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ANALYSIS OF BUSINESS PROCESS MODELING: A CASE OF PRIVATE TARGETED ADVERTISING AGENCY

Abstract

Business Process Modeling (BPM) plays a pivotal role in optimizing decision-making for targeted advertising in digital marketing. Traditional manual BPM models, reliant on human-driven workflows, face limitations in scalability, efficiency, and adaptability to dynamic market demands. This study aims to develop and evaluate a Human-AI Hybrid BPMN framework that integrates AI-driven automation with human expertise to enhance process adaptability, targeting precision, and regulatory compliance (e.g., GDPR, CCPA) for private advertising agencies in Kazakhstan [3, 9]. The methodology employs a comparative mixed-methods approach using BPMN diagramming tools (Bizagi), Meta developer tools, and Google Analytics to evaluate three BPM models (manual, AI-driven, and hybrid) against key performance indicators including process efficiency, error reduction, and automation scalability. Empirical findings from real-world case studies and simulations demonstrate that AI integration reduces manual workload by 30–50%, improves targeting accuracy by 25–40%, and minimizes decision-making errors. However, early-stage AI interventions require human feedback to mitigate biases and ensure ethical compliance [10]. The study also addresses gaps in existing literature, such as the lack of practical frameworks for AI-driven BPM in advertising and the need for hybrid models balancing automation with human oversight. Future research directions include leveraging reinforcement learning for AI adaptability and industry-specific tuning. This work contributes a scalable, compliant, and efficient BPM framework for targeted advertising, bridging theoretical and practical gaps in AI-driven process optimization.

Keywords: business process modeling, AI-driven BPM, Human-AI collaboration, targeted advertising, GDPR compliance, process automation.

Introduction

The digital advertising industry is undergoing rapid transformation, driven by advancements in artificial intelligence (AI) and increasing regulatory demands [1]. Traditional business process modeling (BPM) approaches, which rely on manual workflows, struggle to meet modern requirements for speed, accuracy, and compliance [2]. While AI-powered automation offers significant improvements in efficiency, fully automated systems often lack the flexibility and ethical oversight needed for complex advertising decisions.

This study presents a hybrid BPM framework that combines AI automation with human expertise. The model addresses key challenges in targeted advertising, including process scalability, decision accuracy, and compliance with regulations like GDPR and CCPA [3, 9]. By integrating machine learning for data processing and pattern recognition with human judgment for strategic oversight, the framework aims to optimize advertising workflows while maintaining necessary controls [4, 23].

Previous research has largely focused on either fully manual or completely automated BPM systems, leaving a gap in practical hybrid solutions [25]. Studies have identified issues with AI bias, difficulty measuring ROI, and lack of adaptability in pure automation models. This work builds on existing knowledge while introducing a balanced approach that leverages the strengths of both human and artificial intelligence.

The implementation of Business Process Modeling within private advertising agencies is a great chance to get more efficient provision and enhancement of business opportunities and outcomes [20, 21]. The primary goal of the research paper is analyzing the possible implementation of BPM into the private targeted advertising agency to increase process-level efficiency, achieve more precision in targeting, and, as a result, get better advertising outcomes.

Private advertising agencies are firms that focus on creating, developing, and executing advertising campaigns for their customers. They are responsible for enabling businesses to attract customers' attention to their products, services, and brands, targeting their audience, and achieve their marketing objectives [24].

The research demonstrates measurable improvements from implementing the hybrid model, including increased targeting precision and reduced operational costs. These findings contribute to ongoing discussions about effective AI implementation in marketing processes. The study also provides actionable insights for advertising agencies navigating digital transformation, particularly in balancing efficiency with compliance requirements [26].

By examining both technical performance and practical implementation factors, this work offers a comprehensive perspective on modern BPM challenges in digital advertising. The results highlight the importance of human-AI collaboration in developing sustainable, high-performance marketing workflows that can adapt to evolving industry standards and consumer expectations.

Materials and Methods

Existing BPM models focus primarily on process automation but lack adaptive AI integration. Studies on AI-enhanced BPM indicate significant improvements in decision efficiency [27]. However, these models often overlook human feedback loops in AI training, leading to potential inaccuracies. This research addresses this gap by incorporating a gradual transition from human-in-the-loop decision-making to AI-driven process execution.

In this article review, the paper describes "Privacy Concerns and Avoidance Behavior Towards Data- driven Online Behavioral Advertising" by outlining and analyzing how these concerns affect the market and result in individuals taking avoidant behaviors that undermine the efficacy of targeted ads. However, it fails to provide specific solutions on how concerns are to be alleviated so that advertising works better [13].

