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Designing a Digital Advertising Model Using the Integration of Soft Systems Methodology and Critical Systems Heuristics

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ABSTRACT

This study presents a novel, systems thinking-based approach to designing a comprehensive digital advertising model, addressing the field's complex and ill-structured challenges. Unlike prior research focused on singular aspects, this study integrates multiple worldviews—financial sustainability, technological innovation, market dominance, and project management—to create a holistic framework. A key contribution is the integration of Soft Systems Methodology (SSM) and Critical Systems Heuristics (CSH), which enables a deeper understanding of systemic and ethical dimensions, reconciles diverse stakeholder perspectives, and identifies leverage points for effective interventions. Employing an action research methodology, the model is iteratively refined through real-world implementation. The study expands on foundational digital advertising research by incorporating strategic, tactical, and operational dimensions, situating ad performance metrics within a broader organizational context. It addresses gaps in earlier research, particularly in campaign planning and execution, while considering technical, social, and political implications. Consumer perspectives and concerns about intrusive advertising are also integrated alongside data-driven and behavioural advertising research. The resulting model provides a comprehensive framework for understanding and addressing consumer needs, offering practitioners a tool to develop coherent and effective advertising strategies. By integrating SSM and CSH, this research highlights its unique contribution. This papeer provides a robust methodological foundation for tackling systemic and ethical challenges in digital advertising while advancing theoretical understanding and practical application.

Keywords

Digital advertising model; Digital marketing; Soft systems methodology; Systemic framework; Critical systems heuristics.

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1. Introduction

The digital landscape has fundamentally reshaped the marketing industry, particularly through the ever-evolving world of digital advertising. In today's hyper-connected environment, businesses of all sizes recognize the immense potential of digital marketing to reach target audiences, engage customers, and ultimately drive growth. Among the most prominent strategies in modern marketing is digital marketing (Chaffey, 2015; Chaffey and Ellis-Chadwick, 2019; Chaffey and Smith, 2022). Digital marketing involves promoting products or services using digital technologies, like mobile phones, display advertising, and other digital media. The development of digital marketing since the 1990s and 2000s has revolutionised how brands and businesses utilise technology for marketing purposes. Digital platforms are increasingly being integrated into marketing plans and everyday life. As people use digital devices instead of visiting physical stores, digital marketing campaigns have become more common and effective (Desai, 2019). This shift has significantly altered how companies engage with consumers, requiring a deeper understanding of evolving consumer behaviours behaviourand digital touchpoints. Therefore, the rapid pace of digitalization requires innovative methods to influence customer behaviour (Lingqvist et al., 2015). From social media platforms (Hanafizadeh et al. 2012; Mehrabioun, 2024) to search engines, the channels for digital advertising are vast and dynamic, offering unparalleled targeting capabilities and real-time data insights. However, navigating this complex ecosystem requires a deep understanding of the diverse stakeholders involved, each with distinct mindsets and priorities (Mehrabioun, 2024; Hanafizadeh et al., 2017). Digital advertising, a crucial branch of digital marketing, can be defined as using online channels to deliver targeted promotional messages to potential customers (Gupta and Nair, 2021). From banner ads on websites to sponsored content on social media, these messages aim to influence behaviour and ultimately drive conversions (Chaffey and Smith, 2022). The statistics paint a compelling picture: In 2023 alone, global digital advertising spending is projected to reach a staggering $626.86 billion (Cramer-Flood, 2023), highlighting its immense economic impact. As competition intensifies in an increasingly saturated digital space, crafting impactful advertising campaigns has become more complex, requiring data-driven strategies and consumer-centric approaches.

In this context, SSM emerges as a powerful approach for navigating the complexities of designing digital advertising models. SSM's focus on human-centred design, stakeholder engagement, and iterative development (Checkland, 1999; 2000; Checkland and Poulter, 2006; Hanafizadeh and Mehrabioun, 2022) makes it uniquely suited to address the dynamic and

multifaceted nature of the digital advertising landscape. Despite its potential, the application of SSM in designing digital advertising models remains largely underexplored. While numerous studies have investigated various aspects of digital advertising (Aiolfi et al., 2021; Aslam and Karjaluoto, 2017; Cheng et al., 2009; Gordon et al., 2021; Sundar et al., 2017), a critical gap exists in understanding how SSM can be leveraged to create effective and sustainable advertising models in the context of diverse stakeholders and ever-evolving technologies. This research aims to bridge this gap by demonstrating the value of SSM in designing a digital advertising model that balances the needs of advertisers, platforms, and consumers, paving the way for more effective and ethical advertising practices in the digital age. Consequently, a comprehensive and holistic approach is essential. To address this need, this study leverages systems thinking principles to develop an integrated digital advertising model. Furthermore, it seeks to enhance the intervention by applying CSH questions to uncover underlying assumptions and ethical considerations (Hart and Paucar-Caceres, 2014; Ulrich, 2005; Mohammadi, 2024). CSH offers a set of reflective questions that help uncover underlying assumptions, values, and ethical considerations within systems. By applying CSH, the study aims to enhance the ethical dimension of digital advertising practices, ensuring that decisions are not only effective but also morally sound. Accordingly, this study tries to meet three purposes. 1) It intends to offer a systemic approach based on systems thinking to the design of the digital advertising model; 2) It seeks to consider the application of SSM in digital advertising aspects and improve its intervention using CSH questions; 3) Provides a theoretical foundation for current research in digital advertising studies. Given that SSM is an action research investigation (Checkland, 2011; Checkland and Holwell, 1998), this research was conducted within a specific context to ensure practical relevance. As such, a leading Iranian digital advertising agency, referred to as Company X, was chosen as the case study for this investigation. The following questions guided the research:RQ1: How a combination of SSM and CSH questions can be employed in the design of a digital advertising model for X company?

The methodology of this study has been carefully structured to not only answer the aforementioned research question but also to develop a comprehensive, purpose-driven model applicable to digital advertising design. This investigation primarily aims to illuminate the essential activities and prerequisites for constructing the model. It is important to note that, although the study focuses on model design, it does not extend to the implementation phase of the model.

2. Theoretical background

2.1. Digital advertising

Digital advertising is commonly linked with and often used synonymously with online advertising or Internet advertising. The association reflects their shared use of digital technologies and web-based platforms for delivering promotional content to target audiences. Digital advertising offers unique advantages, including measurability, cost-effectiveness, and the ability to reach a global audience (Lamberton and Stephen, 2016). As the digital landscape continues to evolve, so too does the definition and scope of digital advertising. Recent trends have seen the integration of artificial intelligence, machine learning, and big data analytics in digital advertising strategies, enabling more sophisticated audience targeting and personalisation (Kumar et al., 2019). Additionally, the rise of programmatic advertising and native advertising has further blurred the lines between traditional and digital advertising formats (Malthouse et al., 2018).

2.2. Digital advertising as an ill-structured problem

Research on digital advertising indicates that the challenges in this field are often ill-structured and highly complex, characterized by ambiguity and interdependent factors. These problems typically involve stakeholder perspectives, evolving technologies, and dynamic market conditions, making them difficult to define and address using conventional, linear approaches. The problematic situation arises from the constant evolution of technology, algorithms, and consumer behaviour, rendering traditional advertising models obsolete. Conflicting worldviews among advertisers, marketers, and consumers further contribute to the complexity, as divergent perspectives on privacy, ethics, and the impact of targeted advertising create challenges in finding common ground. The digital advertising ecosystem operates as a complex system of activities involving numerous stakeholders, each with distinct goals, interests, and priorities. The interconnectedness of these systems adds layers of complexity, making it difficult to address issues comprehensively. Purposeful holons, representing autonomous entities within the advertising process, introduce variability and unpredictability, adding to the ill-structured nature of the problem. Learning through inquiry processes becomes imperative in navigating this complexity, requiring continuous adaptation and exploration of innovative solutions.

2.3. Soft Systems methodology

SSM emerged from a critical realisation in the 1970s: traditional "hard" systems thinking, with

its focus on rigid optimisation and control, would not suffice for tackling the complex realities of social and organisational problems (Zarezadeh, 2024). These problems, characterised by their complexity, ill-defined nature, and diverse stakeholder perspectives, demanded a new approach – one that is human-centred. SSM is not a rigid, step-by-step manual; it is a journey of exploration and learning. At its core, SSM embodies a fundamental shift from the reductionist lens of "hard" systems to a holistic understanding of the "epistemological chasm" separating the observer and the observed (Checkland and Holwell, 1998). This chasm necessitates a methodological approach that is not merely prescriptive but dialogical, engaging stakeholders in a collaborative process of inquiry and understanding (Checkland, 1999). Through its iterative seven-stage framework, SSM equips practitioners to navigate complex issues with a focus on context (Flood and Romm, 1996), guiding them through problem exploration, conceptual modelling, and reflective action to drive meaningful solutions.

Checkland proposed two distinct "modes" of SSM – Mode 1 and Mode 2 – each catering to different epistemological stances (Checkland, 2000; Hanafizadeh et al., 2021). Mode 1 navigates the seven stages with a pragmatic focus on generating actionable solutions. While Mode 2 fosters critical reflection and learning journeys (Checkland and Holwell, 1998). This dialectical tension between pragmatism and emancipation ensures that SSM remains a relevant tool for both problem-solving and organizational transformation. SSM's ontological resonance with action research (Flood and Romm, 1996; Ranjbar Fordoei et al., 2023) further strengthens its transformative potential (Faezirad and Khoshnevisan, 2023). Both approaches champion praxis-oriented inquiry (Schön, 1983), where knowledge production (Lather, 1991) is inextricably intertwined with social change (Freire, 1970). This cyclical dance between action, reflection, and learning empowers stakeholders to become agents of change (Checkland and Holwell, 1998) and navigate the complexities of their sociocultural tapestry.

However, SSM is not without its critiques. Its reliance on skilled facilitators and its time-consuming nature can pose practical challenges, particularly in resource-constrained environments (Mingers and Taylor, 1992). Additionally, the abstract nature of its conceptual models can sometimes feel disconnected from the tangible realities of implementation (Mingers, 1984; Jackson, 2003). Despite these limitations, SSM's enduring value lies in its unwavering focus on human-centeredness. It enables stakeholders to engage actively in addressing issues, cultivating a sense of ownership and dedication to the resulting solutions.

2.4. Critical systems heuristics (CSH)

CSH stands as an influential framework in the realm of critical systems thinking, offering a

comprehensive and incisive approach to comprehending and addressing complex societal issues. Rooted deeply in the ethos of democratic and participatory planning (Ulrich and Reynolds, 2010), CSH fundamentally challenges traditional methodologies by highlighting the inherent biases and limitations within the concept of 'improvement.' Its overarching objective is to instil a critical consciousness among individuals, disrupting prevalent technocratic planning paradigms.

At its core, CSH operates on a dual-fronted mission: first, it aims to empower decision-makers, planners (Reynolds, 2008), and experts by fostering self-reflection and a democratic mindset concerning the pursuit of progress (Ulrich, 2005). Simultaneously, it endeavours to equip ordinary individuals—those outside the traditional power structures of decision-making—with the necessary critical competencies. These skills empower them to engage meaningfully in planning processes, thereby transcending their dependency on the goodwill and abilities of established authorities. By emphasising critical consciousness, CSH seeks to subvert the conventional understanding of 'improvement,' urging a deeper evaluation of societal interventions and policies. Its goal is to bridge the gap between those who dictate decisions and those affected by them, advocating for inclusive and participatory approaches to planning (Ulrich and Reynolds, 2010).

