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AI-Enabled Sensory Marketing: A Conceptual Framework for Reinventing Multisensory Customer Experience in the Era of Intelligent Automation

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Abstract-The rapid diffusion of artificial intelligence (AI), automation, extended reality, intelligent interfaces, and data-driven personalization is transforming the manner in which enterprises design and deliver customer experiences. At the same time, sensory marketing has established that consumer perception, judgment, emotion, and behaviour are influenced by sensory stimuli involving vision, hearing, touch, smell, and taste. However, conventional sensory marketing has predominantly been examined in physical environments, whereas digital consumption environments have historically been dominated by visual and auditory cues. The emergence of AI-enabled technologies creates opportunities to move from static sensory communication towards dynamic, personalized, context-sensitive, and increasingly multisensory customer experiences.

This conceptual paper integrates the literature on sensory marketing, experiential marketing, embodied cognition, digital sensory marketing, artificial intelligence, and enterprise automation to develop an AI-Enabled Multisensory Marketing Framework (AEMMF). The framework proposes that AI capabilities—including predictive analytics, generative AI, computer vision, natural-language processing, recommendation systems, intelligent personalization, augmented reality (AR), virtual reality (VR), and haptic interfaces—can function as an enabling layer between consumer data and sensory experience design. The framework conceptualizes five sensory dimensions—visual, auditory, haptic, olfactory, and gustatory—and proposes that their AI-enabled orchestration influences sensory congruence, perceived immersion, emotional engagement, brand experience, purchase intention, and relationship outcomes.

The paper is conceptual and is based on an integrative synthesis of established and contemporary literature rather than primary empirical data. It develops research propositions concerning AI-enabled sensory personalization, multisensory congruence, human–AI interaction, customer experience, and entrepreneurial opportunities. The paper further proposes an implementation architecture through which enterprises can progress from single-sensory digital communication to adaptive multisensory ecosystems. The framework contributes to the conference theme by positioning sensory marketing as a potential application domain through which AI and automation can reinvent customer-facing enterprise processes. It also identifies ethical, technological, accessibility, privacy, and implementation challenges and proposes directions for future empirical research.

Keywords: Artificial intelligence; sensory marketing; digital sensory marketing; multisensory experience; customer experience; automation; experiential marketing; AI-enabled marketing; techno-entrepreneurship; consumer behaviour.

I. INTRODUCTION

The contemporary business environment is increasingly characterized by artificial intelligence, automation, data analytics, digital platforms, intelligent interfaces, and rapidly evolving customer expectations. AI is no longer restricted to back-office analytics or operational automation; it is increasingly becoming part of customer-facing processes such as recommendation, communication, product visualization, service interaction, personalization, and experience design. Consequently, enterprises are moving from conventional product- and transaction-oriented approaches towards experience-oriented forms of competition.

The theme of the NCREHAASTE 2026 conference—Reinventing Enterprise: How AI and Automation Are Shaping Techno-Entrepreneurship—provides an appropriate context for examining how emerging technologies can transform marketing and customer experience. Within this broad transformation, sensory marketing represents an important but comparatively under-integrated domain.

Sensory marketing can be understood as marketing that engages consumers' senses and influences their perception, judgment, and behaviour [2]. The importance of sensory experience is not a new phenomenon. Physical retailers, restaurants, hospitality organizations, manufacturers, and service providers have traditionally used visual design, music, lighting, fragrance, product texture, temperature, and other environmental cues to influence consumer experiences. [1] servicescape framework, for example, demonstrated the strategic importance of physical surroundings in shaping customer and employee responses.

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However, the transition from physical to digital consumption has created a fundamental sensory challenge. A consumer visiting a physical store can potentially see products, touch materials, hear ambient sounds, smell products or surroundings, and taste samples. By contrast, conventional digital interfaces have historically relied heavily on visual and auditory communication. [5] Specifically identified the challenge of compensating for missing sensory inputs in online environments and discussed the potential of technologies such as touch interfaces, virtual environments, and augmented solutions to create richer multisensory online experiences.

The emergence of AI changes the nature of this problem. Instead of merely digitizing existing sensory cues, AI can potentially determine which sensory stimulus should be presented, to whom, when, through which channel, and in what combination. Thus, AI can become an orchestration mechanism for sensory marketing.

