Service-dominant logic in the age of AI: An extension and update

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Cite as:
Greve Goetz (2025), Service-dominant logic in the age of AI: An extension and update. *Proceedings of the European Marketing Academy*, 54th, (125285)

Paper from the 54th Annual EMAC Conference, Madrid, Spain, May 25-30, 2025

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Abstract:

This paper explores the transformative impact of artificial intelligence (AI) on service-dominant (S-D) logic in marketing. By framing AI as a hybrid resource that combines characteristics of operand and operant resources, the study introduces an AI-augmented S-D logic. The analysis highlights how AI enhances value co-creation, actor involvement, and service ecosystem dynamics by facilitating real-time personalization, efficiency, and scalability. AI is proposed not merely as a tool but as an integral participant in value co-creation processes, potentially altering the foundational operand/operant dichotomy into a dynamic spectrum. Key takeaways include the evolving role of AI as both a passive enabler and an active contributor, reshaping marketing value propositions and ecosystem interactions.

Keywords: Artificial intelligence, Service-Dominant Logic, Value Co-Creation

Track: Marketing Strategy & Theory

1. Introduction

The rapid rise of artificial intelligence (AI) is revolutionizing the marketing discipline, fundamentally changing how businesses understand, reach, and engage with their customers by enabling more personalized, data-driven, and efficient marketing strategies. These advances have reshaped value co-creation, resource integration, and service delivery in ways that extend the foundational concepts of service-dominant (S-D) logic. S-D logic, as proposed by Vargo and Lusch (2004), represents a shift from viewing economic exchange as being based on goods to understanding it as rooted in service. The integration of AI provides new opportunities to enhance and expand upon the propositions of S-D logic, particularly in the areas of value co-creation, actor involvement, and service ecosystems (Corsaro, Vargo, and Hofacker, 2022; Vargo & Lusch, 2017).

The paper contributes to the evolution of S-D logic by addressing the fundamental dichotomy of operand and operant resources. Traditionally, operand resources are passive and require action upon them to create value, whereas operant resources are active and create value through their application. By conceptualizing AI as a hybrid resource that embodies both operant and operand characteristics, this paper proposes an extension to the framework: AI is neither merely an operand nor purely an operant resource but exists along a continuum that allows it to dynamically shift roles depending on the context.

This novel framing of AI highlights how AI can actively shape and be shaped by value co-creation processes. It moves beyond existing static categorizations of resources and suggests that AI introduces a fluid interplay between operand and operant roles. This perspective challenges the foundational dichotomy in S-D logic and offers a nuanced understanding of AI's role in service ecosystems, ultimately suggesting that the operand/operant distinction may evolve into a dynamic spectrum. Thus, this contribution provides a theoretical basis for understanding AI not as a mere technological add-on but as an integral, adaptable participant in marketing systems that redefines value propositions and reshapes the dynamics of service ecosystems.

2. AI, marketing, and the S-D logic

AI can be defined as the capability of a machine to imitate intelligent human behavior, often involving learning, reasoning, problem-solving, and perception (Russell & Norvig, 2021). AI encompasses a wide array of technologies, such as machine learning, natural language processing, and predictive analytics, which enhance firms' ability to process large volumes of data, gain insights into customer behavior, and facilitate decision-making. These

technologies enable more personalized and efficient service delivery, transforming how firms interact with customers and create value (Huang & Rust, 2021).

In the context of marketing, AI technologies provide significant advantages by transforming how firms connect with customers and co-create value. AI enhances firms' ability to understand customer needs, personalize interactions, and automate marketing processes. Within multi-actor ecosystems, AI integrates with other resources—such as data, human expertise, and digital infrastructure—to foster collaborative value co-creation among firms, customers, and other stakeholders. Kumar, Ashraf, and Nadeem (2024) describe AI's transformative effect on key marketing areas, including enhanced customer insights, the automation of marketing strategies, ethical considerations, and growth opportunities through AI implementation. Similarly, Mikalef, Islam, Parida, Singh, and Altwaijry (2023) highlight AI's role in B2B marketing as a core competency that enhances marketing capabilities and operational efficiency, consistent with collaborative value creation and resource integration across ecosystems. AI also changes interaction dynamics by enabling real-time adaptation and personalization, allowing value propositions to be continuously adjusted based on real-time data and insights, which creates a dynamic value co-creation process (Vlacic, Corbo, Costa et Silva, and Dabíc, 2021).