3. Literature review

3.1. A Review of digital advertising studies

Empirical studies exploring the efficacy of digital advertising strategies have offered valuable insights into audience engagement, platform effectiveness, and campaign performance metrics. For instance, Silva et al. (2020) conducted a mixed-method study assessing the impact of targeted social media advertising on conversion rates, revealing significant improvements in engagement and sales metrics when comparing Business-to-Business (B2B) and Business-to-Consumer (B2C) companies. Similarly, Setyani et al. (2019) shed light on the nuanced factors influencing consumer perceptions and behaviour in response to digital ads, emphasising the importance of personalised content and contextual relevance. Building on these findings, Gao et al. (2023) examined the role of Artificial Intelligence (AI) in optimising digital advertising campaigns. Their research demonstrated that AI-driven ad placement and content customisation resulted in higher click-through rates and improved Return On Investment (ROI) across various digital platforms. Likewise, Adeleye et al. (2024) investigated the potential of big data analytics in improving the accuracy of audience targeting, demonstrating that data-driven segmentation

strategies significantly surpassed traditional demographic-based methods in engagement and conversion metrics.

Lee and Cho (2020) provide a foundational definition of digital advertising, identifying key trends and proposing management strategies for future campaigns. Building on this, Taylor (2009) discusses factors contributing to the Internet's rise as a major advertising medium; however, the study lacks a comprehensive analysis of the challenges in new media advertising. Expanding the scope, Chen et al. (2016) offer a holistic survey of the digital advertising ecosystem, covering technical, social, and political implications. This broad approach is complemented by more focused studies, such as Cheng et al. (2009), who compare attitudes towards different types of interactive digital advertising and identify three key attitudinal forms: informative, entertaining, and irritating. Delving into the technological aspects, Bruce et al. (2017) present a dynamic model measuring the effects of ad formats, content, and targeting on performance over time. In a similar vein, Gordon et al. (2021) examine market inefficiencies in digital advertising, including ad effectiveness measurement and fraud, offering valuable insights into the challenges faced by practitioners.

Consumer perspectives are well-represented in the literature, with Truong and Simmons (2010) linking perceived consumer intrusiveness with strategic marketing implications. Further enriching this consumer-centric approach, Aiolfi et al. (2021) offer insights into factors influencing data-driven digital advertising and online behavioural advertising. The evolution of digital advertising practices is captured by Truong et al. (2010), who identify five key trends, including permission-based advertising and increased personalisation. Complementing this practical perspective, Stewart et al. (2018) contribute to the theoretical understanding of consumer responses to digital advertising by developing a framework based on the affect transfer hypothesis. While these studies collectively provide a comprehensive overview of digital advertising, some gaps remain. Truong and Simmons (2010) note a lack of focused work on the intrusive aspects of digital advertising, while Gordon et al. (2021) primarily focus on the current state of digital advertising, potentially overlooking some practical aspects of campaign planning and execution.

Therefore, this current research distinguishes itself as a pioneering study that not only adopts a holistic perspective but also systematically addresses digital advertising as a comprehensive system. Specifically, it prioritises a meticulous examination of inputs, outputs, and processes in the design of digital advertisements while also incorporating a pragmatic and systems-thinking approach to involve diverse stakeholders.

3.2. A Review of SSM and CSH combination

The combination of SSM and CSH has been explored in the literature as a powerful approach to addressing complex, multi-stakeholder problems, particularly those characterised by asymmetric power relations and conflicting perspectives. SSM offers a structured framework for understanding and addressing problematic situations through systemic thinking, enabling practitioners to model and reflect on systems conceptions about real-world scenarios. However, SSM's focus on systemic modelling and comparison with perceived situations can sometimes overlook the critical examination of the assumptions and boundaries that shape these perceptions. It is where CSH complements SSM by introducing a critical dimension, interrogating the underlying assumptions and values that define how problems are framed and addressed. Both SSM and CSH share a foundational understanding of systems as conceptual tools for learning about reality rather than as direct representations of reality itself. However, they differ in how they operationalise this understanding. SSM encourages practitioners to reflect on their systems conceptions and compare them with the perceived real-world situation to identify feasible interventions.

In contrast, CSH takes a step further by problematising the "perceived situation" itself, challenging the assumptions and boundaries that underpin it. This critical approach allows practitioners to see through their assumptions and recognise that the distinction between "system" and "situation" is not a rigid opposition but rather a continuum between two poles of contrasting proximity to reality (Torun and Torlak, 2023; Venter and Goede, 2017; Ravasan et al., 2018). While SSM provides practical tools for modelling and intervention, CSH ensures that these interventions are critically informed, addressing power dynamics and challenging dominant perspectives. Together, they develop a more robust methodology for addressing complex problems, striking a balance between systemic reflection and critical boundary critique. This integration underscores the value of combining SSM and CSH, offering a nuanced and comprehensive approach to understanding and addressing real-world challenges.

One of the key reasons for combining SSM and CSH is their ability to address asymmetric power relations, which are often present in complex problem situations. Setianto et al. (2014) argue that CSH is particularly useful in complementing SSM by explicitly addressing power imbalances. CSH's focus on boundary critique enables the identification and questioning of the assumptions and values that underpin different perspectives, ensuring that the voices of less powerful stakeholders are not marginalised. It is particularly relevant in cases where more powerful stakeholders, such as government or industry representatives, dominate the discourse.

Hart and Paucar-Caceres (2014) demonstrate this in their evaluation of an SSM intervention in a mining case study in Peru. They highlight that while SSM provides mechanisms for capturing diverse perspectives, CSH's boundary critique ensures that these perspectives are not overshadowed by the demands of more powerful actors for harder, data-driven research. While SSM is an effective approach for capturing and exploring different perspectives, it often lacks the critical dimension needed to challenge the assumptions that underpin these perspectives. CSH addresses this gap by employing boundary critique, a process that makes transparent the assumptions and values that shape how problems are defined and addressed (Hutcheson et al., 2024). It is particularly important in coercive problem situations, where SSM's lack of grounding in social theory can limit its effectiveness. Torun and Torlak (2023) advocate for CSH as a favourable alternative to SSM in such contexts, as it directly considers problems through the lenses of control and legitimacy.

The integration of SSM and CSH has been demonstrated in various practical applications. For example, Petkov et al. (2007) describe a process in which multiple perspectives were developed through stakeholder groups performing CATWOE analysis (a core component of SSM) and answering the CSH's Boundary Judgment Questions. This combined approach ensures that both the systemic structure of the problem and the critical assumptions underlying it are addressed. Additionally, Pinzon-Salcedo (2023) highlights how CSH's lack of attention to managing complexity can be addressed by integrating it with methodologies such as interactive planning and SSM. This integration enables a more holistic approach to problem-solving, striking a balance between critical reflection and practical action.

4. Research methodology

The process begins with the "Finding-out" phase, which involves a thorough exploration of the environment and organisational context. This phase includes "Environmental Analysis" to identify external factors influencing the system, followed by "Organisational Analysis" (comprising Analysis 1, 2, and 3) to examine internal structures, processes, and stakeholders. A Rich Picture is then designed to visually represent the complex interrelationships within the system. The "Finding-out Statement" is developed after the researcher gains a deep understanding of the problem situation through the application of the 12 CSH questions. These questions are used to explore both the current state and the desired state of the system, thereby enriching the analysts' understanding of the problem context. The 12 CSH questions enable the researcher to examine the problem from multiple perspectives, identify contradictions and conflicts, and provide a comprehensive view of the existing and ideal conditions of the system.

In the next step, the “Root Definitions” phase is undertaken to articulate the core purpose and boundaries of the system under study. It is followed by “Defining Performance Measures”, which establishes criteria for evaluating the system's effectiveness. The “Definition Enrichment” phase further refines the understanding of the system by incorporating additional perspectives and insights. Subsequently, the “Building Purposeful Activity System” phase focuses on designing a conceptual model that aligns with the system's objectives. It leads to the “Building Consensus Model” phase, where stakeholders collaborate to validate and refine the proposed model. Finally, the "Debate and Discussion" phase provides an opportunity for stakeholders to engage in critical evaluation, provide feedback, and build consensus, ensuring the robustness and applicability of the findings. The research methodology steps are outlined in Figure 1.

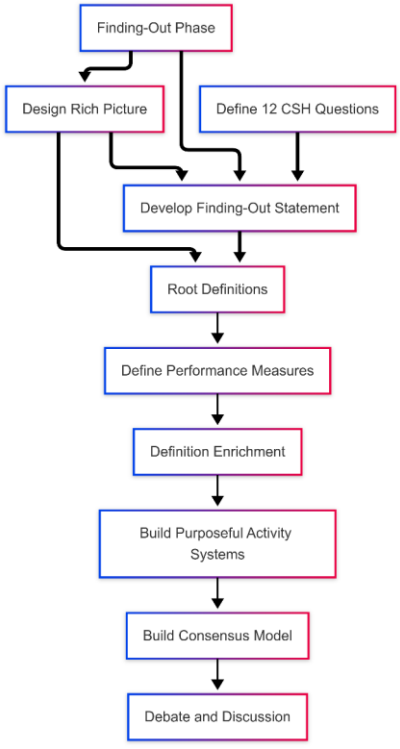

Figure 1. Research methodology steps

4.1. Findings

In the process of designing digital advertising, the finding-out phase entails four key steps. Firstly, in step 1, an analysis of the digital advertising landscape is conducted to identify external factors influencing its development. This analysis draws upon existing research and literature relevant to digital advertising models. Secondly, in step 2, an examination of internal organisational dynamics is carried out. Data for this internal analysis were collected through interventions in problem situations and detailed interviews with various stakeholders, including

managers, experts, and customers of X company, who were selected through snowball sampling due to their involvement in the technical or business aspects of digital advertising development. A total of 14 in-depth interviews were conducted, providing substantial qualitative data, which was then analysed using ATLAS.ti 9 software. The data analysis process explores the relationships between codes and interview concepts. More details about the interviews are provided in Appendix 1, where one sample interview is summarised, and another sample interview is summarised in Appendix 2. In addition, step 3 involves creating a comprehensive overview or 'rich picture' based on the analysis of both internal and external data. Finally, in step 4, the findings from the finding-out phase are synthesised into a statement based on CSH boundary questions and the analysis of internal and external factors influencing the development of digital advertising strategies.

4.1.1. Environmental analysis

To design digital advertising plans, an environmental analysis was conducted to investigate various factors influencing the digital advertising landscape for X company. This analysis encompassed social, economic, political, legal, and technological dimensions, providing a holistic understanding of the contextual influences on digital advertising practices.

Social: In the context of social analysis, the analysis indicates significant shifts in customer needs and preferences regarding digital advertising services. Unlike traditional advertising approaches, which uniformly present products and services, the digital advertising paradigm tailors its offerings to meet diverse customer needs. This shift has necessitated partnerships with new stakeholders who were not traditionally involved in conventional advertising models. Additionally, social analysis revealed substantial shifts in the preferences and demands of gamers for digital entertainment services.