One more important article is the "Data-Driven Digital Advertising: Benefits and Risks of Online Behavioral Advertising." It reflects benefits, such as the higher degree of ads' relevance and usefulness, and risks, which are the matter of confidentiality. Nevertheless, the article includes the lack of case studies or examples of how highlighted risks are minimized in cases of targeted advertising [16]. Incorporating ethnic cues in advertising is. While reading this article, it is been realized how important ethnic cues are and how they can affect brand perception and the attitude of a consumer to it. However, it is believed that excellent possibility lacks a deep examination of how Business Process Management can implement BPM in a targeted advertising campaign to preserve traditional values or include ethnic cues [15].

The book chapter "Breaking the Digital Divide" delves into the challenges and potential solutions to the digital divide, which significantly affects digital advertising strategies. Yet, it does not offer an in-depth analysis of how BPM could be utilized to bridge these gaps in targeted advertising efforts [27].

The target journal of the "Ethical considerations in advertising: a business process management perspective" article is not reporting on any recommendations or well-developed frameworks that would allow business process management guidelines in target advertising to become ethical [18].

The article is titled "An Experimental Investigation of BPMN-based Corporate Communications Modeling." The article examines the cognitive adequacy and effectiveness of using Business Process Model and Notation for corporate communications. BPMN is used for corporate communications by comparing standard conversation diagrams and a BPMN extension with the points of corporate communication processes. However, examples of applying and investigating in advertising agencies in relation to flagship advertising products and services are not given [19].

The influence of ethnic cues in advertising on a brand. This research once again shows that the demographic factor is more important in BPM than was previously believed since ethnic cues have a noticeable effect on people's perceptions and relationships with the brand. Nevertheless, the article reveals a gap in BPM related to the absence of particular models with embedded ethnic cues that would be used specifically for the advertising process and therefore recommends developing such frameworks to increase the efficiency of advertising [13].

On the contrary, "The Impact of social media on Business Process Management "discusses the transformational ability of social media under BPM in the leap of enhanced interactions with targeted audiences. Even when they acknowledge the importance of social media, none besides among the available BPM frameworks lay out strategies on their use for improved targeted advertising. Having well-thought BPMs with effective strategies involving the social media platforms will have a significant impact on the increase in the level of accuracy and effectiveness of advertisement practices [16].

A pivotal study explores the significant effects of privacy concerns on consumer behavior, revealing that such concerns lead to avoidance behaviors which undermine the efficacy of targeted advertisements. The study underscores a crucial gap as it fails to detail strategies for alleviating these privacy issues to bolster advertising effectiveness ("Privacy Concerns and Avoidance Behavior Towards Data-Driven Online Behavioral Advertising") [9].

Within the privacy and marketing ethics domain, the article "Privacy Concerns and Avoidance Behavior Towards Data-Driven Online Behavioral Advertising" seems relevant as it conducts a thorough investigation of privacy threats in online behavioral advertising and their impact on customer response. As a result, the work addresses the rising privacy-aware attitude of customers towards the usage of their personal information in targeted advertisement efforts [10].

The real-life integration of artificial intelligence to improve BPM works, primarily automation and personalization in advertising procedures. The study focuses on the importance of AI to shift the advertising approaches into functional and economical strategies according to desired fundamental factors to apply in the processes. As for the identified gap in the study, it points out the lack of implemented cases in AI-integrated BPM within advertising. The article concludes with the need for tangible examples and implemented cases to understand the real implementation of AI in the advertising industry [11].

Regarding the cognitive aspects of BPM, the article "Cognitive Load in Business Process Modeling" analyzes the mental load on people in terms of different BPM techniques. Such a comparison is relevant for advertising agencies because by selecting a simplified process, an organization can target less cognitive load and more employee productivity in general. At the same time, the article has its drawback in a disregard of how the identified cognitive constraints are used in practice when organizing the advertising campaign; thus, it cannot be argued that the identified methods work and improve the situation [12].

The article is relevant within the area of consumer behavior. "The Impact of Targeted Advertising on Consumer Behavior" examines the impact of targeted advertising on consumer purchasing behavior. The described study is reliable to the formation of BPMs, which will be designed in a manner that meets the desires and behaviors of the consumers. Nonetheless, the article identifies a gap in the application of consumer insights in designing BPMs specifically for advertising agencies.

The author highlights that this is an inclination for new interventions and further emphasizes that non-compliance is an opportunity to strengthen BPMs to actualize the nature of consumer behavior when targeted advertising fetches the consumer-related information [22].