To understand AI's role in marketing, the framework of service-dominant (S-D) logic as introduced by Vargo and Lusch (2004) can be applied. S-D logic, as introduced by Vargo and Lusch (2004), posits that service is the primary basis of exchange, and value is co-created through interactions between firms and customers. This perspective shifts the focus from tangible goods to the intangible processes and relationships that underpin value creation. Rather than viewing products as ends in themselves, S-D logic positions them as mechanisms for delivering services, emphasizing the experiential and relational aspects of value. AI has amplified this co-creation process by enabling real-time and context-specific interactions, which expand the scope and speed of value co-creation in service ecosystems (Corsaro et al., 2022). AI's ability to provide deep insights into customer behavior, preferences, and emotions allows for a more nuanced understanding of value co-creation, where firms can dynamically adapt their offerings to meet individual customer needs (Mustak et al., 2021). The foundational premise of S-D logic is that value is not embedded in the product but rather co-created by various actors, including firms, customers, and other stakeholders, through dynamic interactions (Vargo & Lusch, 2008). Hence, the concept of value-in-use replaces value-in-exchange, highlighting that value emerges as a result of how products and services

are used by consumers in specific contexts, rather than merely ascribed through market transactions.

Vargo and Lusch (2017) also emphasize the importance of institutions and institutional arrangements in facilitating value co-creation. Institutions are the human-devised rules, norms, and beliefs that enable and constrain action, making social life predictable and meaningful. In service ecosystems, these institutional arrangements coordinate the actions of different actors and ensure the effective integration of resources for value co-creation. With the integration of AI, these institutional arrangements must evolve to accommodate new forms of interaction and value creation that involve AI as both a tool and an autonomous actor within the ecosystem. These ecosystems consist of interconnected actors—including firms, customers, and other stakeholders—who interact through resource integration and service-for-service exchange. This approach moves beyond a simple dyadic interaction model to recognize the complex, networked nature of modern value creation processes (Vargo & Lusch, 2017).

S-D Logic also introduces the distinction between operand and operant resources (Vargo & Lusch, 2004). Operand resources are those upon which actions are performed to create effects, such as raw materials or products (Constantin & Lusch, 1994). Operant resources, on the other hand, are those that act upon other resources to create value, such as skills, knowledge, and competencies. AI, depending on its application, can function as both an operand and an operant resource. When AI is utilized as an operand resource, it primarily serves as a tool or asset that firms act upon to enhance operational capabilities. For example, mechanical AI - systems that automate repetitive tasks such as data entry or customer segmentation (Huang & Rust, 2021) - can be understood as an operand resource. In this role, AI serves as a passive enabler, supporting existing processes without independently driving value creation. Conversely, AI can also function as an operant resource, actively shaping marketing processes and co-creating value. Operant resources are those that act upon other resources, and AI technologies such as predictive analytics and natural language processing serve as operant resources by providing real-time insights, enabling decision-making, and facilitating personalized interactions. Huang and Rust (2021) categorize AI in marketing into three types of intelligence: mechanical, thinking, and feeling AI. While mechanical AI functions as an operand resource, thinking AI—which analyzes data to derive insights—and feeling AI—which focuses on understanding and responding to human emotions—can be seen as operant resources. These forms of AI actively contribute to transforming marketing

activities by enabling more precise targeting, real-time personalization, and deeper emotional engagement with customers.

The concept of AI as an operant resource becomes particularly evident in marketing communications. Malthouse and Copulsky (2022) describe AI ecosystems in marketing communications as comprising algorithms, customer data, digital content assets, and IT infrastructure. Together, these elements facilitate targeted and personalized marketing efforts, with AI acting on other resources - such as data and content - to optimize customer engagement and enhance overall marketing workflows. Generative AI (GAI) tools, such as ChatGPT and Midjourney, further illustrate AI's role as an operant resource by enabling the creation of customized content at scale, supporting real-time customer interactions, and streamlining content production (Kshetri, Dwivedi, Davenport, and Panteli, 2023). Table 1 summarizes the different views on AI as an operand-operant resource.