Technological: To strengthen its market presence, Company X is actively developing a comprehensive digital advertising strategy. The rapidly evolving technological landscape has significantly influenced the gaming sector, and this influence extends directly into the domain of mobile applications. Acknowledging the transformative influence of these advancements, Company X is strategically positioning itself to harness their potential. Within this dynamic environment, social networks have become essential platforms for launching new games, a perspective that Company X actively embraces and leverages. By utilizing these networks as a primary channel for advertising, the company is well-positioned to establish a strategic alliance that not only boosts visibility but also enables the identification of potential issues. This

approach is a user-focused strategy, underscoring its commitment to a user-centric advertising approach, ensuring a seamless and engaging experience for its audience.

Economic: Company X is strategically positioned to enhance its market presence through a comprehensive digital advertising plan, seizing opportunities within the dynamic gaming sector. With a keen focus on customised gamification designs for businesses, the company aims to diversify revenue streams and cater to the increasing demand for personalised marketing approaches. Accessing diverse advertising capabilities represents a critical opportunity for Company X, enabling the company to expand its audience reach and enhance market exposure. Additionally, by leveraging targeted advertising, the company seeks to minimiseunoptimisedminimise unoptimised spending, optimising campaigns for greater efficiency and improved return on investment. Nevertheless, the economic environment poses significant challenges, particularly the high costs associated with infrastructure and server maintenance. To address this, Company X must adopt strategic resource management practices and explore cost-effective solutions to mitigate these financial pressures.

4.1.2. Organisational analysis (Analysis 1, 2, 3)

Regarding analysis 1, in the pursuit of creating value, Company X's marketing objectives encompass retargeting users, facilitating easy analysis of data, documenting campaign information and decision propositions, achieving return on investment, intelligently optimising advertising channels, delivering targeted reports, and ensuring proper budget allocation and management. The current state of digital advertising involves executing campaigns based on the organisation's overall strategy and promoting new features or products derived from existing ones. Challenges include a considerable gap between ideation and execution quality, substantial loss and inadequate desired results, lack of documentation and campaign reporting, and the absence of a comprehensible dashboard. Nevertheless, Company X possesses valuable assets, including creative campaign ideas and designs, a shared user base, a relatively agile technical team, and notable capacity in owned and earned media.

Social analysis involves identifying three key dimensions: roles, norms, and values. The roles essential in designing digital advertising at X company include financial analysts, technical experts, marketing strategists, planning managers, and the general marketing directorate. Adherence to norms is crucial within X company's operational framework. It includes the implementation of personalised gamification strategies, efficient utilisation of advertising capacities, and targeted approaches to prevent wastage of advertising expenses. These norms

serve as guiding principles to optimise resources and enhance the effectiveness of marketing endeavours. Complementing these norms are the company's core values, which encompass user retargeting, easy data analysis, targeted reporting, prudent budget allocation, intelligent advertising channel optimisation, and a focus on achieving a return on investment.

Analysis 3, or political analysis, focuses on identifying dominant and influential groups within an organisation. In examining power dynamics, the financial unit prioritises cost-effective customer service and strategic investments, allocating resources toward enhancing customer satisfaction and driving business expansion rather than incurring digital advertising expenditures. Meanwhile, the technical unit, responsible for platform implementation, gains critical insights into marketing requirements and operational activities, ensuring the technical infrastructure supports data extraction and reporting needs. Shareholders, on the other hand, stand to benefit from the platform's success, as digital advertising remains a key revenue driver for many businesses within the ecosystem. However, the potential advantages and spheres of influence regarding the project's success or failure differ across stakeholder roles, shaping their respective priorities and decision-making processes. Financially, success translates to project profitability, diversified revenue streams, and the empowerment to allocate budgets to respective units. For innovation and product development, success entails steering budgets towards development, serving as a notable resume for larger projects. In the marketing domain, success is evident in increased brand recognition, the execution of larger campaigns, enhanced customer experiences, precise targeting of a wider audience, successful campaign tracking and measurement, and better alignment with overall marketing strategies. In essence, the collective success of the project has multifaceted impacts on the financial, technical, and marketing realms, highlighting the importance of effective collaboration and strategic coordination among these units within Company X.

4.1.3. Designing rich picture

A rich picture schematically identifies all information and relationships governing the problem situation, enabling researchers to gain an in-depth understanding of the issue. After analysing internal and external dimensions, it is crucial to identify the stakeholders and their concerns using the rich picture (Figure 2). This rich picture presents the key stakeholders, activities, and four dominant worldviews within a digital advertising company. It highlights areas of alignment and conflict—marked with red Xs—between goals such as market expansion, user experience, financial sustainability, and project management.

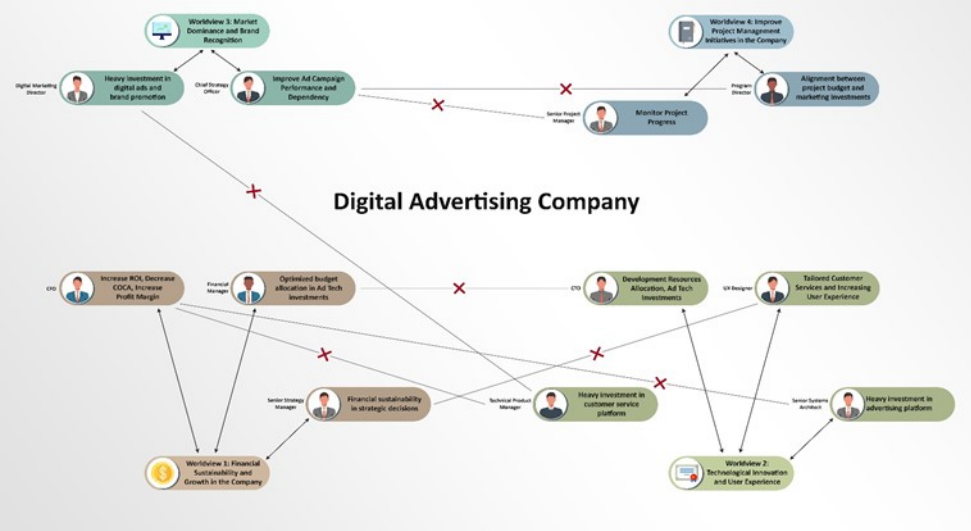

Figure 2. Rich picture of digital advertising company

4.1.4. Finding-out statement

Using CSH boundary questions can be a highly effective technique for uncovering underlying issues and generating insightful findings. CSH boundary questions facilitate a holistic examination of diverse perspectives and stakeholder interests, fostering a collaborative environment for problem-solving (Ulrich, 2005). Through this process, valuable insights emerge, leading to informed decisions and innovative solutions that address the root causes of complex issues. Thus, employing CSH boundary questions as a technique not only facilitates the discovery of pertinent information but also promotes deeper understanding and more effective problem resolution. In the fourth step, a focus group session was convened to gather ideas and formulate the findings statement. Representatives from the financial, technical, marketing, and planning departments, as well as the planning manager, participated in the session. Pre-determined questions guided the discussion, which took place in September 2023. Fifteen participants attended the meeting, which lasted over three hours and involved data collection through recording. Prior to the meeting, respondents received the questions, which were presented during the session via PowerPoint slides. The author reviewed the recorded data to extract answers to each question. Based on the meeting results, a findings statement document was prepared. This document, along with the results, was sent to each participant for confirmation, requesting verbatim validation of quotes and their interpretations. The findings related to answers to the key questions are summarised in Table 1.

Table 1. Results of CSH boundary questions (‘Is’ mode)

No	Question	Financial analysts	Technical experts	Marketing strategists	Planning managers
1	Who is the customer?	Stakeholders impacted by the project outcomes (internal and external), Senior management and leadership team	Target consumers and potential customers, Existing customer base	Clients/advertisers seeking effective digital advertising platforms, End-users/consumers of digital advertising experiences	Shareholders, investors, Senior management team
2	What is the purpose of this idea?	Evaluate financial viability and potential return on investment	Assess technical feasibility and alignment with existing systems	Develop strategies to promote and market the idea effectively	Determine how the idea fits into overall organizational goals
3	What is the criterion for improvement/success?	Increase revenue generation and profitability	Ensure seamless integration and user satisfaction	Enhance brand visibility and market share	Achieve project objectives within specified timelines and budget
4	Who is the decision-maker?	Chief Financial Officer or Finance Department	Chief Technology Officer or Technical Team	Chief Marketing Officer or Marketing Department	Project Manager or Planning Department
5	What resources are controlled by the decision-maker?	Budget allocation and financial resources	Technological infrastructure and development resources	Marketing budget and promotional resources	Project timeline and human resources
6	What are the conditions outside the decision environment that lead to project success?	Economic trends, market demand, and competitive landscape	Technological advancements and industry standards	Social media trends, consumer behaviour, and cultural influences	Regulatory requirements, organizational priorities, and market dynamics
7	Who is considered a professional or an expert?	Certified financial analysts and economists	Experienced software developers and IT specialists	Marketing strategists and branding experts	Project management professionals and strategic planners
8	What specialities are used?	Financial analysis, risk assessment, and investment strategies	Software development, coding languages, and system architecture	Market research, consumer psychology, and advertising techniques	Strategic planning, resource allocation, and project management
9	Who guarantees success?	Ensuring financial viability and profitability	Ensuring technical functionality and user satisfaction	Ensuring effective promotion and market penetration	Ensuring project completion within scope and objectives
10	Who is the lawyer/representative of the people who are affected but not involved?	Financial regulators and compliance officers	User experience designers and quality assurance professionals	Public relations specialists and customer service representatives	Legal advisors and risk management experts
11	What guarantees the release of affected people?	Compliance with financial regulations and ethical standards	User-friendly interfaces and efficient technical support	Transparent communication and responsiveness to customer feedback	Clear project communication and stakeholder engagement
12	What is the worldview?	Financial sustainability and growth mindset	Technological advancement and innovation	Market orientation and customer-centric approach	Strategic planning and adaptive management

Table 2. Results of CSH boundary questions ('Ought' mode)