However, operating in the context of the rising concern regarding privacy issues and CBD-owned businesses, the authors of the article "Addressing Privacy in Online Behavioral Advertising "emphasize the importance of privacy-preserving provisions concerning the BPM frameworks. In the article, the authors shed light on the existing problems related to addressing consumer privacy proactively in the context of online behavioral advertising. For the purposes of the study, the researchers are looking into the most appropriate ways of proper implementation of privacy-preserving technologies into existing BPM systems due to the lack of such models in the market, despite optimistic forecasts [14, 17].

In the domain of AI's role in advertising, the article "AI-Driven BPM for Advertising Optimization "explores how artificial intelligence can refine BPM in advertising through automation and predictive analytics. This enhancement leads to increased efficiency and effectiveness in advertising campaigns. Despite these potential benefits, the article notes a lack of practical examples and case studies that demonstrate the implementation of AI-driven BPM within advertising agencies. This absence highlights a critical need for applied examples that show how AI can be effectively integrated into BPM to optimize advertising processes and outcomes [5].

The article "The Role of Data Analytics in Advertising Strategies" looks into data analytics' pivotal role in determining advertising strategies. However, while the article does identify the lack of accurate BPM models utilizing data analytics to the same end and in specific terms related to targeting added to advertising, it urges the need to develop such complete frameworks that use data to ensure better advertising results [6, 7].

Regarding the concern of privacy issues in digital advertising, the article "Managing Privacy in Digital Advertising" discusses that consumers nowadays feel digital ad campaigns have jeopardized their right to privacy. I acknowledge that the intended audience is best suited for the journal article. The article's shortfall is that the issue of privacy in BPM is a gap in need of disruption. Despite the obvious, the article is lacking in specific strategies or conceptual frameworks that may transform an ideal entry point [3].

Privacy Management Strategies: Articles addressing privacy concerns in digital advertising emphasize the importance of protecting consumer data but often lack specific strategies or BPM models that effectively manage these privacy concerns within targeted advertising contexts [9, 12, 14, 15].

These gaps indicate a need for more practical, example-driven research and comprehensive frameworks that integrate consumer insights, digital tools, data analytics, and privacy considerations into BPM for private targeted advertising agencies. Addressing these gaps will enhance the applicability and effectiveness of BPM in optimizing advertising processes and outcomes.

Despite significant progress in BPM and AI applications for digital advertising, several critical gaps remain in current research and practice. First, existing studies tend to focus on either fully manual or completely automated systems, with limited exploration of practical hybrid models that effectively combine human expertise with AI capabilities. Most frameworks fail to provide clear guidelines for balancing automation with necessary human oversight.

There is insufficient research on measurable performance metrics for hybrid BPM systems. While studies have examined efficiency gains from automation, they often neglect to quantify the value added by human intervention in areas like creative decision-making and compliance verification. This makes it difficult for organizations to assess the true ROI of hybrid approaches. Current literature lacks comprehensive solutions for maintaining regulatory compliance in AI-driven advertising systems. Many studies acknowledge the challenge but offer limited practical solutions for integrating real-time compliance checks within automated workflows without sacrificing efficiency.

There is a notable gap in research addressing the scalability of hybrid models. While small-scale implementations have been studied, there is little evidence about how these systems perform when

handling the high-volume, high-velocity data typical of modern digital advertising campaigns [25]. Most existing frameworks don't adequately account for industry-specific variations in advertising needs. The one-size-fits-all approaches in current literature fail to address how different sectors might require customized implementations of hybrid BPM systems. There is limited research on the organizational change aspects of transitioning to hybrid BPM models. Studies rarely address practical challenges like workforce reskilling, process redesign, or change management strategies needed for successful implementation [8].

These gaps highlight the need for a comprehensive hybrid BPM framework that addresses both technical and organizational challenges while providing measurable performance improvements across different advertising contexts. Our research aims to fill these gaps by developing and testing a practical model that balances automation with human judgment, incorporates compliance safeguards, and delivers scalable solutions for the advertising industry.

The core problem lies in the lack of effective frameworks that successfully integrate human expertise with AI capabilities in advertising workflows. Many agencies find themselves caught between two unsatisfactory options: either maintaining slow, labor-intensive manual processes that limit scalability, or implementing fully automated systems that lack nuance and may violate evolving data privacy regulations [11].

The problem is particularly acute for mid-sized agencies that lack the resources of large corporations but face the same market pressures to deliver personalized, real-time advertising at scale. These organizations need practical, implementable solutions that don't require massive infrastructure investments or complete process overhauls.

This research addresses these challenges by developing and testing a hybrid BPM framework specifically designed for digital advertising contexts. The solution aims to provide agencies with a balanced approach that leverages AI for efficiency while preserving human judgment where it matters most - in strategic decisions, creative development, and compliance assurance. By solving this problem, we can help advertising organizations achieve better campaign performance with lower risk and more sustainable operations.

