \times (xi - Li) / (Ui - Li)$$

For the disincentive indicator, the growth of which means an increase in costs or risk, the inverse formula is used:

$$Ni = 100 \times (Ui - xi) / (Ui - Li)$$

where xi is the actual value of the indicator; Li and Ui are the previously established lower and upper boundaries. The boundaries are determined prior to analysis based on industry benchmark, target range, or pilot sample distribution. Values outside the boundaries are limited to the range of 0-100, and the proportion of such observations is disclosed. Permissions are not automatically equated to zero: their processing method is recorded in advance and verified by sensitivity analysis.

Each subindex is calculated as the arithmetic mean of the normalized indicators of the corresponding block. The first version proposes equal weighing within the blocks, as expert and statistical weights have not yet been validated. Equal weights are a transparent starting assumption, rather than an empirically optimal structure.

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Table No1[5]

Subindex	**Content and possible indicators**
DGR - Data and Control Readiness	Share of sources with assigned owners; completeness of client/campaign identifiers; record quality; documentation of processing purposes and grounds; timeliness of data updates.
AIC - analytical and AI capability	Proportion of decisions supported by analytics; prediction accuracy relative to the base model; drift monitoring; presence of a model owner; human review procedure.
IDI - Innovative Implementation	Proportion of significant changes tested before scaling; number of completed experiments; proportion of successful tests integrated into processes; new proposals based on identified needs.
MCI - Market and Customer Effect	Incremental margin for marketing costs; retention and repeat purchases relative to control; conversion considering returns; acquisition cost considering margin; satisfaction and complaints.
TRI - Trust and Responsible Application	Share of communications with documented grounds; frequency of privacy complaints; security incidents considering their severity; mechanism for correcting automated decisions; differences in errors between groups.

Subindex formulas for equal weighing:

DGR = (Σ di) / nD

AIC = (Σ ai) / nA

IDI = (Σ ii) / nI

MCI = (Σ mi) / nM

[5] Author's research

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TRI = (Σ ti) / nT

The Integral Index of Innovative Marketing is proposed to be calculated as the geometric mean of five sub-indexes:

IIM = (DGR × AIC × IDI × MCI × TRI) ^ (1/5)

Geometric aggregation limits compensation: a high result in one direction should not completely obscure the critically low level of the other. At a zero value, the index is reset; if the single zeros are due to coding, it is permissible to use a pre-established minimum threshold (for example, 1 point) while disclosing this solution and verifying sensitivity. For diagnostics, the IIM, all five sub-indexes, and initial indicators are published.

Preliminary interpretation ranges: 0-39 - fragmentary practice; 40-59 - developing ability; 60-79 - integrated practice; 80-100 - high maturity without a critical failure in trust and data quality. These thresholds are proprietary guidelines for piloting, rather than validated standards or the basis for public ranking.

Assessing the effectiveness of the AI scenario should rely on an additional result compared to the control group, rather than just attributed revenue. For the result Y, the incremental effect is calculated as:

ΔY = test - control

Incremental return on marketing costs is defined as the ratio of additional marginal profit to additional costs for implementing and conducting an intervention. Discounts, returns, cancellations, logistics costs, the cannibalization of organic shopping, and long-term customer value must be taken into account. The report specifies the observation period, sample size, group distribution method, and uncertainty interval.

Practical Adaptation and Roadmap

For a marketplace or online store, a possible scenario is to improve recommendations within a single product category. First, the customer's journey from searching to receiving and returning the order is described, followed by an audit of data on views, search queries, product cards, baskets, payments, cancellations, delivery, and appeals. After this, a basic version without AI and a test version with analytical or AI support are formed. The main success criteria are the change in marginal outcome per user, while protective metrics include returns, cancellations, complaints, and the concentration of impressions among a limited number of sellers.

For the retail chain, a pilot for evaluating the promotion in comparable stores is possible. The main indicator is the additional margin relative to control points; the protective indicators are product availability, charges, and repeat applications. For a small enterprise, a simplified version of the model is appropriate: a unified campaign log, basic CRM, standardized accounting of orders and returns, simple analytics, and a control group. Complex machine learning models are not a mandatory first step.

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Table No2[6]

Stage	Content	Planned duration
1. Diagnostics	Selection of business objectives; data map; quality audit, legal framework, and source metrics.	4-6 weeks
2. Design	Hypothesis; main and protective indicators; control and stopping criteria.	2-4 weeks
3. Pilot	Limited implementation; recording results, costs, errors, and complaints.	6-12 weeks
4. Evaluation	Comparison with the control; uncertainty analysis; decision about scaling or stopping.	Based on pilot results

The deadlines are project recommendations rather than empirically established standards. The project sponsor, business task owner, data owner, analyst, and information security officer are appointed. The pilot's passport records the customer's problem, audience, hypothesis, business metric, safety metrics, control group, observation period, data sources, and stopping criteria.