No	Question	Financial Analysts	Technical Experts	Marketing Strategists	Planning Managers
1	Who should be the customer?	Stakeholders impacted by the project outcomes (internal and external), Senior management and leadership team	Target consumers and potential customers, Existing customer base	Clients/advertisers seeking effective digital advertising platforms, End-users/consumers of digital advertising experiences	Shareholders, investors, Senior management team
2	What ought to be the purpose of this idea?	Evaluate financial viability and potential return on investment	Deliver a seamless, user-centric advertising experience through advanced technological infrastructure and innovative software solutions	Establish market dominance and increase brand recognition through innovative marketing strategies and consumer insights	Achieve project objectives within specified timelines and budgets while integrating regulatory requirements and organizational priorities
3	What ought to be the criterion for improvement/success?	ROI of campaigns, COCA (Cost of Customer Acquisition), and profit margins	Ensure seamless integration and user satisfaction	Enhance brand visibility, market share, and campaign performance	Timely project completion, adherence to budget, regulatory compliance, and alignment with organizational goals
4	Who ought to be the decision-maker?	Chief Financial Officer or Finance Department	Chief Technology Officer or Technical Team	Chief Marketing Officer or Marketing Department	Project Manager or Planning Department
5	What resources ought to be controlled by the decision-maker?	Budget allocation and financial resources	Development resources, IT infrastructure, and software tools for implementing advanced solutions	Marketing budget and promotional resources	Project timelines, human resources, budgets, risk management tools, and stakeholder expectations influencing project execution
6	What ought to be the conditions outside the decision environment that lead to project success?	Market trends, consumer behaviour, technological advancements, and competitive dynamics	Technological advancements and industry standards	Social media trends, consumer behaviour, and cultural influences	Regulatory requirements, organizational priorities, and market dynamics
7	Who ought to be considered a professional or an expert?	Financial analysts, digital marketing specialists, and data scientists	Software developers, IT specialists, and UX/UI designers with expertise in cutting-edge technologies	Marketing strategists and branding experts	Project management professionals and strategic planners
8	What specialties ought to be used?	Financial analysis, digital marketing strategies, and data-driven decision-making	Software development, coding languages, and system architecture	Market research, consumer psychology, social media marketing, customer relationship management and advertising techniques	Strategic planning, resource allocation, and project management
9	Who ought to be responsible for guaranteeing success?	Ensuring financial viability and profitability	Ensuring technical functionality and user satisfaction	Ensuring effective promotion and market penetration	Ensuring project completion within scope and objectives
10	Who ought to be the lawyer/representative of the people who are affected but not involved?	Compliance officer or ethical advisor ensuring ethical and legal standards	User experience designers and quality assurance professionals	Public relations specialists and customer service representatives	Legal advisors and risk management experts
11	What ought to guarantee the release of affected people?	Compliance with financial regulations and ethical standards	User-friendly interfaces and efficient technical support	Transparent communication and responsiveness to customer feedback	Clear project communication and stakeholder engagement
12	What should be the worldview?	Financial sustainability and growth mindset	Technological advancement and innovation	Market orientation and customer-centric approach	Strategic planning and adaptive management

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The comparison between the "is" mode (current state, Table 1) and the "ought" mode (ideal state, Table 2) across the four worldviews reveals both alignment and discrepancies, highlighting areas for improvement. For financial analysts, the "is" mode focuses on financial viability and revenue generation, which the CFO controls, while the "ought" mode emphasises a data-driven approach that incorporates ROI, COCA, and profit margins alongside ethical standards. This shift calls for greater integration of digital marketing strategies and financial sustainability. For technical experts, the "is" mode centres on technical feasibility and system integration, led by the CTO, whereas the "ought" mode prioritises a seamless, user-centric advertising experience through advanced technologies and UX/UI design. This transition highlights the importance of aligning technical efforts with user satisfaction and innovation. Marketing strategists operating in the "is" mode aim for market penetration under the guidance of the CMO, while those in the "ought" mode seek market dominance through innovative strategies, consumer insights, and transparent communication. This shift underscores the importance of a consumer-centric, data-driven approach for achieving long-term brand success. For planning managers, the "is" mode focuses on aligning projects with organisational goals managed by project managers. In contrast, the "ought" mode adopts a holistic approach, integrating regulatory requirements, market dynamics, and adaptive management principles to achieve a comprehensive understanding. It suggests a need for a more strategic, compliance-oriented mindset.

4.2. Root definitions

During the finding-out phase, a variety of distinct viewpoints emerged, each offering unique perspectives on the issue under examination. In the subsequent fifth step, a precise of the root definition was carefully outlined for each of these identified viewpoints, offering clarity and guidance in understanding their foundational principles. Through the analysis of qualitative data from interviews (detailed in Appendices 1 and 2) and active engagement by researchers in addressing the problem, four distinct worldviews were identified, each playing a crucial role in shaping the approach to resolving the identified issues. The following four worldviews were discerned:

The first worldview: Financial sustainability and growth mindset

The purpose of this worldview is to ensure the financial sustainability and growth of the organisation through diligent financial management and strategic decision-making. It entails evaluating financial viability and potential return on investment to enhance revenue generation

and profitability. The primary decision-maker within this worldview is the Chief Financial Officer, responsible for budget allocation and efficient utilisation of financial resources for digital campaigns, which could create some obstacles for digital advertising. Key factors considered include the return on investment (ROI) of campaigns, the COCA index, and profit margins. Ultimately, the focus lies on achieving financial sustainability and fostering a growth mindset within the organisation.

The second worldview: Technological innovation and seamless user experience

The second worldview in a digital advertising company is defined by its commitment to delivering a seamless and user-centric advertising experience through advanced technological infrastructure and innovative software solutions. Assessing the technical feasibility and alignment with existing systems involves evaluating the company's current technological capabilities, development resources, and adherence to industry standards. This assessment encompasses analysing the proficiency of software developers and IT specialists, ensuring compatibility with emerging technological advancements, and prioritising user satisfaction through user-friendly interfaces and efficient technical support. By leveraging experienced professionals and staying abreast of industry trends, the company aims to integrate cutting-edge technologies seamlessly and enhance user satisfaction in its advertising endeavours.

The third worldview: Technological innovation and seamless user experience

The third worldview aims to establish market dominance and increase brand recognition through a comprehensive marketing strategy leveraging consumer behaviour insights, innovative advertising techniques, and responsive customer service. By conducting thorough market research, implementing cutting-edge advertising methods, and staying current with social media trends, the company can effectively promote its brand and expand its market share. Collaborating with marketing experts, prioritising customer satisfaction, and maintaining transparent communication with consumers are essential components of this approach. By adopting a market-oriented approach and continuously monitoring performance, the company can ensure effective promotion, market penetration, and sustained growth in a competitive landscape.

The fourth worldview: Technological innovation and seamless user experience

The fourth worldview is a holistic approach to project management and strategic planning that integrates regulatory requirements, organisational priorities, and market dynamics to achieve project objectives within specified timelines and budgets. It involves coordinating project timelines and human resources, guided by strategic planning and adaptive management

principles. The Fourth Worldview is facilitated by project management professionals and strategic planners who ensure clear communication of project objectives and effective engagement with stakeholders. It encompasses resource allocation, risk management, and legal advisory to ensure project completion within scope and objectives, aligning with overall organisational goals.

After formulating the root definitions, PQR analysis is employed to further delineate each of them. This analysis is detailed in Table 3.

Table 3. PQR Analysis

Worldview	PQR analysis
First worldview	P: Implement diligent financial management and strategic decision-making practices. Q: Assess budget allocation, ROI of campaigns, and resource utilization for digital campaigns. R: Ensure financial sustainability and foster growth within the organization.
Second worldview	P: Deliver a seamless and user-centric advertising experience through advanced technological infrastructure and innovative software solutions. Q: Assess the technical feasibility, evaluate current technological capabilities, and prioritize user satisfaction through user-friendly interfaces and efficient technical support. R: Enhance user satisfaction, ensure compatibility with emerging technological advancements, and stay competitive in the digital advertising industry.
Third worldview	P: Establish market dominance and increase brand recognition through a comprehensive marketing strategy. Q: Utilize consumer behaviour insights, innovative advertising techniques, and responsive customer service. R: Ensure effective promotion, market penetration, and sustained growth in a competitive landscape.
Fourth worldview	P: Integrate regulatory requirements, organizational priorities, and market dynamics. Q: Coordinate project timeline and human resources using strategic planning and adaptive management. R: Ensure project completion within scope and objectives, aligning with overall organizational goals.

5. Step 6: Defining performance measures

Once the root definitions are established, it becomes essential to develop criteria for evaluating the performance of each worldview. These criteria are categorized as follows:

1. Criteria to assess whether the transformation T is achieving its intended outcomes (efficacy).
2. Criteria to assess whether the transformation is achieved using minimal resources (efficiency).
3. Criteria to assess whether the transformation contributes to higher-level or long-term goals (effectiveness).

Details defining the performance assessment criteria for each root definition are provided in Table 4.

Table 4. Performance measures

Performance assessment criteria	First worldview	Second worldview	Third worldview	Fourth worldview
Effectiveness	Year-over-year revenue growth, Increase in market share, Improvements in brand equity and reputation, Sustainable competitive advantage achieved, Long-term profitability and shareholder value creation	Revenue growth from technology-driven advertising solutions, Market share in the ad-tech industry, Industry recognition and awards for technological innovation, Retention of top technical talent and developers, Successful partnerships and integrations with industry leaders	Year-over-year growth in market share, Improvements in brand equity and reputation, Customer retention and loyalty rates, Revenue growth attributed to marketing efforts, Industry awards and recognition for marketing excellence	Year-over-year growth in market share, Improvements in brand equity and reputation, Customer retention and loyalty rates, ROI of completed projects
Efficiency	COCA index, Marketing spend as a percentage of revenue, Operational costs as a percentage of revenue, Budget adherence and variance analysis	Development time and costs for new features and enhancements, code coverage, defect density, Resource utilization and scalability of infrastructure, Time-to-market for new product releases	Cost per acquisition (CPA), Marketing return on investment (MROI), Customer lifetime value (CLV) to customer acquisition cost (CAC) ratio, Time-to-market for new advertising campaigns and initiatives	Project cost performance index (CPI), schedule performance index (SPI), Resource utilization rates (e.g., workforce utilization, equipment utilization), Cycle time for project phases and processes
Efficacy	Return on Investment (ROI) of digital campaigns and marketing initiatives, Revenue growth rate, Profit margins, Customer acquisition and retention rates	Net Promoter Score, Uptime and reliability of advertising platform, Seamless integration with existing client systems, Successful adoption of new technologies and software solutions	Brand awareness and recall metrics, Engagement rates on social media and advertising campaigns, Customer acquisition and conversion rates	Percentage of projects completed within scope, timeline, and budget, Stakeholder satisfaction ratings, Compliance with regulatory requirements and industry standards, Achievement of project objectives and key performance indicators

5.1. Definition enrichment

After conducting the PQR analysis, CATWOE is employed to define the primary attributes of the system and to obtain a precise, enriched characterization of the root definitions (Checkland, 1981). Table 5 presents the details regarding the CATWOE analysis for each worldview (Tayebnia et al., 2023).