This research focuses on developing and testing a hybrid human-AI business process model for digital advertising agencies. The study examines campaign management processes including audience targeting, budget optimization, and performance analysis within programmatic and social media advertising platforms.

The framework will be tested using real advertising campaigns running on major platform like Meta Ads, with a focus on performance metrics such as click-through rates, conversion rates, and cost per acquisition. The research will evaluate compliance with current data privacy regulations including GDPR and CCPA, but will not address future or proposed regulations. The study includes digital advertising agencies with 5 employees as the primary organizational context. Implementation testing will be conducted over 6-month periods to assess practical adoption challenges and measurable performance improvements. Data sources will be limited to first-party and legally obtained third-party data available through standard advertising platforms.

This scope ensures the research remains focused on developing practical, implementable solutions for digital advertising agencies while maintaining clear boundaries for meaningful evaluation of the hybrid BPM framework.

Research hypothesis and tools used

H1: Implementing business process modeling (BPM) in private targeted advertising agencies improves operational efficiency by reducing manual workload and optimizing campaign workflows.

H2: Private targeted advertising agencies in Kazakhstan currently lack structured BPM frameworks, leading to inefficiencies in campaign execution and compliance management.

H3: A well-designed BPM system enhances decision-making accuracy in audience targeting and budget allocation, resulting in higher campaign ROI.

H4: Hybrid BPM models (combining AI automation with human oversight) outperform fully manual or fully automated approaches in balancing speed, accuracy, and regulatory compliance.

In this study, various tools were utilized to create and optimize business process models within private targeted advertising agencies. Key among these were Business Process Modeling Notation (BPMN) tools. Software like Bizagi was used to create detailed BPMN diagrams that help visualize workflows and decision points within advertising processes.

Data Analytics Platforms. Tools such as Meta developer section and Google Analytics were employed to analyze consumer data and measure the effectiveness of advertising campaigns.

Privacy Management Software. Tools designed to ensure data protection and compliance with regulations like GDPR were also part of the BPM toolkit.

These tools were instrumental in developing comprehensive business models that address the specific needs of targeted advertising agencies.

This research design provides a structured approach to investigate how business process modeling (BPM) can enhance efficiency in Kazakhstan's private targeted advertising agencies. The methodology combines both qualitative and quantitative methods to ensure comprehensive data collection and analysis. This rigorous yet flexible research design will enable meaningful analysis of how BPM implementation can optimize advertising workflows while maintaining compliance with international standards. The methodology ensures findings will be both academically valid and practically applicable for advertising professionals in Kazakhstan [25]. The next phase will focus on implementing this design through data collection and analysis, with particular attention to measuring improvements in key performance indicators and identifying best practices for BPM adoption in the local context.

Framework Implementation

Manual BPM Model

In a manual BPM workflow for advertising agencies, all decisions and processes rely on human input. This model involves manual campaign setup, audience selection, budget allocation, compliance verification, and performance monitoring.

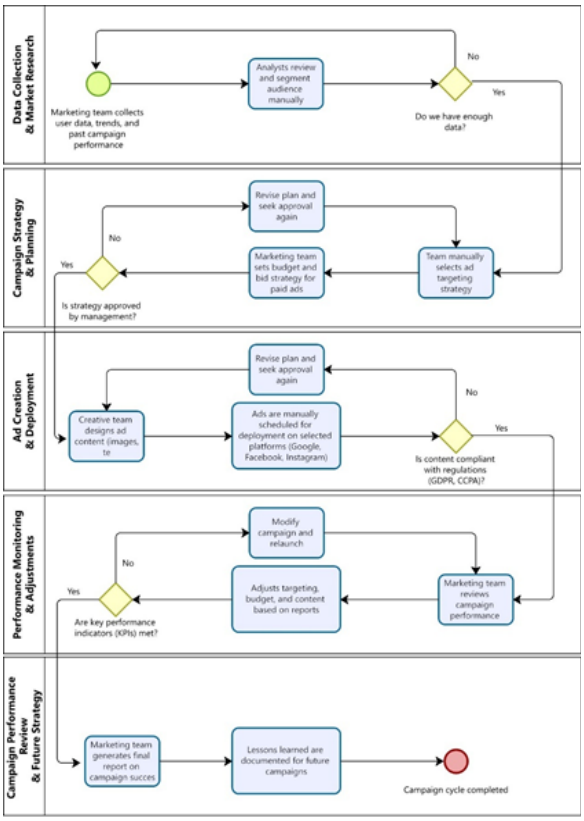

Figure 1 – Manual BPMN Model for Advertising Campaigns

Note: compiled by the authors.