Against this background, the present paper develops a conceptual framework explaining how AI and automation can facilitate the transformation of sensory marketing from predominantly physical and manually designed stimuli towards intelligent, adaptive, and multisensory customer experience systems.

II. BACKGROUND OF THE STUDY

Sensory marketing emerged from the recognition that consumers do not process products and brands purely through rational or verbal information. Consumers experience markets through their bodies and senses. Sensory marketing as an important field connecting sensory perception with consumer cognition, emotion, judgment, and behaviour [2].

The five traditionally examined senses are: (1) vision, (2) hearing, (3) touch, (4) smell, and (5) taste. The visual dimension includes colour, shape, typography, packaging, product appearance, spatial design, and imagery. Auditory marketing involves music, sound effects, voice, sonic logos, and other acoustic stimuli. Haptic marketing concerns texture, weight, temperature, material and tactile interaction. Olfactory marketing involves fragrance and smell, while gustatory marketing incorporates taste and flavour.

Importantly, sensory stimuli do not necessarily operate independently. Consumer responses can result from interactions between different sensory modalities. Research on multisensory perception and embodied cognition suggests that sensory experiences can influence cognitive representations and judgments [3]. Wörfel et al. (2022) further show how sensory marketing has developed from experiential marketing, store atmospherics, grounded cognition, and related research into an interconnected research stream.

Digital Transformation of Sensory Marketing

Digital transformation has created both a limitation and an opportunity for sensory marketing. Traditional online marketing has predominantly provided visual stimuli through photographs, videos, graphics, colour, typography, animations, and screen-based interfaces. Auditory stimuli have subsequently become important through videos, podcasts, voice assistants, music, notifications, and branded sounds.

The challenge is that physical sensory dimensions such as touch, smell, and taste are difficult to reproduce digitally. Digital sensory marketing as an emerging domain concerned with technologies that can compensate for missing sensory inputs and create richer multisensory online experiences. Their review identifies haptic interfaces, virtual reality, augmented reality, and other human–computer interaction technologies as potential mechanisms for expanding sensory engagement beyond conventional visual communication [5].

This technological development is significant because it changes the role of marketing technology from a communication medium into an experience-generation system.

Artificial Intelligence as an Enabler of Sensory Marketing

AI can contribute to sensory marketing at three broad levels: sensory content generation, sensory personalization, and sensory orchestration.

At the first level, generative AI can produce product images, videos, voice content, music, descriptive sensory narratives, virtual environments, personalized advertisements, and interactive brand content.

At the second level, AI systems can analyze consumer behaviour, browsing history, product preferences, interaction patterns, engagement, purchase history, and contextual information. This creates the possibility of selecting sensory combinations for particular consumer contexts.

At the third and most advanced level, AI can coordinate multiple sensory inputs simultaneously. Instead of asking whether visual, auditory, or haptic marketing is effective individually, enterprises can ask which combination of sensory stimuli should be delivered to a particular consumer at a particular stage of the customer journey. This represents a shift from sensory marketing to intelligent multisensory experience management.

III. PROBLEM STATEMENT

Existing sensory marketing literature provides substantial evidence concerning the influence of sensory stimuli on consumer perceptions and behaviour. Subsequent research has examined multisensory experience, embodiment, atmospherics, haptics, imagery, and digital environments. Nevertheless, several conceptual gaps remain [2].

First, much sensory marketing research has developed around physical consumption environments. Second, digital sensory marketing has primarily focused on the technological possibilities of introducing additional sensory interfaces rather than fully integrating AI-based decision-making. Third, there is insufficient conceptual integration between sensory marketing and the enterprise-level transformation created by AI and automation.

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Fourth, the literature does not yet provide a sufficiently comprehensive framework explaining how AI can connect consumer data, sensory content generation, sensory orchestration, customer experience, and business outcomes.

The present paper therefore addresses the following central problem: How can AI and automation transform sensory marketing from a largely stimulus-oriented approach into an adaptive, personalized, and multisensory customer-experience capability?

IV. RESEARCH OBJECTIVES

To examine the conceptual relationship between artificial intelligence, automation, and sensory marketing.