Hypotheses for subsequent empirical verification

- H1. A higher level of quality and integration of marketing data is positively linked to the enterprise's marketing analytical capability.
- H2. Marketing analytical ability is positively related to the quality of marketing decisions and the speed of identifying customer needs.
- H3. The relationship between analytical ability and effectiveness is partially mediated by the quality of experiments and innovative implementation.
- H4. The impact of AI implementation on market outcomes depends on organizational readiness, cross-functional integration, and the quality of initial data.
- H5. The connection between innovative marketing and financial outcome is stronger in incremental metrics regarding control than in click metrics or uncontrolled attribution.

[6] Author's research

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- H6. Trust and responsible data management are positively linked to customer retention, but excessive or opaque personalization can weaken this effect.

These are hypotheses for future research, not established results. To verify, it is recommended to combine executive surveys with objective data from campaigns, orders, and financial systems. Before structural modeling, it is necessary to verify the substantive and structural validity of the scales, including the language versions in Uzbek and Russian. Cross-sectional questioning alone does not provide a convincing causal identification; several waves of observation and field experiments are preferable.

Discussion

The main result of the conceptual development is the transition from a list of digital tools to a process model for creating and verifying marketing value. In UZ-MIX, AI and Big Data are considered technological resources, the effectiveness of which depends on data quality, analytical capability, organizational coordination, experimental implementation, and feedback. This logic aligns with the findings regarding the connection between Big Data and analytics and a broad set of marketing capabilities, as well as the results regarding the role of holistic decision-making.[7]

The second contribution lies in the multidimensional diagnostic system. Dividing an index into five sub-indexes allows for determining which block forms the final profile of the enterprise. Geometric aggregation reflects the assumption of complementarity between components: a lack of data quality or trust should not be fully compensated for by high technological equipment. At the same time, any integral index includes regulatory decisions regarding the selection of indicators, boundaries, and weights. Therefore, equal weighing and the proposed thresholds should be considered as initial assumptions.

The third contribution is contextual adaptation without the unreasonable transfer of foreign coefficients. Publications on e-commerce in Uzbekistan highlight the importance of digital service quality and customer satisfaction (Lee et al., 2022), but do not provide a basis for assessing the effectiveness of AI in specific companies. The platforms Uzum.uz, Zoodmall.uz, and OLX.uz are considered potential future research environments, but not proven cases for implementing the proposed model.

The practical consequence is that enterprises are advised to start by identifying a specific customer or commercial problem rather than purchasing an AI tool. It is necessary to conduct a data audit, establish a baseline scenario, form a control group, and determine the main outcome and security metrics in advance. An increase in click-through rate or attributable revenue without improving marginal outcome should not be automatically interpreted as commercial success.

The limitations of the study are related to the conceptual nature of the work, the lack of a primary sample of enterprises in Uzbekistan, and the lack of empirical calibration of indices. The proposed system is

[7] This approach aligns with research findings identifying a positive correlation between the level of development of Big Data Analytics capabilities and the formation of enterprise marketing capabilities, as well as emphasizing the role of analytical data integration in increasing the validity and consistency of management decisions.

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not yet a validated scale and is not intended for public ranking of organizations. Future verification should include expert evaluation of indicator content, factor analysis of suitable blocks, analysis of formative constructs, verification of criterion validity, and stability of weights.

Conclusion

The article develops a UZ-MIX conceptual model that describes innovative marketing as a closed cycle of transforming data into market solutions, experiments, omnichannel execution, value measurement, and organizational learning. The model combines six blocks and provides end-to-end management of privacy, security, explainability, and human control.

Five sub-indices—DGR, AIC, IDI, MCI, and TRI—and an integral index IIM based on a geometric mean are proposed for diagnosis. The system allows for the assessment of not only technological readiness but also the enterprise's ability to transform analytical findings into verifiable actions, achieve customer and commercial efficiency, and maintain trust. Formulas, weights, and thresholds are original design solutions and require empirical validation.

The practical application of UZ-MIX involves piloting in Uzbekistan's e-commerce, retail trade, and digital services enterprises. The next step is to collect multi-period company data, locally verify measurement scales, experimentally evaluate individual AI scenarios, and analyze the stability of the index. Before conducting such an audit, the model should be interpreted as a research framework and piloting protocol, rather than as a proven methodology for assessing enterprise efficiency.

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