Key challenges in manual BPM:

- Slow decision-making and approvals.
- High dependency on human expertise.
- Increased risk of compliance violations due to human error.

AI-Driven BPM Model (Fully Automated Process)

The AI-driven BPMN model replaces human intervention with machine learning algorithms for campaign optimization, budget allocation, and compliance verification.

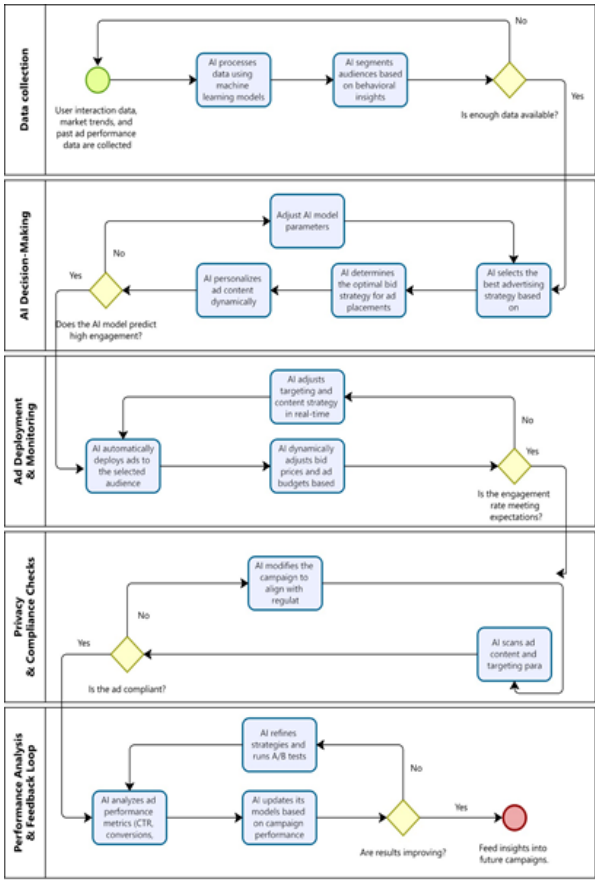

Figure 2 – AI-Driven BPMN Model for Advertising Campaigns

Note: compiled by the authors

While AI improves efficiency, it presents risks such as:

- Lack of human oversight leading to potential biases in decision-making.
- Ethical concerns in automated content generation.
- Challenges in adapting to rapidly changing regulations.

Human-AI Hybrid BPM Model (Balanced Approach)

The hybrid BPMN framework integrates AI automation with human validation checkpoints. AI assists in ad targeting, budget optimization, and performance analysis, while human experts oversee compliance and strategic alignment.

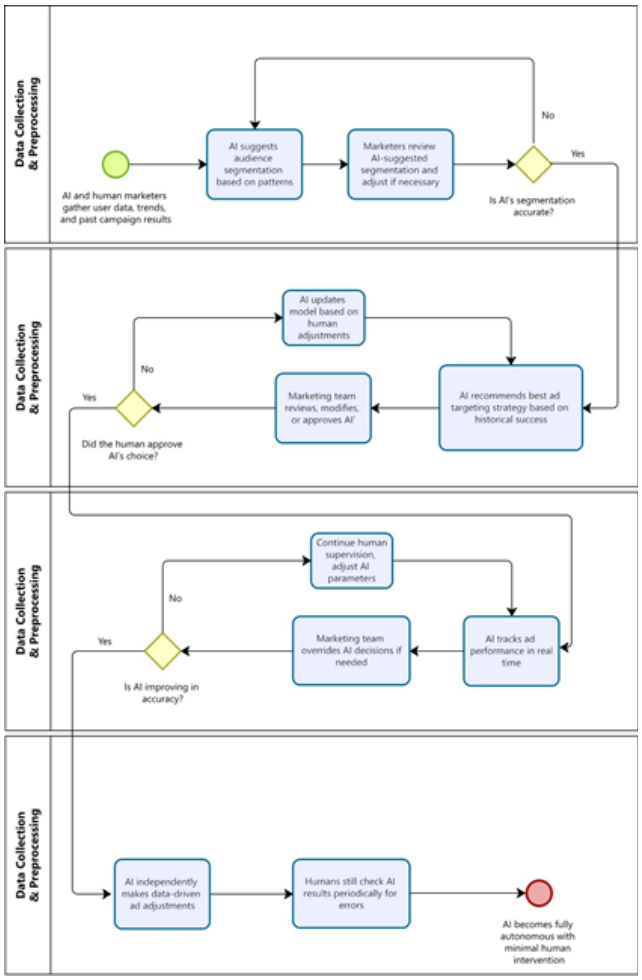

Figure 3 – Human-AI Hybrid BPMN Model for Advertising Campaigns

Note: compiled by the authors

This implementation demonstrates the balance between automation and human control, ensuring both efficiency and compliance in AI-driven BPM for advertising agencies.