To explain how AI-enabled technologies can support the five dimensions of sensory marketing.

To develop a conceptual framework linking AI capabilities with multisensory customer experience.

To identify the role of sensory congruence and personalization in AI-enabled sensory marketing.

To formulate research propositions for future empirical investigation.

To identify managerial and entrepreneurial opportunities emerging from AI-enabled sensory marketing.

To discuss technological, ethical, privacy, and consumer-related challenges associated with intelligent multisensory marketing.

Research Questions

RQ1: How can AI and automation transform conventional sensory marketing into an adaptive digital multisensory experience?

RQ2: How can AI-enabled technologies facilitate personalization across visual, auditory, haptic, olfactory, and gustatory dimensions?

RQ3: How does multisensory congruence influence customer experience within AI-enabled marketing environments?

RQ4: What organizational and entrepreneurial opportunities can emerge from AI-enabled sensory marketing?

RQ5: What ethical, technological, and consumer-related challenges may constrain AI-enabled sensory marketing?

V. RESEARCH METHODOLOGY

This paper adopts a conceptual research design based on integrative literature synthesis. No primary survey or experimental data are used, and therefore the paper does not claim empirical relationships or statistical effects.

Relevant literature was conceptually examined across sensory marketing; experiential marketing; multisensory experience; servicescape and atmospherics; embodied and grounded cognition; digital sensory marketing; artificial intelligence in marketing; human–computer interaction; immersive technologies; and customer experience.

The conceptual synthesis integrates established sensory marketing literature with emerging technology-oriented literature. The objective is not to calculate an empirical effect size but to construct an explanatory framework and identify theoretically meaningful relationships that can subsequently be tested through quantitative, experimental, qualitative, or mixed-method research.

VI. THEORETICAL FOUNDATIONS

Sensory Marketing Theory

Sensory marketing provides the primary theoretical foundation. [2] conceptualizes sensory marketing around the engagement of consumer senses and its consequences for perception, judgment, and behaviour.

Embodied and Grounded Cognition

Embodied cognition suggests that cognition is not entirely independent of bodily and sensory experiences. There is a connection between sensory experience, embodiment, imagery, simulation, and consumer judgment. This perspective is particularly relevant to AI-enabled sensory marketing because technologies such as AR, VR and haptic interfaces can simulate experiences connected to physical interaction [3].

Servicescape Theory

Servicescape framework provides a foundation for understanding how environmental cues influence customers and employees. The proposed framework extends the servicescape concept from a primarily physical environment towards a digital-intelligent servicescape in which AI can dynamically adapt environmental and sensory cues [1].

Experiential Marketing

Experiential marketing emphasizes the creation of memorable consumer experiences rather than merely communicating functional product information. Then further established the strategic importance of aesthetics and sensory experiences for brand identity and customer impressions [6].

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Proposed AI-Enabled Multisensory Marketing Framework

The proposed AI-Enabled Multisensory Marketing Framework (AEMMF) consists of five layers. AI functions as an intermediary between customer/context data and sensory experience design.

Five Sensory Dimensions in AI-Enabled Marketing

AI-Enabled Visual Marketing

Vision is currently the most developed digital sensory dimension. AI can dynamically generate and modify product images, colours, layouts, advertisements, virtual environments, product demonstrations, personalized videos, AR product visualization, and virtual try-on experiences. The strategic shift is from one-size-fits-all visual communication towards adaptive visual experiences.

AI-Enabled Auditory Marketing

Auditory stimuli include music, sound effects, voice, brand sounds, conversational interfaces, and audio environments. AI can personalize voice assistants, advertising voice, tone of communication, music, language, pronunciation, and sound effects. The integration of conversational AI creates an important opportunity because the consumer is no longer merely receiving a message but participating in an interactive auditory experience.

AI-Enabled Haptic Marketing

Touch has traditionally represented one of the major limitations of online shopping. The importance of haptic information in product evaluation and highlighted differences across products, consumers, and situations. AI combined with haptic technology could enable simulated texture, vibration, pressure feedback, temperature-related feedback, tactile interaction, immersive gaming and shopping environments, and remote product interaction. Although widespread digital reproduction of physical touch remains technologically challenging, AI may determine when haptic feedback is useful while the haptic interface provides the sensory output [4].