Table 5. CATWOE analysis

CATWOE components	First worldview	Second world view	Third worldview	Fourth worldview
Customers (C)	Shareholders, investors, Senior management team	Clients/advertisers seeking effective digital advertising platforms, End-users/consumers of digital advertising experiences	Target consumers and potential customers, existing customer base	Stakeholders impacted by the project outcomes (internal and external), Senior management and leadership team
Actors (A)	Chief Financial Officer (CFO), Finance and accounting teams, Strategic planning and budgeting teams	Software developers and engineers, IT specialists and infrastructure teams, UX designers, Technical support and customer service teams	Marketing teams (digital marketing, social media, etc.), Market research and consumer insights analysts, Advertising and creative teams, Customer service and support teams	Project managers and project management teams, Strategic planners and business analysts, Risk management and legal advisory teams, Subject matter experts and cross-functional teams involved in the project
Transformation Process (T)	Transforming financial resources and data into optimized budget allocations, strategic investment decisions, and financial performance metrics to drive profitability and growth	Transforming technological capabilities, development resources, and user insights into innovative software solutions and seamless advertising experiences	Transforming consumer insights, market research, and creative ideas into innovative advertising campaigns, effective brand promotion strategies, and responsive customer service to drive market dominance and brand recognition	Transforming organizational priorities, market dynamics, and project requirements into well-coordinated project plans, resource allocations, and risk mitigation strategies to achieve project objectives within specified timelines and budgets
Worldview (W)	Strategic planning and adaptive management	Market orientation and customer-centric approach	Technological advancement and innovation	Financial sustainability and growth mindset
Owner (O)	Chief Financial Officer (CFO)	Chief Technology Officer (CTO) or Head of Engineering/IT	Chief Marketing Officer (CMO) or Head of Marketing	Project Sponsor or Senior Project Manager
Environment (E)	Organizational financial policies and regulations, Economic conditions and market trends, Competitive landscape and industry dynamics, Availability of financial resources and investment opportunities, Potential obstacles or limitations in digital advertising campaigns	Industry standards and technological advancements, Compatibility with clients' existing systems and platforms, Availability of skilled technical talent and development resources, User preferences and expectations for digital advertising experiences, Competitive landscape in the ad-tech industry	Consumer trends and preferences, Competitive landscape and market dynamics, Availability of marketing resources and budgets, Advertising regulations and legal compliance, Social media and digital marketing trends and platforms	Regulatory requirements and industry standards, Organizational policies, culture, and structure, Market trends, competition, and customer demands, Availability of skilled project management resources, Budgetary constraints and resource limitations

After conducting the CATWOE analysis, root definitions are formulated for each mindset. Subsequently, these root definitions can be characterised in the following manner:

Root definition 1: Designing a digital advertising plan is a system owned by the shareholders, investors, and the senior management team and is operated by the CFO, finance and accounting teams, as well as strategic planning and budgeting teams. This system transforms financial resources and data into optimised budget allocations, strategic investment decisions, and financial performance metrics. This system aims to drive profitability and growth through

strategic planning and adaptive management, while considering organisational financial policies and regulations, economic conditions and market trends, the competitive landscape and industry dynamics, the availability of financial resources and investment opportunities, and potential obstacles or limitations in digital advertising campaigns.

Root definition 2: Designing a digital advertising plan is a system owned by the CTO or Head of Engineering/IT, and operated by software developers and engineers, IT specialists and infrastructure teams, User Xxperience (UX) designers, and technical support and customer service teams, to transform technological capabilities, development resources, and user insights into innovative software solutions and seamless advertising experiences for clients/advertisers seeking effective digital advertising platforms and end-users/consumers of digital advertising experiences. This system is guided by a market-orientation and customer-centric approach, while considering industry standards, technological advancements, compatibility with clients' existing systems and platforms, availability of skilled technical talent and development resources, user preferences and expectations for digital advertising experiences, and the competitive landscape in the ad-tech industry.

Root definition 3: Designing a digital advertising plan is a system owned by the CMO or Head of Marketing and operated by marketing teams (digital marketing, social media, etc.), market research and consumer insights analysts, advertising and creative teams, and customer service and support teams, to transform consumer insights, market research, and creative ideas into innovative advertising campaigns, effective brand promotion strategies, and responsive customer service for target consumers and potential customers, as well as the existing customer base. This system is guided by a focus on technological advancement and innovation, while considering consumer trends and preferences, the competitive landscape and market dynamics, the availability of marketing resources and budgets, advertising regulations and legal compliance, as well as social media and digital marketing trends and platforms.

Root definition 4: Designing a digital advertising plan is a system owned by the Project Sponsor or Senior Project Manager and operated by project managers and project management teams, strategic planners and business analysts, risk management and legal advisory teams, as well as subject matter experts and cross-functional teams involved in the project. This system transforms organisational priorities, market dynamics, and project requirements into well-coordinated project plans, resource allocations, and risk mitigation strategies to achieve project objectives within specified timelines and budgets, benefiting stakeholders impacted by the project outcomes (both internal and external) as well as senior management and the leadership team. The system is guided by a worldview of financial sustainability and a growth mindset

while considering regulatory requirements and industry standards, organisational policies, culture and structure, market trends, competition, customer demands, the availability of skilled project management resources, and budgetary constraints and resource limitations.

5.2. Building a purposeful activity system

The conceptual models were created by analysing the interview transcripts with representatives of each mindset conducted during the finding-out phase. The development of these conceptual models proceeded as follows:

The researchers, in collaboration with digital advertising experts, thoroughly examined the interview transcripts. Following a detailed review of the interview content, the researchers conducted open coding based on consensus among themselves and the two experts for code naming. This step aimed to ensure consistency between the encoded text and its interpretation (refer to Appendix 1 and Appendix 2 for details on open coding). During the coding process, relationships between codes in the interview transcripts were analysed. For example, if interviewees identified "Analyse Financial Resources" as a prerequisite for "Optimise Budget Allocations," it was categorised accordingly. The conceptual models were tailored to address the concerns of each representative of the respective mindsets. Figures 2-5 depict the conceptual model (human activity system) advocated by proponents of the first mindset. It should be noted that due to space constraints, communication and control processes are not depicted in the conceptual models.

