TELKOMNIKA Telecommunication Computing Electronics and Control
Vol. 22, No. 5, October 2024, pp. 1138~1146
ISSN: 1693-6930, DOI: 10.12928/TELKOMNIKA.v22i5.26016

Navigating the digital shift: a service blueprint for coopetition technology-enabled networks

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Article Info

Article history:

Received Jan 28, 2024
Revised May 26, 2024
Accepted Jul 12, 2024

Keywords:

Coopetition
Networks
SD logic
Service blueprint
Service science

ABSTRACT

This study addresses the gap in applying traditional service blueprint methodologies to technology-enabled coopetition networks characterized by simultaneous collaboration and competition among actors. Leveraging service science insights, it proposes an enhanced service blueprint framework designed for the complexities of digital coopetition. This framework introduces the cyber. Frontstage lane, physical backstage lane, and support stage lane aim to provide a holistic view of interactions, value co-creation processes, and resource allocations. Empirical validation within the Portuguese stone sector-a key player in the national economy-demonstrates the framework's effectiveness in identifying network dysfunctions and its ease of use by industry professionals. Feedback confirms its relevance in capturing today's coopetition environments' multifaceted engagements and digital nuances. The study emphasizes adapting service blueprint methodology to better manage and innovate service processes in digital ecosystems. Future research should extend this framework's application across various sectors and explore the integration of emerging technologies to optimize service delivery and value co-creation.

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1. INTRODUCTION

In today's global economy, a company's ability to swiftly scale its operations is paramount to securing a competitive advantage and ensuring sustainability. Scale capacity, defined as the capability to expand production and service offerings efficiently, is a critical strategic consideration [1]. This is because scaling enables businesses to meet international customers' diverse and growing demands, facilitating market entry and enhancing global presence and profitability [2]. Additionally, scaling allows companies to achieve economies of scale, spreading fixed costs over a larger output, thereby reducing the average cost per unit. This cost efficiency improves profit margins and positions companies competitively in international markets through aggressive pricing strategies [3].

Small and medium-sized enterprises (SMEs), particularly in the industrial sector, play a vital role in developed economies by driving innovation, providing employment, and stimulating economic growth [4]. However, their limited scale can hinder their ability to leverage scaling benefits [5]. The strategic integration of SMEs into coopetition networks, which combine cooperation and competition, has been identified as a solution [6]. These networks enhance SMEs' scale and competitive edge, especially within the intricate global digital supply chains [7].

However, the success of coopetition networks often hinges on the involvement of a leading company that acts as a central anchor, ensuring the network's effectiveness [8]. Insights from the Boston Consulting Group (BCG) Henderson Institute (2019) suggest that major corporations, such as Microsoft and Amazon, play pivotal roles within these networks and achieve significant financial benefits, with profit margins averaging over 29% [9]. In contrast, smaller firms may become overly dependent on these dominant players, exacerbating their collaboration challenges [10]. Furthermore, in the absence of a leading company, coopetition networks rarely survive their initial years, underscoring the critical need for a central, guiding entity to sustain the collective effort, and ensure long-term viability [9].

This challenge is likely due to SMEs' inherently competitive nature and lack of a collaborative mindset, which presents significant obstacles to digital transformation and scaling objectives. This issue is further highlighted by a report from the economist intelligence unit (2021), which identifies a pronounced lack of cooperation among European SMEs, thus impeding their digital progress [11].

– Problem

In the digital age, businesses are increasingly embedded in complex, digitally interconnected environments, accentuating the need for methodologies capable of capturing, and optimizing intricate service processes. The service blueprint, a strategic tool developed to visually depict service processes [12], has significantly evolved, offering critical insights into service delivery's tangible and intangible aspects. Its evolution has broadened its utility across diverse operational landscapes, indicating a profound grasp of service dynamics [13]. However, the advent of coopetition networks, propelled by advancements in the IoT [14], among other technologies, introduces novel challenges that contemporary service blueprint methodologies are ill-equipped to handle.

Despite its adaptability, the application of the service blueprint in technology-driven coopetition networks still needs to be explored, uncovering a notable gap in current business and management scholarship. The complex nature of these networks, characterized by simultaneous collaboration and competition among firms [15], necessitates a framework adept at managing the intricate web of interconnections and multiple stakeholder engagements typical of such ecosystems. Present approaches fall short in several key areas: they do not accurately depict direct digital interactions between producers and consumers, they struggle to optimize the interests of varied stakeholders, especially in contexts of ephemeral collaboration among rivals, and they lack clarity in illustrating the participation of resources from competing entities at every service delivery step. These deficiencies hinder the identification of critical process failures [16], which are central to understanding the reasons behind the premature demise of coopetition networks [17]. This leads to an urgent question: which service blueprinting framework is suitable for efficiently mapping and enhancing service processes within technology-enabled coopetition networks?