Operand resource (AI as a tool)	Operant Resource (AI as an Actor)
Mechanical AI: Automates repetitive tasks like data entry or customer segmentation (Huang & Rust, 2021; Davenport, Guha, Grewal, and Bressgott, 2019; Kumar et al., 2024).	**Thinking AI**: Analyzes data to derive insights, enabling decision-making (Huang & Rust, 2021).
Passive role: Enhances efficiency without independently driving value creation (Huang & Rust, 2021; Kopalle et al., 2022).	**Feeling AI**: Understands and responds to human emotions, enhancing personalization (Huang & Rust, 2021).
Supportive function: Acts as a tool for operational efficiency (e.g., data entry, segmentation) (Davenport et al., 2019; Kumar et al., 2024).	**Active contribution**: Provides real-time insights and shapes marketing processes (Malthouse & Copulsky, 2022).
Automates existing processes: Supports existing workflows without altering them (Mikalef et al., 2023; Vlacic et al., 2021).	**Generative AI (GAI)**: Creates customized content at scale, enhancing customer engagement (Kshetri et al., 2023).
Reactive resource: Requires direction from human actors to perform tasks (Davenport et al., 2019; Malthouse & Copulsky, 2022).	**Marketing communications**: Acts on data and content to optimize engagement and personalize efforts (Malthouse & Copulsky, 2022).
Operational focus: Primarily enhances internal efficiency and supports firm-driven actions (Kumar et al., 2024; Kopalle et al., 2022).	**Service ecosystem dynamics**: Enables real-time adaptation and personalization, co-creating value dynamically (Vlacic et al., 2021).

Table 1. Overview of AI as operand versus operant resource

Consequently, within the framework of S-D Logic, AI functions as both an operand and an operant resource, depending on its role in the value creation process. This transformation aligns with Hunt's (2020) discussion of the re-institutionalization of marketing paradigms, indicating that the rise of AI is reshaping the theoretical foundations of marketing into what could be termed Era V, characterized by the integration of AI-driven processes. As an operand resource, AI serves as a tool that firms act upon to enhance efficiency and support operational tasks. As an operant resource, AI actively contributes to value creation by shaping marketing practices, enhancing decision-making, and enabling personalized customer interactions. This dual perspective emphasizes AI's transformative role in marketing, both as a passive enabler and as an active participant in value co-creation, thereby functioning as a hybrid operand-operant resource.

3. Extending the service-dominant logic: AI-augmented S-D logic

Given the transformative influence of AI, it appears necessary to update the foundational principles of S-D Logic to incorporate the capabilities and implications of AI. Hence, the proposed AI-augmented S-D logic reflects the active role of AI as an operand-operant resource in value co-creation, resource integration, and service ecosystems. Based on the fundamental propositions of Vargo and Lusch (2004) central axioms are derived to reflect the characteristics of AI in marketing.

Axiom 1. Resource duality: AI as an operand-operant resource

In S-D logic, operant resources are dynamic and capable of acting upon other resources to create value (Vargo & Lusch, 2004). AI exemplifies a new category of operant resource, wherein machine learning algorithms and predictive analytics act upon data to create insights and facilitate decision-making. Hence, these capabilities transform AI into a potent operant resource that can autonomously adapt, learn, and generate new service propositions. This adaptability and scalability make AI a key enabler of value creation, shifting the balance of operant resources towards intelligent systems. However, it should be noted that AI systems still require configuration, maintenance, and data. Thus, AI inherits operand characteristics, too. Consequently, it can be suggested that the distinction between operand and operant resources could evolve into a spectrum, with AI resources dynamically changing roles depending on the context.

Axiom 2. AI as a co-creator of value

The original S-D logic posits that service is the fundamental basis of exchange and value is co-created by multiple actors, including firms and customers (Vargo & Lusch, 2008). Hence, it can be argued that AI systems become active agents in the value co-creation process. AI enhances personalization, efficiency, and scalability in customer interactions, thereby becoming an integral co-creator of value alongside human actors (Huang & Rust, 2021). Unlike traditional technologies, AI can independently learn from user data, make context-specific recommendations, and facilitate real-time adaptations, extending its role from a passive tool to an active participant in service co-creation.