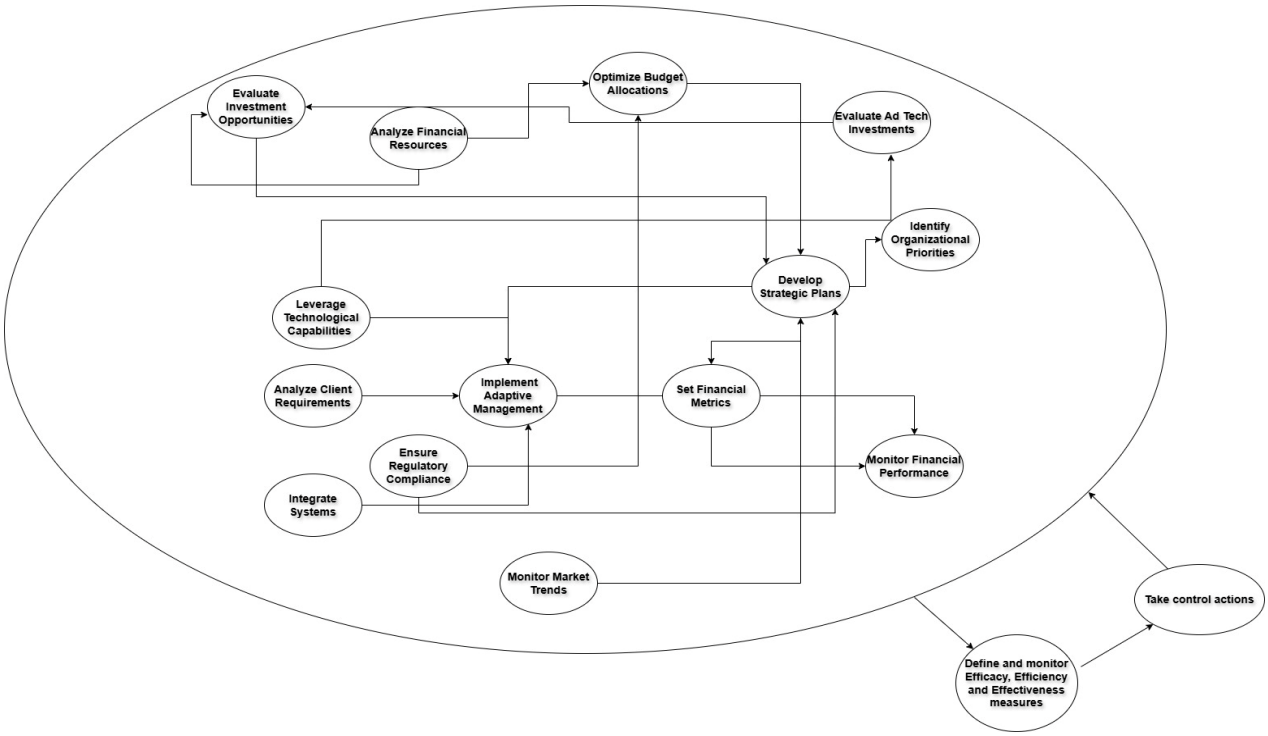

Figure 3. Conceptual model representing the first worldview idea

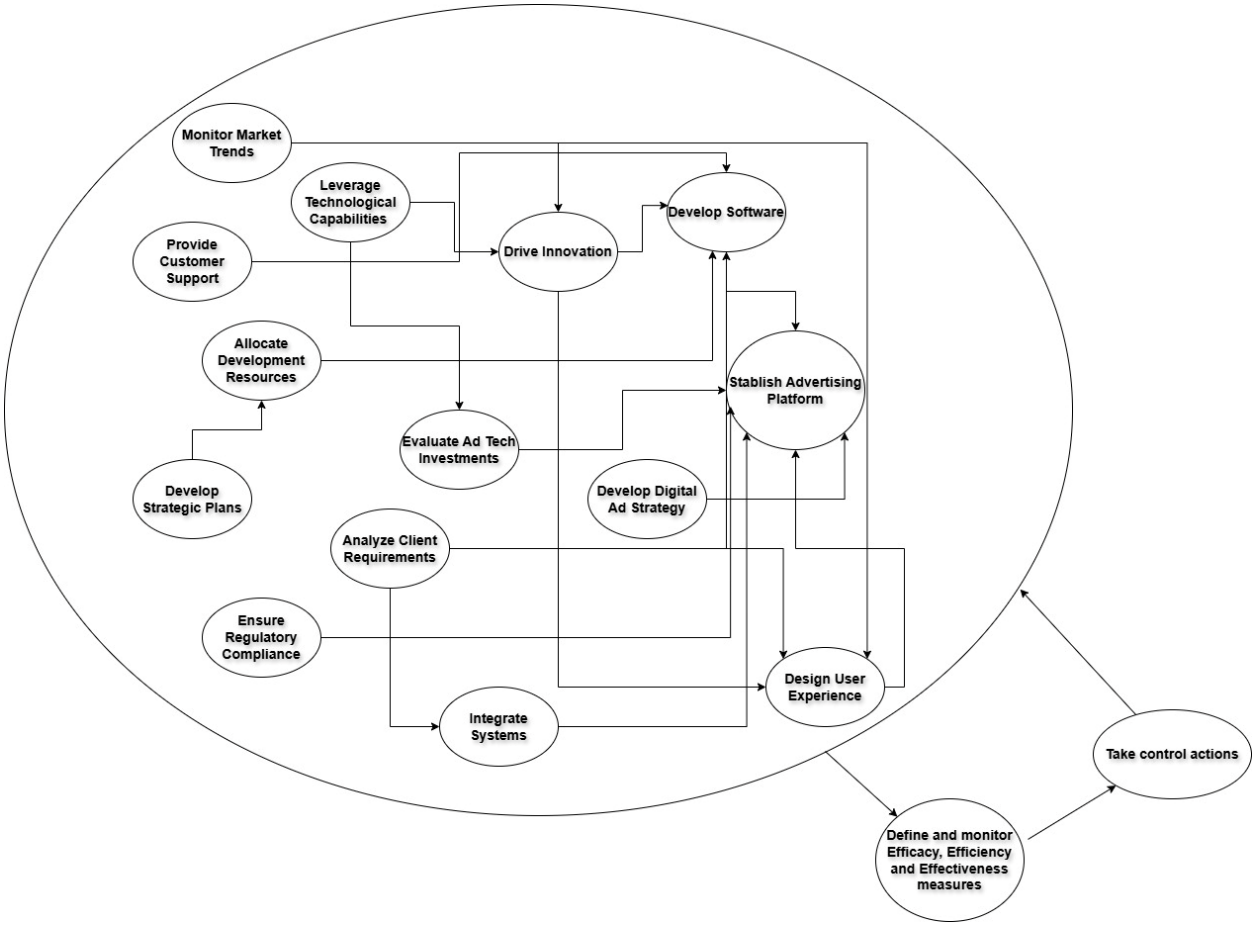

Figure 4. Conceptual model representing the second worldview idea

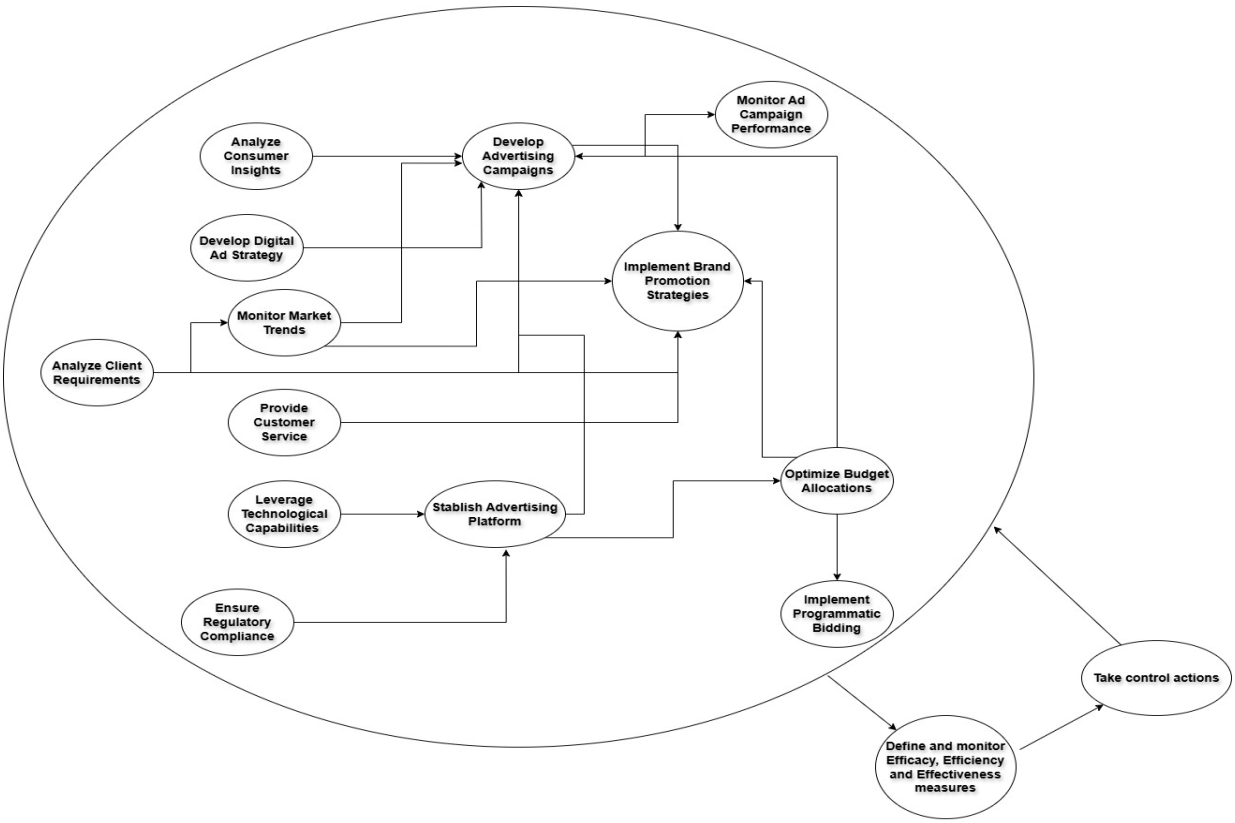

Figure 5. Conceptual model representing the third worldview idea

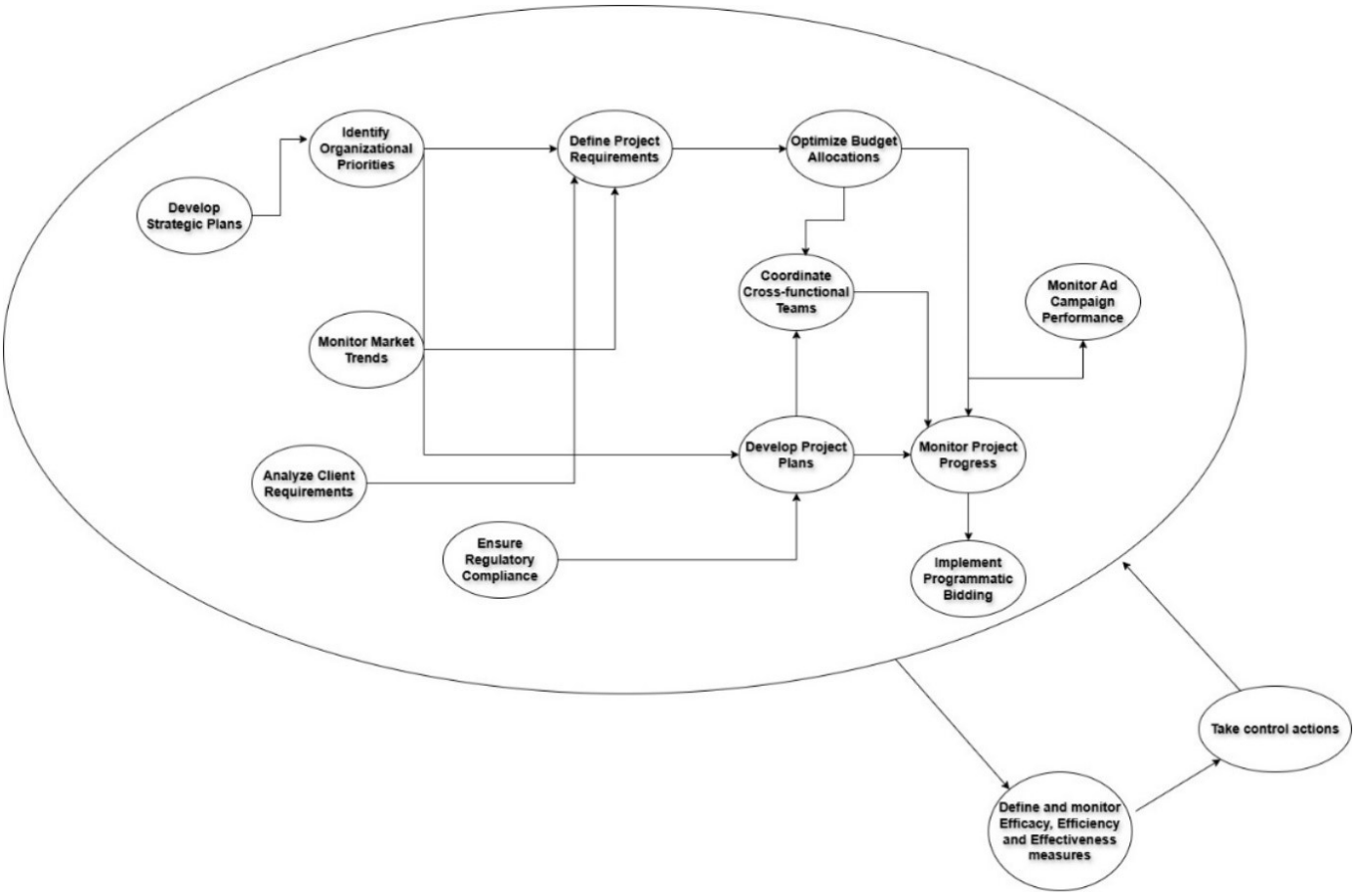

Figure 6. Conceptual model representing the fourth worldview idea

5.3. Building consensus model

After designing mindset-specific activity systems, it's essential to develop a unified model that all perspectives can agree on and defend (Hanafizadeh and Mehrabioun, 2020). Wilson (2001) suggests using the Consensus Primary Task Model (CPTM) for this purpose, which begins by identifying different types of consensus among activities.

Neutral primary task (global consensus): These are activities that contribute to the core nature of digital advertising, regardless of mindset differences. For instance, " Provide Customer Support " is universally applicable across all mindset-based models.

100% consensus: This represents activities that all conceptual models agree on. An example is " Implement data-driven marketing", which is consistent across all mindsets.

Local consensus (consensus by accommodation): These are activities that initially lack general agreement but may reach consensus through discussion.

Table 6 provides an overview of global, 100%, and local consensus activities in designing a digital advertising model.

Table 6. Global, 100% and local consensus

Type of consensus	Activities
Global	Ensure Regulatory Compliance, Provide Customer Support, Monitor Market Trends, Optimize Budget Allocations, Analyze Client Requirements, Analyze Customer Acquisition Costs
100%	Implement data-driven marketing, Align ATL/BTL services
Local	**W1 and W2:** Leverage Technological Capabilities, Integrate Systems, Develop Strategic Plans, Evaluate Ad Tech Investments **W1 and W3:** Leverage Technological Capabilities **W1 and W4:** Develop Strategic Plans, Identify Organisational Priorities, **W2 and W3:** Leverage Technological Capabilities, Develop Digital Ad Strategy **W2 and W4:** Implement Programmatic Bidding, Develop Strategic Plans **W3 and W4:** Monitor Ad Campaign Performance

After identifying activities, a "Tentative Primary-Task Model" was developed. This model is constructed based on the concepts outlined in Table 6 and their relationships, as illustrated in Appendix 3. The next step in the CPTM development involves creating a "Test model" derived from the Tentative Primary-Task Model. This process begins by extracting a root definition from the Tentative Primary-Task Model, which serves as the basis for constructing the Test model.

The text then indicates that a root definition follows, but it's not provided in the excerpt you've shared. This root definition would typically encapsulate the core purpose and components of the system being modelled.

A system owned by senior management and operated by cross-functional teams, including strategic planners, digital marketers, financial analysts, project managers, customer service representatives, and technological experts, to transform organisational priorities, consumer insights, market trends, financial resources, and technological capabilities into optimised digital advertising campaigns and brand promotion strategies. This system aims to achieve project objectives, maximise return on investment, and enhance customer satisfaction through the development and implementation of strategic plans, digital ad strategies, and advertising campaigns. The system functions by analysing client requirements, defining project requirements, developing project plans, and optimising budget allocations while ensuring regulatory compliance and leveraging technological capabilities. It continuously monitors ad campaign performance, project progress, and market trends to implement adaptive strategies and programmatic bidding. Key performance indicators, including return on ad spend, customer acquisition costs, brand awareness metrics, and overall project success rates, measure the success of the system.