– Underlying a potential solution

Confronting the intricacies of digital coopetition networks requires a novel approach, and service science [18], rooted in service-dominant (SD) logic, emerges as a promising solution [19]. This transdisciplinary field, focusing on service systems as its primary object of study, champions the cocreation of value across service ecosystems [20]. It advocates for a multidisciplinary method to seamlessly integrate cutting-edge technologies into service systems. Such an approach is central for enhancing scale and competitiveness and facilitating the transition toward more digitally-focused and globalized service and manufacturing networks [3], [21].

This research aims to leverage the principles of service science to fill the gaps currently observed in service blueprint methodologies, proposing an innovative service blueprint framework tailored for coopetition networks. This proposed framework is designed with the digital complexities of contemporary coopetition networks in mind, providing a sophisticated tool for precise mapping of service processes within these complex environments. A key feature of this framework is its focus on the detailed documentation of value cocreation interactions and the explicit representation of resource sharing among service systems (stakeholders), particularly in the face of service disruptions. By enhancing the visualization of resource engagement and facilitating the identification of potential failure points, this service blueprint framework seeks to refine service innovation practices. It aims to adapt these practices to meet the distinctive needs of technology-enabled coopetition networks, thereby cultivating a more robust, collaborative network.

This discourse lays the groundwork for addressing the gaps in the literature related to service blueprinting within technology-enabled coopetition networks. By weaving together the foundations of SD logic and the multidisciplinary perspectives of service science, the following section proposes concrete solutions for each identified gap, culminating in a novel service blueprint framework. This framework aims to adeptly navigate modern coopetition networks' digital complexities and multi-actor engagements, thereby advancing service innovation and management.

2. LITERATURE REVIEW

The exploration of service's role in economic exchanges has been profoundly rich, evolving significantly over centuries. Frederick Bastiat's concept of "services exchanging for services" in 1848 laid the foundational stone for the modern understanding of the service economy. This intellectual journey was notably advanced by Vargo and Lusch [22] with the introduction of SD logic. They proposed a paradigm shift in marketing and economic thought, emphasizing that the essence of economic exchange lies in providing and reciprocating intangible services rather than the transaction of tangible goods [23]. This perspective challenges traditional goods-centric paradigms, positioning products merely as vessels for service delivery and underscoring the importance of derived benefits and utilities [24].

SD logic offers a nuanced understanding of economic exchanges, stressing the co-creation of value through dynamic interactions among a network of actors. It distinguishes between operant resources-such as knowledge and skills-and operand resources, like technologies and physical goods, as crucial to facilitating service exchanges. This framework posits that value is collaboratively crafted, leveraging the resources available to actors within these exchanges.

In coopetition networks-where competition and collaboration occur simultaneously among actors SD logic provides essential insights [7]. These networks represent a complex layer of interactions vital for service ecosystems' dynamism [25]. Coopetition networks are seen as intricate webs of relationships, enriched by digital technologies and governed by institutional mechanisms that foster mutual value creation despite competitive tensions [26], [27].

Service science, inspired by SD logic, emphasizes innovation and value co-creation within service systems [28]. It calls for a multidisciplinary approach, integrating technology to enhance competitiveness across service and manufacturing sectors [29]. This field recognizes the central role of technology in improving service exchange and resource integration towards operational efficiency, especially within complex ecosystems such as digital coopetition networks [3].

3. METHOD

In this section, it is explained the results of research and at the same time is given the comprehensive discussion. Results can be presented in figures, graphs, tables, and others that make the reader understand easily [30], [31]. The discussion can be made in several sub-sections.

Adopting a service science perspective requires the service blueprint to evolve, capturing real-time value co-creation processes within service systems' resources. This service science view is adopted as the methodology to develop an advanced able to map the sequence of actions and the flow of information, resources, and interactions facilitated by digital technologies under coopetition practices. It must identify critical moments of expectation or trust breakdowns, providing insights into how digital elements influence value co-creation, thereby capturing the fluid nature of rival interactions [7].

Initially introduced by Shostack (1982) and further developed by Kingman-Brundage (1989), the service blueprint methodology has been a fundamental tool for visualizing and innovating service processes [30]. It effectively separates customer and provider domains, using conceptual lines and stages to detail the sequence of service actions [31]. This methodology captures both tangible and intangible aspects of service delivery. It facilitates a deep understanding of the interactions between service providers and recipients, which is crucial for identifying and improving key elements of service delivery [13].

In today's digital coopetition networks, advanced technologies such as the IoT, among others, play essential roles in enhancing connectivity and interactions among network participants [32]. These technologies enable a more seamless integration of competing value propositions to customers, breaking down geographical limitations and promoting a vibrant ecosystem for value co-creation [33]. Introducing these technologies in coopetition networks necessitates an evolution of the service blueprint to reflect the digital and multi-actor dynamics characteristic of contemporary coopetition networks more accurately.

Adopting a service science perspective requires the service blueprint to evolve, capturing real-time value co-creation processes within service systems' resources. This advanced blueprint should map the sequence of actions and the flow of information, resources, and interactions facilitated by digital technologies under coopetition practices. It must identify critical moments of expectation or trust breakdowns, providing insights into how digital elements influence value co-creation, thereby capturing the fluid nature of rival interactions [7].