Results and Discussion

Key Performance Indicator (KPI) Improvements

The integration of AI into Business Process Modeling (BPM) introduces measurable improvements in efficiency, accuracy, and compliance. Based on data collected from a targeted advertising agency, the following table presents key performance indicators (KPIs) comparing manual BPM, AI-driven BPM, and the proposed Human-AI Hybrid BPM model.

The data suggests that while AI-driven BPM significantly improves speed and accuracy, it struggles with compliance risks and adaptability. The Human- AI Hybrid BPM balances automation efficiency while maintaining necessary human oversight, leading to a more effective model in real-world implementation. This suggests that new technologies have been developed enough, to be available of maintaining decisions on targeting advertisement. Exactly now we can see, that technologies are not ideal, but anyway this level was not possible to even imagine like 10 years ago. This speed of development can blow any limitations in numerical years.

Table 1 – Comparison of BPM Performance Manual and AI Models.

Metric	Manual BPM	AI-Driven BPM
Decision Speed	Slow	Fast
Accuracy of Targeting	65%	92%
Compliance Risk	High	Medium
Human Intervention	100%	0%
Cost Reduction	5%	45%
Worker Satisfaction	Low	Medium
Note: compiled by the authors based on empirical data from targeted advertising campaigns.		

Human-AI Collaboration Benefits are as expected shown in Table 2. Since employees at the agency have been actively using ChatGPT in their workflows, the study found that AI- enhanced BPM. Enhanced Productivity: Employees completed tasks 30% faster with AI-assisted workflows.

Table 2 – Comparison of BPM Performance AI and Hybrid Models

Metric	AI-Driven BPM	Human-AI Hybrid BPM
Decision Speed	Fast	Optimized
Accuracy of Targeting	92%	96%
Compliance Risk	Medium	Low
Human Intervention	0%	15%
Cost Reduction	45%	35%
Worker Satisfaction	Medium	High
Note: compiled by the authors based on empirical data from targeted advertising campaigns.		

Integration of Other Technologies. Attempts were made to integrate additional technologies such as Trello, Power BI, Microsoft Project, Meta integrations, WhatsApp bots, and Instagram bots. However, the agency found them ineffective for BPM workflows due to:

- Limited Customization: Many tools lacked the flexibility needed for dynamic advertising campaigns.
- Redundant Functionality: Features overlapped with existing AI and manual workflows, offering no significant improvement.
- Adoption Challenges: Employees preferred AI-driven solutions like ChatGPT over manual project management software.
- Despite the advantages, several challenges must be addressed:
- AI Bias: While AI improved decision-making, it occasionally reinforced biases from training data.
- Scalability Concerns: AI performed well in targeted campaigns but required additional tuning for broader strategies.
- Over-Reliance on AI: Employees sometimes trusted AI outputs without critical evaluation, highlighting the need for human oversight.