Using the previously mentioned root definitions, a Test model was developed, as shown in Appendix 5. Following this, representatives from each mindset were brought together for meetings. The purpose of these gatherings was to scrutinize the root definition and the Test model, aiming to refine the Test model and achieve consensus. These meetings were conducted as unstructured interviews, primarily focusing on critiquing the Test model. Rather than following a predetermined list of questions, the discussions centred on evaluating and improving the Test model.

In total, two meetings were conducted with representatives from various groups: Financial Analysts, Technical Experts, Marketing Strategists, and Planning Managers. The outcome of these meetings revealed specific demands from different units or departments. The text suggests that these demands would be listed next, but they are not included in the excerpt you have provided. This process demonstrates an iterative approach to model development, where initial models are created, tested, and then refined based on input from various stakeholders.

Financial Analysts: According to financial analysts, defining ad spend efficiency metrics and monitoring financial forecasts are critical activities in optimising digital marketing strategies and enhancing financial performance. The definition of ad spend efficiency metrics involves establishing a comprehensive set of measures to accurately evaluate advertising expenditure across digital channels. These metrics typically include CPA, LTV/CAC, and channel-specific performance indicators.

Technical Experts: Technical experts emphasise the importance of establishing RTB infrastructure and developing marketing automation scripts in digital advertising. RTB infrastructure requires integrating both demand and supply side platforms in advertising, and ad exchanges, along with algorithms for rapid bid placement. Marketing automation scripts streamline processes like email marketing and lead scoring, integrating with CRM systems and analytics platforms. Both activities necessitate robust, scalable infrastructure capable of handling real-time data processing.

Marketing Strategists: Marketing strategists emphasize the importance of redefining target audience segmentation in digital advertising. This process involves analyzing diverse data sources to move beyond traditional demographic segmentation, incorporating psychographic and behavioural factors. Advanced analytics and machine learning are used to identify micro-segments with specific needs and behaviours.

Planning Managers: Planning managers emphasise the importance of implementing agile methodologies, setting Objectives and Key Results (OKRs), and monitoring capacity planning in digital advertising strategies. Agile methodologies enable more flexible and responsive

project management, allowing teams to adapt quickly to changing market conditions and campaign performance. OKR setting provides a framework for aligning team efforts with organizational goals, ensuring that advertising initiatives contribute directly to broader business objectives.

After evaluating the Test model, stakeholders refined it by adding multiple activities and removing one. This process resulted in the CPTM. Table 8 details these changes, while Appendix 3 provides a comprehensive view of the CPTM. This iterative approach ensured that the final model incorporated diverse perspectives and addressed stakeholder concerns.

Table 7. Added and removed activities in CPTM

The activities added to the CPTM
Define Ad Spend Efficiency Metrics, Monitor Financial Forecasting, Establish RTB Infrastructure, Develop Marketing Automation Scripts, Implement Agile Methodologies, Implement OKR Setting, Monitor Capacity Planning, Redefine Target Audience Segmentation

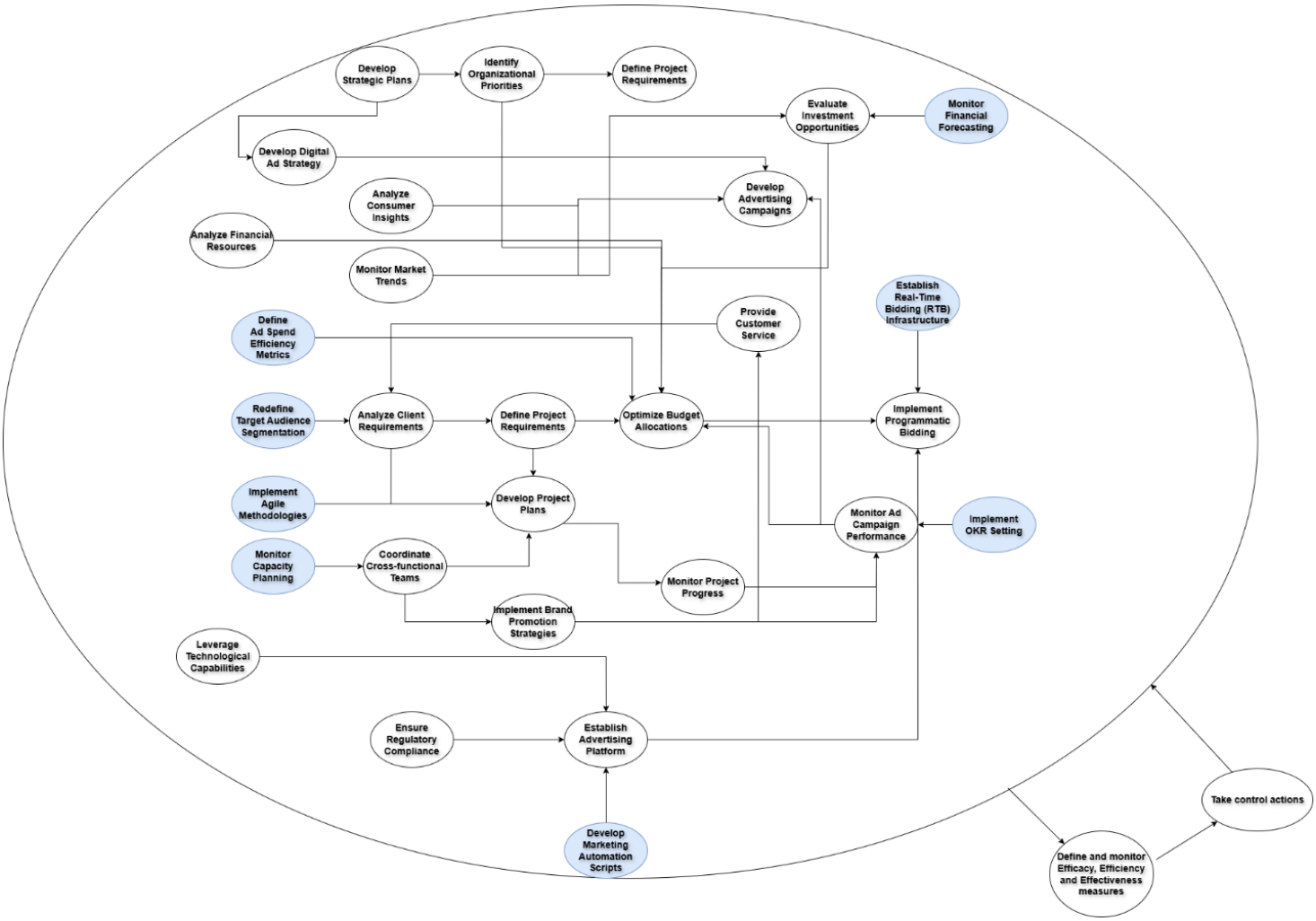

Figure 7. Final CPTM

5.4. Debate and discussion phase

The CPTM developed earlier serves as the foundation for structured discussions and debates in this phase. Involving diverse stakeholders leads to dynamic and energetic exchanges of ideas. This stage focuses on identifying roles crucial for implementing digital advertising model activities. It also enables a proper definition of governance elements in the model's execution, ensuring a comprehensive approach to digital advertising implementation.

Table 8. Digital advertising model activities and implementation

Activity	Exist/ Not Exist	Current mechanism	Performance measurement	Proposed changes	Roles	Required procedural changes	Required structural changes	Required attitudinal changes
Evaluate Investment Opportunities	Exist	Financial analysis, risk assessment	ROI, NPV, IRR	Use AI for predictive analytics	Financial analysts	Train staff on new AI tools	Integrate AI tools	Foster data-driven decision-making
Develop Advertising Campaigns	Exist	Creative teams, marketing research	Campaign reach, engagement	Integrate cross-platform analytics	Marketing team	Update campaign tracking processes	Cross-functional collaboration	Encourage innovative thinking
Provide Customer Service	Exist	Call centres, online support	Customer satisfaction scores	Implement AI chatbots	Customer service reps	Train staff on AI systems	Enhance the IT infrastructure	Promote a customer-centric approach
Monitor Project Progress	Exist	Project management software	Milestone completion, KPIs	Use real-time dashboards	Project managers	Update project tracking protocols	Real-time data integration	Embrace transparency in progress
Optimize Budget Allocations	Not Exist	Financial planning tools	Budget variance, efficiency	Implement automated budget optimisation	Financial planners	Update budgeting software	Integrate AI for budgeting	Adopt a proactive cost management
Define Project Requirements	Exist	Stakeholder meetings, requirement docs	Requirement satisfaction	Use agile methodologies for requirements	Business analysts	Shift to agile requirement gathering	Agile team structures	Encourage iterative feedback
Develop Strategic Plans	Exist	SWOT analysis, market research	Strategic goal achievement	Incorporate scenario planning	Strategy team	Enhance scenario analysis processes	Strategic Foresight Division	Foster long-term thinking
Identify Organisational Priorities	Exist	Leadership meetings, strategic sessions	Priority alignment	Use OKRs for prioritisation	Executives	Implement OKR framework	Streamline decision-making	Promote alignment and focus
Define Project Requirements	Not Exist	Stakeholder interviews, workshops	Requirement fulfillment	Use user stories and agile backlog	Business analysts	Adopt agile user stories format	Agile team structures	Embrace continuous refinement
Develop Project Plans	Exist	Gantt charts, project software	On-time delivery, budget adherence	Integrate agile planning tools	Project managers	Transition to agile planning methods	Create cross-functional teams	Promote flexibility and adaptability
Implement Brand Promotion Strategies	Not Exist	Marketing campaigns, PR	Brand awareness, engagement	Leverage influencer marketing	Marketing team	Update promotion tactics	Utilize new media channels	Encourage creative engagement
Coordinate Cross-functional Teams	Exist	Team meetings, collaboration tools	Team synergy, project success	Use integrated collaboration platforms	Team leads	Enhance team coordination processes	Flatten hierarchical structures	Promote interdepartmental collaboration
Analyze Client Requirements	Exist	Client interviews, surveys	Client satisfaction, requirement fit	Implement client feedback loops	Client managers	Create continuous feedback systems	Improve client communication channels	Prioritize client feedback in processes