AI-Enabled Olfactory Marketing

Smell presents a particularly challenging but potentially distinctive dimension. Digital systems cannot simply transmit ordinary smells through conventional screens. However, specialized scent-generation technologies can potentially be integrated with immersive experiences. AI could potentially control scent intensity, timing, and combinations based on environment, consumer preference, product category, experience stage, and contextual information. The practical implementation remains technologically constrained, making olfactory marketing an important area for future research rather than an established mainstream digital capability.

AI-Enabled Gustatory Marketing

Taste is another predominantly physical sensory dimension. Rather than attempting to transmit taste digitally, AI-enabled gustatory marketing may develop through digital–physical integration. Possible applications include personalized food recommendations, AI-generated recipes, smart kitchen systems, customized food products, interactive food experiences, digitally guided tasting experiences, and personalized flavour selection. AI may not directly transmit taste but can automate the design, recommendation, and personalization of taste experiences.

Multisensory Congruence as a Central Mechanism

Simply increasing the number of sensory stimuli does not necessarily improve customer experience. The proposed framework therefore places sensory congruence at the centre of AI-enabled sensory marketing.

Sensory congruence refers to the degree to which different sensory cues are perceived as compatible with one another and with the brand, product, context, or consumer expectation. When sensory stimuli communicate compatible meanings, consumers may perceive the experience as more coherent and immersive. Research on sensory marketing has increasingly emphasized multisensory interactions rather than isolated sensory stimuli [7].

AI as a Sensory Orchestrator

The most important contribution of the proposed framework is the conceptualization of AI not simply as a content generator, but as a sensory orchestrator.

Traditional marketing can be represented as: Consumer → fixed campaign → sensory stimulus → response.

AI-enabled sensory marketing can be represented as: Consumer/context → data → AI interpretation → sensory selection → multisensory orchestration → experience → feedback → AI learning → revised experience.

This creates a continuous feedback loop and is consistent with the broader movement of enterprise transformation from static processes towards data-driven adaptive systems.

VII. RESEARCH PROPOSITIONS

Proposition 1: AI-enabled personalization is positively associated with the perceived relevance of sensory marketing experiences.

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Proposition 2: Multisensory congruence positively influences perceived immersion in AI-enabled customer experiences.

Proposition 3: AI-enabled multisensory orchestration positively influences customer experience through emotional engagement and perceived immersion.

Proposition 4: The effectiveness of AI-enabled sensory marketing is contingent on the relevance of the sensory modality to the product category and consumption context.

Proposition 5: Consumer characteristics moderate the relationship between AI-enabled sensory stimuli and customer responses.

Proposition 6: Sensory personalization combined with AI-enabled interaction is likely to create greater opportunities for differentiated customer experiences than standardized digital sensory communication.

Proposition 7: AI-enabled sensory marketing creates new entrepreneurial opportunities in technology-supported experience design**.**

AI and Automation Across the Customer Journey

AI-enabled sensory marketing can be applied across awareness, interest, evaluation, trial, purchase, consumption, post-purchase, and loyalty stages. At awareness, generative AI can support personalized visual/audio advertising; during evaluation, computer vision and AR can support product visualization; during purchase, conversational AI can support voice-guided interaction; and during loyalty, AI personalization can enable continuous multisensory brand experiences.

Implications for Techno-Entrepreneurship

AI-enabled sensory marketing creates potential entrepreneurial domains including AI sensory experience platforms, virtual sensory commerce, haptic commerce solutions, AI-powered sensory analytics, and smart packaging. These opportunities connect technological innovation with experience-oriented business models.

Managerial Implications

Enterprises should shift from product-centric to experience-centric design, develop a coherent sensory brand identity, integrate marketing and technology teams, use AI for orchestration rather than merely task automation, and maintain human-centred design principles.

Ethical and Implementation Challenges

Privacy: AI-enabled personalization may require substantial consumer data and therefore demands transparent and responsible data practices.

Manipulation and consumer autonomy: Because sensory cues can influence perception and emotion, excessive personalization may raise concerns regarding consumer autonomy.

Sensory overload: More sensory stimulation is not necessarily better; excessive or poorly coordinated stimuli may reduce usability and create discomfort.