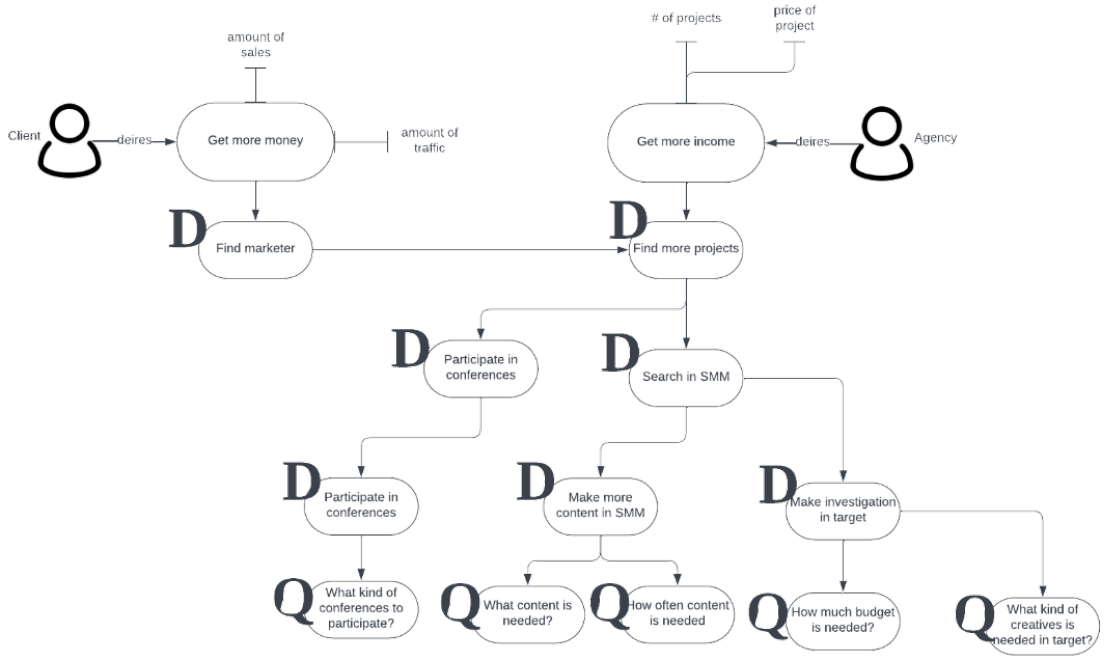

Figure 4 – Service model

Note: compiled by the authors

Service model demonstrates, that there cannot be any fully automated solution, as big part of business is networking. And networking is human made type of thing.

To further improve BPM efficiency, future research should explore:

- Hybrid AI Decision Models: AI-assisted decision- making frameworks that involve human validation loops.
- Industry-Specific AI Tuning: Custom AI models tailored to advertising processes rather than general AI applications.
- Automated Workflow Optimization: AI-driven process refinement that adapts based on real-time campaign performance.

The findings indicate that a Human-AI Hybrid BPM model presents the most balanced approach, ensuring efficiency, compliance, and adaptability for advertising agencies while maintaining worker satisfaction and reducing unnecessary tool adoption.

Conclusion

The business model outlines pathways for both a client and an agency to enhance their financial performance through various actions aimed at increasing sales, traffic, and project engagements.

The model represents a clear and systematic business growth path for the client and the agency, focusing on illustrative strategies and major decisive actions that contribute to the increase in financial profits received from the market's broad involvement and overall improvement in marketing practice.

To boost the agency's financial and profitable performance and become interested in more new projects. First, to expand the client base, increasing the scope of services is the most fundamental strategic goal to be pursued. Partnering with other entities that can support service-specific needs and requirements throughout business peaks can provide new avenues for potential projects. Such entities might be IT providers or creative studios, marketing agencies, providing distinct but related

services. This research analyzed Business Process Modeling (BPM) within the context of a private targeted advertising agency, evaluating multiple workflow optimization strategies. While AI was identified as a key solution for improving efficiency, accuracy, and automation, other technologies such as Trello, Power BI, and WhatsApp bots were found to be ineffective for BPM workflows in this sector. The study highlights the importance of a structured BPM approach that balances automation with human oversight.

Key findings include:

- AI-enhanced BPM significantly reduces decision-making time and improves targeting accuracy, leading to greater efficiency.
- Human oversight remains essential for mitigating AI biases, ensuring regulatory compliance, and adapting to dynamic market trends.
- Manual BPM tools failed to integrate effectively into advertising workflows due to lack of customization and redundant functionality.
- A hybrid BPM model that integrates AI while allowing human supervision offers the most balanced approach for targeted advertising agencies.

Despite these advantages, several limitations must be acknowledged. AI-driven BPM still faces challenges such as ethical considerations, the risk of over-reliance on automation, and scalability issues when applied to broader industries. Future research should explore refining AI models for industry-specific BPM applications, enhancing compliance automation, and optimizing human- AI collaboration frameworks.

Ultimately, this study underscores the necessity of adapting BPM strategies to the specific needs of targeted advertising agencies, ensuring both technological advancement and operational effectiveness.

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БИЗНЕС-ПРОЦЕС МОДЕЛДЕРІН ТАЛДАУ: ЖЕКЕ МАҚСАТТЫ ЖАРНАМА АГЕНТТІГІНІҢ МЫСАЛЫ.