Activity	Exist/ Not Exist	Current mechanism	Performance measurement	Proposed changes	Roles	Required procedural changes	Required structural changes	Required attitudinal changes
Monitor Market Trends	Exist	Market research, trend analysis	Market share, trend adaptation	Use predictive analytics	Market analysts	Update market analysis techniques	Invest in analytics tools	Encourage proactive market adaptation
Analyze Consumer Insights	Exist	Consumer surveys, focus groups	Consumer satisfaction, insights utilization	Use big data analytics	Consumer researchers	Integrate advanced analytics	Enhance data collection methods	Foster a data-driven culture
Develop Strategic Plans	Exist	SWOT analysis, strategic frameworks	Strategic goals achievement	Integrate digital transformation strategies	Strategy team	Update strategic planning frameworks	Form digital transformation teams	Embrace digital-first mindset
Develop Digital Ad Strategy	Not Exist	Digital marketing tools, analytics	Ad performance, ROI	Use advanced programmatic advertising	Digital marketers	Update digital ad processes	Enhance digital infrastructure	Foster innovation in digital marketing
Leverage Technological Capabilities	Exist	IT solutions, digital tools	Tech utilization, innovation rate	Invest in emerging technologies	IT and innovation teams	Create a technology adoption roadmap	Enhance IT support structures	Promote a culture of innovation
Monitor Capacity Planning	Exist	Resource management software	Resource utilization, capacity vs. demand	Use real-time capacity planning tools	Operations managers	Update capacity planning processes	Enhance resource management	Foster proactive capacity management
Implement Agile Methodologies	Not Exist	Scrum, Kanban	Agile metrics, sprint success	Expand agile to more teams	Agile coaches	Train more teams in agile practices	Restructure teams to be agile	Encourage an agile mindset across the organization
Redefine Target Audience Segmentation	Not Exist	Market segmentation tools	Target audience reach, engagement	Use advanced AI for segmentation	Marketing analysts	Update segmentation tools	Enhance data analysis capabilities	Embrace precision marketing
Leverage Technological Capabilities	Exist	Tech stack optimization	Innovation rate, tech utilization	Adopt new digital marketing tools	IT and digital teams	Update tool adoption processes	Integrate the latest tech tools	Promote continuous learning
Monitor Financial Forecasting	Exist	Financial models, forecasting tools	Forecast accuracy	Use AI for improved forecasting	Financial analysts	Train staff on AI forecasting tools	Integrate AI forecasting systems	Foster predictive financial management
Establish Real-Time Bidding (RTB) Infrastructure	Not Exist	Ad bidding platforms	RTB efficiency, ad performance	Enhance RTB algorithms	Digital advertising team	Update bidding processes	Invest in RTB technology	Embrace real-time decision-making
Implement Programmatic Bidding	Not Exist	Programmatic ad platforms	Bidding efficiency, ROI	Use advanced programmatic tools	Digital advertising team	Update programmatic bidding processes	Invest in programmatic tech	Encourage data-driven bidding strategies
Monitor Ad Campaign Performance	Exist	Analytics dashboards	Campaign metrics, ROI	Use AI for deeper insights	Digital marketers	Enhance performance tracking	Integrate AI analytics	Promote continuous improvement
Implement OKR Setting	Exist	Strategic goal-setting tools	OKR achievement	Use OKR software for tracking	Executives, team leads	Implement OKR tracking processes	Align team goals with OKRs	Foster goal alignment and accountability
Develop Marketing Automation Scripts	Not Exist	Automation tools	Automation efficiency, lead conversion	Use AI for script optimisation	Marketing automation team	Update automation processes	Invest in advanced automation tools	Promote a culture of efficiency
Establish Advertising Platform	Not Exist	Third-party platforms	Platform engagement, ROI	Create a proprietary ad platform	Digital team	Develop ad platform setup processes	Invest in platform development	Embrace platform-based advertising

6. Discussion and conclusion

This study presents a novel approach to designing a digital advertising model that employes systems thinking and considers multiple worldviews. The resulting model is comprehensive, addressing not only business aspects but also project management, technical considerations, and strategic elements of the implementing company. This holistic approach represents a significant advancement in the field of digital advertising research. Unlike previous studies that focused on singular aspects of digital advertising, this research encompasses all facets of digital advertising, including strategic, tactical, and operational dimensions. While Lee and Cho (2020) provided a foundational definition of digital advertising and identified key trends, and Taylor (2009) discussed factors contributing to the Internet's rise as a major advertising medium, our study builds upon these insights by integrating them into a comprehensive model that considers multiple perspectives. The pragmatic and action research approach adopted in this study allowed for the implementation and refinement of the model in practice. This methodology enhances the practical value of the research for both scholars and practitioners in the field of digital advertising, addressing the gap identified by Gordon et al. (2021), who noted that certain practical aspects of campaign planning and execution has been previously overlooked.

One of the key strengths of this study is its integration of systems thinking into the design of a digital advertising model. By considering various worldviews, including financial sustainability, technological innovation, market dominance, and project management, the model provides a more balanced and realistic representation of the digital advertising landscape. This multifaceted approach builds on the holistic framework of the digital advertising ecosystem proposed by Chen et al. (2016), which covers technical, social, and political implications. The model's consideration of project management and technical aspects alongside business elements is particularly noteworthy. This integration recognises the interdependencies between various organisational functions and the necessity of alignment in executing successful digital advertising campaigns. The current study extends the work of Bruce et al., (2017), who presented a dynamic model measuring the effects of ad formats, content, and targeting on performance over time by incorporating these elements into a broader organisational context. While previous research has often focused on specific techniques or channels, such as Cheng et al. (2009), which compared attitudes towards different types of interactive digital advertising, this study provides a holistic view of the digital advertising ecosystem. This approach enables practitioners to develop more coherent and effective advertising strategies that consider the interplay between different levels of decision-making and implementation.

The action research methodology employed in this study is particularly valuable in bridging the gap between theory and practice. By implementing and refining the model in real-world scenarios, the research offers insights that are directly applicable to the challenges faced by digital advertising professionals. This practical orientation addresses the concerns raised by Truong and Simmons (2010) regarding the lack of focused work on the intrusive aspects of digital advertising, providing a framework for addressing such issues. Our model also incorporates consumer perspectives, building on the work of Aiolfi et al., (2021) on data-driven digital advertising and online behavioural advertising.

6.1. Limitations and future avenues for research

While this study makes a significant contribution to digital advertising research, its limitations include the scope of implementation, which may limit generalizability across different organisational contexts. The rapidly evolving nature of digital technology and consumer behaviour necessitates frequent model updates. The study may not have captured all relevant perspectives, and the action research approach could have introduced biases. Each component of the model could benefit from more in-depth analysis. The integration with traditional advertising methods and the ethical implications of advanced techniques were not fully explored. Future research avenues include cross-cultural studies, integration of emerging technologies and industry-specific variations of the approach adopted in this study. These areas of exploration will further enhance our understanding and implementation of effective digital advertising strategies in an increasingly complex landscape.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix 1: Interviewees' data, and codes elicited from each interview

No	Mindsets	The data of interviewees (the relevant work experience)	Concepts (codes)
1	1	CFO with 15 years of experience in digital advertising firms	Evaluate Investment Opportunities, Analyze Financial Resources, Optimize Budget Allocations, Set Financial Metrics, Monitor Financial Performance
2	1	Financial Manager with 10 years of experience in ad tech companies	Evaluate Ad Tech Investments, Leverage Technological Capabilities, Integrate Systems, Analyze Client Requirements
3	1	Senior Strategy Manager with 12 years of experience in marketing agencies	Develop Strategic Plans, Identify Organizational Priorities, Implement Adaptive Management, Ensure Regulatory Compliance
4	1	COO with 8 years of experience in digital marketing operations	Optimize Budget Allocations, Implement Adaptive Management, Monitor Financial Performance, Analyze Client Requirements
5	2	Senior Software Engineer with 8 years in ad tech	Drive Innovation, Develop Software, Leverage Technological Capabilities
6	2	UX Designer with 6 years in digital advertising platforms	Design User Experience, Monitor Market Trends, Establish Advertising Platform
7	2	CTO with 12 years in digital marketing companies	Evaluate Ad Tech Investments, Develop Strategic Plans, Allocate Development Resources
8	2	Senior Systems Architect with 10 years in ad tech	Integrate Systems, Establish Advertising Platform, Ensure Regulatory Compliance
9	2	Technical Product Manager with 7 years in digital advertising	Provide Customer Support, Develop Digital Ad Strategy, Monitor Market Trends
10	3	Senior Account Strategist with 10 years in digital marketing agencies	Analyze Client Requirements, Develop Digital Ad Strategy, Provide Customer Service, Develop Advertising Campaigns
11	3	Digital Marketing Director with 8 years in e-commerce	Leverage Technological Capabilities, Implement Brand Promotion Strategies, Ensure Regulatory Compliance, Develop Digital Ad Strategy
12	3	Chief Strategy Officer with 12 years in ad tech companies	Monitor Market Trends, Monitor Ad Campaign Performance, Implement Programmatic Bidding, Optimize Budget Allocations
13	4	Senior Project Manager with 10 years in digital advertising agencies	Develop Strategic Plans, Identify Organizational Priorities, Analyze Client Requirements, Coordinate Cross-functional Teams, Develop Project Plans, Monitor Project Progress
14	4	Program Director with 12 years in ad tech companies	Monitor Market Trends, Ensure Regulatory Compliance, Optimize Budget Allocations, Implement Programmatic Bidding, Monitor Ad Campaign Performance

Appendix 2: Selected Interviews, Extracted Codes, and Relevant Conceptual Model

Interview (summarized)

Respondent (CFO with 15 years of experience in digital advertising firms):

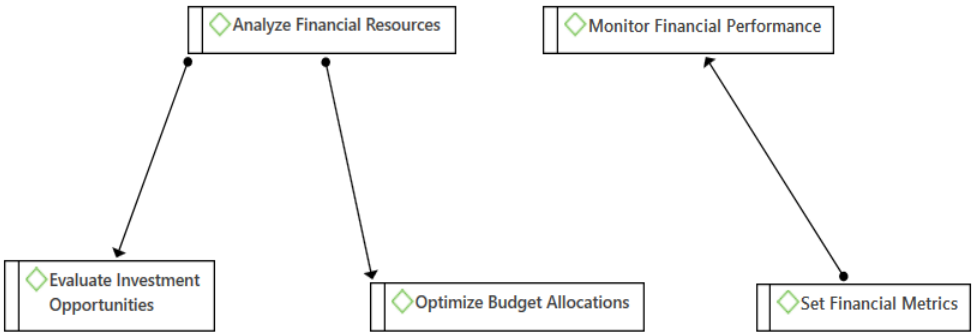
"Certainly. Our financial management process in digital advertising is interconnected and cyclical. We start by analyzing our financial resources, which directly informs how we evaluate investment opportunities. This analysis is crucial because it determines our capacity for new investments and helps us identify areas where we can optimize our budget allocations. Once

we've evaluated potential investments and optimized our budget, we set clear financial metrics. These metrics are tailored to each project or campaign and serve as our benchmarks for success. They might include ROI, ROAS (Return on Ad Spend), or customer acquisition costs, depending on the specific goals of each initiative. With these metrics in place, we then continuously monitor our financial performance. This ongoing monitoring is directly tied to the financial metrics we've set. It allows us to assess whether our budget allocations are effective and if our investments are yielding the expected returns. The results of this performance monitoring then feed back into our analysis of financial resources. If we're exceeding our targets, we might identify opportunities for further investment. If we're falling short, we might need to re-evaluate our budget allocations or investment strategies. This cycle of analysis, evaluation, optimization, setting metrics, and monitoring performance ensures that we're always making data-driven financial decisions in our digital advertising efforts. It allows us to be agile, adjusting our strategies based on real-time performance data, and helps us maximize the return on our advertising investments."

The codes elicited from the interview

Evaluate Investment Opportunities, Analyze Financial Resources, Optimize Budget Allocations, Set Financial Metrics, Monitor Financial Performance

Conceptual model



Appendix 3: CPTM