Accessibility: Sensory marketing should not assume that all consumers experience sensory information in the same way. Accessible design should be incorporated from the beginning.

Algorithmic bias: AI systems learning from historical customer data may reproduce existing biases in personalization.

Technological cost: Advanced haptic, immersive, olfactory, and other sensory technologies may remain expensive for smaller enterprises.

Authenticity: AI-generated sensory experiences should remain consistent with the actual product to avoid expectation–experience gaps.

Proposed Enterprise Implementation Roadmap

Stage 1 – Sensory Audit: Identify visual, auditory, tactile, olfactory, and gustatory cues across customer touchpoints.

Stage 2 – Digital Sensory Mapping: Identify which sensory dimensions can currently be digitized and which require physical integration.

Stage 3 – AI Personalization: Use customer data to identify appropriate sensory preferences and contextual requirements.

Stage 4 – Multisensory Orchestration: Integrate multiple sensory dimensions while maintaining brand consistency and sensory congruence.

Stage 5 – Continuous Optimization: Use customer feedback and behavioural data to continuously improve the experience.

The implementation sequence can therefore be represented as: Audit → Digitize → Personalize → Orchestrate → Learn → Optimize.

VIII. FUTURE RESEARCH AGENDA

Future research can use experimental designs to manipulate AI-generated visual stimuli, AI-generated sounds, haptic feedback, multisensory congruence, and personalization, with outcomes such as perceived immersion, brand attitude, purchase intention, trust, engagement, and loyalty intention.

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Future studies can also examine consumer segmentation by age, technology familiarity, product involvement, personality, shopping orientation, and cultural context. Industry-specific research can investigate food and beverage, retail, hospitality, tourism, automobiles, fashion, education, healthcare services, entertainment, and e-commerce.

Other promising areas include rural and emerging-market contexts, AI–human co-created sensory experiences, and neuro-sensory research using biometric, eye-tracking, facial-expression, and physiological measures, subject to appropriate ethical standards.

Theoretical Contribution

The principal theoretical contribution of this paper is the integration of four traditionally distinct research domains: Sensory Marketing + Digital Experience + Artificial Intelligence + Enterprise Transformation.

The framework extends conventional sensory marketing by changing the role of technology from a delivery mechanism to an experience-orchestration mechanism; extending sensory marketing from predominantly physical environments to digital–physical ecosystems; and introducing adaptability and personalization as central dimensions of intelligent sensory experience.

The conceptual distinction can therefore be stated as follows: Traditional sensory marketing = designing sensory stimuli. Digital sensory marketing = technologically extending sensory stimuli. AI-enabled sensory marketing = intelligently selecting, generating, personalizing, coordinating, and continuously optimizing sensory experiences.

IX. CONCLUSION

Artificial intelligence and automation are transforming the enterprise from a collection of operational processes into increasingly intelligent and adaptive systems. Marketing is an important component of this transformation because customer experience has become an important dimension of competitive differentiation.

Sensory marketing offers a valuable theoretical foundation for understanding this transformation. Existing research demonstrates that sensory experiences can influence perception, judgment, emotion, and consumer behaviour, while research on digital sensory marketing demonstrates that emerging technologies can extend sensory engagement beyond conventional visual and auditory interfaces.

The present paper argues that AI can provide the missing orchestration layer between consumer information and multisensory experience design. The proposed AI-Enabled Multisensory Marketing Framework conceptualizes AI as an intelligent mechanism capable of connecting consumer/context data with sensory content generation, personalization, multisensory orchestration, experience measurement, and continuous learning.

The central conceptual proposition is that the future of sensory marketing is not simply about adding more senses to digital marketing; it is about using intelligent technologies to determine how, when, where, and for whom different sensory experiences should be coordinated.

Such a transformation has implications not only for established enterprises but also for techno-entrepreneurs developing new forms of immersive commerce, AI-powered experience platforms, haptic technologies, sensory analytics, smart packaging, and digital–physical customer experiences. At the same time, responsible implementation requires attention to privacy, accessibility, consumer autonomy, algorithmic bias, sensory overload, technological feasibility, and authenticity. AI-enabled sensory marketing should therefore be understood not merely as a technological innovation but as a human-centred enterprise transformation capability.

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