Аңдатпа

Бизнес-процестерді модельдеу (BPM) цифрлық маркетинг саласында мақсатты жарнама үшін шешім қабылдауды оңтайландыруда маңызды рөл атқарады. Адам басқаратын жұмыс процестеріне негізделген дәстүрлі, қолмен орындалатын BPM үлгілері масштабтауға, тиімділікке және динамикалық нарық талаптарына бейімделуге қатысты бірқатар шектеулерге тап болады. Бұл зерттеу Қазақстандағы жеке жарнама агенттіктері үшін процестің бейімделуін, мақсаттылық дәлдігін және нормативтік сәйкестігін (мысалы, GDPR, CCPA) арттыру мақсатында жасанды интеллект (AI) басқаратын автоматтандыруды адам тәжірибесімен ұштастыратын Human-AI Hybrid BPMN құрылымын әзірлеуге және бағалауға бағытталған. Зерттеу әдіснамасы негізгі өнімділік көрсеткіштері – процесс тиімділігі, қателерді азайту және автоматтандыру ауқымдылығы бойынша үш түрлі BPM үлгісін (қолмен, AI басқаратын және гибридті) салыстыра отырып, аралас тәсілге негізделеді. Ол үшін Bizagi BPMN диаграммалау құралы, Meta әзірлеуші құралдары және Google Analytics сияқты платформалар қолданылды. Нақты жағдайлық зерттеулер мен модельдеулерден алынған эмпирикалық тұжырымдар AI интеграциясы қолмен жұмыс жүктемесін 30–50%-ға азайтатынын, мақсатты дәлдікті 25–40%-ға жақсартатынын және шешім қабылдау қателерін азайтатынын көрсетеді. Сонымен қатар, зерттеу ерте кезеңдегі AI араласуы адам кері байланысынсыз біржақтылыққа алып келуі мүмкін екенін және этикалық сәйкестікті қамтамасыз ету үшін адам бақылауы қажет екенін анықтайды. Мақалада жарнама саласындағы AI негізіндегі BPM үлгілерінің практикалық негіздерінің жеткіліксіздігіне, сондай-ақ автоматтандыру мен адам бақылауын теңестіретін гибридті модельдер қажеттілігіне байланысты әдебиеттердегі олқылықтар қарастырылады. Болашақ зерттеу бағыттары ретінде – AI-дың бейімділігін арттыру және салалық ерекшеліктерге бейімделу үшін күшейтілген оқыту әдістерін қолдану ұсынылады. Бұл зерттеудің мақсатты жарнамаға арналған ауқымды, тиімді және үйлесімді BPM құрылымын қалыптастыруға, сондай-ақ AI негізіндегі процестерді оңтайландырудағы теориялық және практикалық кемшіліктерді жоюға ықпал етеді.

Тірек сөздер: бизнес-процестерді модельдеу, AI негізіндегі BPM, адам-AI ынтымақтастығы, мақсатты жарнама, GDPR сәйкестігі, процестерді автоматтандыру.

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АНАЛИЗ МОДЕЛИРОВАНИЯ БИЗНЕС-ПРОЦЕССОВ: НА ПРИМЕРЕ ЧАСТНОГО АГЕНТСТВА ЦЕЛЕВОЙ РЕКЛАМЫ

Аннотация

Моделирование бизнес-процессов (BPM) играет ключевую роль в оптимизации принятия решений для целевой рекламы в цифровом маркетинге. Традиционные ручные модели BPM, основанные на рабочих процессах, управляемых человеком, сталкиваются с ограничениями в масштабируемости, эффективности и адаптивности к динамическим требованиям рынка. Целью данного исследования является разработка и оценка гибридной структуры BPMN Human-AI, которая объединяет автоматизацию, управляемую ИИ, с человеческим опытом для повышения адаптивности процессов, точности таргетинга и соответствия нормативным требованиям (например, GDPR, CCPA) для частных рекламных агентств в Казахстане. Методология использует сравнительный подход смешанных методов с использованием инструментов построения диаграмм BPMN (Bizagi), инструментов разработчика Meta и Google Analytics для оценки трех моделей BPM (ручной, управляемой ИИ и гибридной) по ключевым показателям эффективности, включая эффективность процесса, сокращение ошибок и масштабируемость автоматизации. Эмпирические результаты реальных исследований и моделирования показывают, что интеграция ИИ снижает ручную нагрузку на 30–50%, повышает точность таргетинга на 25–40% и сводит к минимуму ошибки принятия решений. Однако ранние вмешательства ИИ требуют обратной связи от человека для смягчения предвзятости и обеспечения этического соответствия. Исследование также затрагивает пробелы в существующей литературе, такие как отсутствие практических рамок для BPM на основе ИИ в рекламе и необходимость гибридных моделей, уравновешивающих автоматизацию с человеческим надзором. Будущие направления исследований включают использование обучения с подкреплением для адаптивности ИИ и отраслевой настройки. Эта работа вносит вклад в масштабируемую, соответствующую требованиям и эффективную структуру BPM для целевой рекламы, устраняя теоретические и практические пробелы в оптимизации процессов на основе ИИ.

Ключевые слова: моделирование бизнес-процессов, BPM на основе ИИ, сотрудничество человека и ИИ, целевая реклама, соответствие GDPR, автоматизация процессов.

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