The original S-D logic posits that service is the fundamental basis of exchange and value is co-created by multiple actors, including firms and customers (Vargo & Lusch, 2008). In an AI-augmented framework, AI systems become active agents in the value co-creation process (Kumar et al., 2024). AI enhances personalization, efficiency, and scalability in customer interactions, thereby becoming an integral co-creator of value alongside human actors (Huang & Rust, 2021). AI's ability to learn and adapt over time allows it to contribute uniquely to the co-creation process, providing context-specific recommendations and real-time adjustments that enhance customer experiences (Mustak et al., 2021).

Axiom 3. Symbiotic cohesion: Integration of human and AI resources

The S-D logic emphasizes the importance of integrating resources through collaborative efforts among multiple actors. In an AI-dominant context, the focus extends to the integration of human and AI resources. AI augments human capabilities by providing data-driven insights and automating repetitive tasks, thus freeing up human actors for creative, empathetic, and strategic work (Wilson & Daugherty, 2018). This symbiotic relationship between human agents and AI systems creates a new dimension of value integration, wherein AI not only complements as an operand resource but also enhances human capabilities in the value co-creation process as an operant resource at the same time. Firms must recognize AI’s dual roles into their value co-creation strategies, ensuring alignment with employee capabilities, customer needs and service outcomes.

Axiom 4. Dynamic co-creation: AI as a Facilitator of dynamic value propositions

The value propositions in S-D logic are dynamic and context-dependent (Chandler & Vargo, 2011). AI's ability to process vast quantities of data and provide personalized solutions in real-time makes it a unique facilitator of such dynamic value propositions. AI allows firms

to understand consumer preferences more accurately and respond to them instantaneously, thereby aligning value propositions more closely with customer needs. This real-time adaptation is central to creating personalized and context-relevant experiences, underscoring AI's role in enhancing the dynamism of value propositions in the market.

Axiom 5. Institutional adaption: Institutions and service ecosystems in an AI context

S-D logic considers value co-creation to occur within a service ecosystem governed by institutional arrangements, such as norms, laws, and cultural values (Vargo & Lusch, 2016). AI influences these institutions by reshaping expectations around privacy, personalization, and decision-making transparency. Service ecosystems must adapt to the ethical and regulatory challenges that accompany AI, including bias, accountability, and trust (Jobin, Ienca, and Vayena, 2019). In an AI-augemnted service ecosystem, norms and standards must evolve to balance the capabilities of AI with ethical considerations, thus ensuring fair and equitable value co-creation.

4. Conclusion, limitations, and outlook

The proposed AI-augmented S-D logic represents an evolution of the foundational principles of S-D logic, recognizing AI as a central actor in modern value co-creation processes. By reframing AI as an operand-operant resource, an integrative agent, and a dynamic facilitator of value, this updated paradigm addresses the transformative influence of AI on marketing. The integration of AI into service ecosystems introduces both opportunities and challenges, emphasizing the need for ethical frameworks that guide its role in co-creation. Ultimately, AI-augmented S-D logic calls for an updated understanding of marketing, one that embraces the complexities and possibilities introduced by AI in shaping value.

This paper provides a conceptual framework for understanding AI-augmented S-D logic in marketing. However, several limitations need to be acknowledged. First, the theoretical propositions discussed require empirical validation to determine their applicability across different industries and contexts. Further research is necessary to explore how AI operates as an active participant in various types of service ecosystems and how institutional arrangements can adapt to the presence of AI as a new form of operand-operant resource. Future studies could focus on longitudinal case studies that examine the evolution of AI’s role in value co-creation over time, allowing for a deeper understanding of how firms and consumers interact with AI systems in dynamic environments.

Additionally, the ethical considerations related to AI's role in value co-creation warrant further exploration. As noted by Vargo and Lusch (2017), institutional arrangements are critical for coordinating actions in service ecosystems, and the integration of AI challenges existing institutions, particularly around privacy, transparency, and fairness. Future research should focus on developing frameworks that ensure responsible and ethical AI integration in marketing, addressing concerns such as bias, accountability, and data privacy.

Finally, while this paper draws primarily from the service-dominant perspective, integrating AI-augmented S-D logic with other theories of marketing—such as relationship marketing and consumer culture theory—could provide a more holistic understanding of how AI reshapes marketing practice and consumer experiences. By broadening the theoretical scope, researchers can further elucidate the multifaceted impacts of AI and contribute to building comprehensive models for marketing in the AI era.

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