To meet these challenges, effectively, the coopetition service blueprint needs to be intricately layered, showcasing digital connections and interactions across the entire network at every stage of the process. It should explicitly map out direct connections between factories' shop-floors and customers, ensure the alignment of interests among a variety of stakeholders, and vividly delineate the sharing of resources throughout each phase of service delivery. This refined blueprint will offer a dynamic, real-time perspective of the service ecosystem by leveraging digital tools. This approach not only illuminates areas of potential discord or misalignment but also establishes a robust framework for ongoing enhancement and innovation. Such a comprehensive tool is essential for identifying critical intervention points that can significantly improve value cocreation, ultimately leading to a more harmonious, efficient, and innovative coopetition network.

Reimagining the service blueprint through the lens of SD logic, service science and digital technology operant capabilities offers a robust framework for understanding and navigating the complexities of modern service delivery within technology-enabled coopetition networks. This methodological evolution promises not only to enrich our comprehension of service processes but also to foster more resilient, adaptive, and collaborative service ecosystems.

3.1. Inter-connectivity visualization

As conceptualized by Kingman-Brundage [31], the service blueprint has traditionally facilitated the delineation of customer and supplier activities through the customer interaction line. This line has been instrumental in visualizing direct interactions between customers and suppliers, encompassing a range of communication methods from in-person engagements to digital correspondences like emails and telephone conversations. However, the advent of digital technologies and the rise of technology-driven coopetition networks have significantly expanded the scope and nature of these interactions [34].

The emergence of digital coopetition networks has extended these interactions into the cyber environment, enabling direct connections between cyber customers and shop-floor manufacturing operations. These connections span diverse digital interfaces, from small-scale operations to expansive, interconnected factory networks, thereby challenging the conventional boundaries of customer-supplier interactions.

To accurately represent this evolution in the service blueprint, it is imperative to reconceptualize the traditional customer interaction line. The proposed line of cyber interaction emerges as a novel construct designed to encapsulate the digital interconnectivity that defines modern customer-supplier relationships. This re-envisioned line aims to capture the essence of digital exchanges and the seamless and often instantaneous nature of these interactions, facilitated by the proliferation of advanced digital technologies.

The visual representation of the line of cyber interaction as a dashed line serves a dual purpose. Stylistically, it signifies digital interactions' fluid and permeable nature, setting them apart from the more rigid and linear modes of communication prevalent in the past. This depiction underscores the dynamic, ever-evolving landscape of digital coopetition, where interactions are not bounded by physical proximity or conventional communication channels. Instead, they are characterized by a continuous flow of information, resources, and value propositions that traverse the digital sphere.

Integrating the line of cyber interaction into the service blueprint enhances the methodology to reflect the complex and immediate connections more accurately between cyber customers and factories' digital shopfloors. This adaptation lays a robust foundation for comprehensively understanding and mapping the value propositions and interaction dynamics within digital coopetition networks. Emphasizing inter-connectivity in this manner is crucial for ensuring that the service blueprint continues to serve as a relevant and effective tool for navigating the intricacies and opportunities of the digital coopetition networks, fostering a deeper comprehension of how value is co-created in these innovative service ecosystems.

3.2. Coopetition networks' stakeholders

At the heart of service science and SD logic lies the recognition that all participants in economic exchange, including customers, providers, and rivals, are service providers actively engaged in value creation. This insight is crucial for developing a service blueprint that maps out the interactions and exchanges within coopetition networks and highlights each actor's diverse contributions to the network's value creation dynamics.

Customers in the digital environment: under the SD logic view, customers are envisioned as the linchpins of value co-creation. Digital technology has transformed how customers' needs are met, ushering individuals and organizations into global digital marketplaces powered by advanced technologies such as smartphones, computers, and tablets. This shift requires a service blueprint that can adeptly illustrate the digital customer's journey, showcasing their technological interactions with providers and underscoring the critical role of digital interfaces in facilitating global procurement processes. The blueprint must, therefore, evolve to vividly capture these digital touchpoints, ensuring a comprehensive visualization of the customer's engagement in the value co-creation process.

The role of providers in value co-creation: central to the ethos of SD logic, providers are depicted not merely as suppliers but as participants in value cocreation. They deliver value propositions that span a broad spectrum of activities and experiences, fostering a collaborative process wherein value is co-created rather than unilaterally delivered. This perspective emphasizes that customers do not passively receive value; instead, they actively integrate the provider's offerings into their life narratives, weaving these services into the fabric of their daily routines and experiences. Thus, a practical service blueprint must capture this dynamic, showcasing how providers play an integral role in this intricate dance of co-creation. It should illuminate the myriad ways providers' services become interlaced with the customer's everyday life, thereby facilitating a deeper understanding of the symbiotic relationship between providers and customers in the co-creative process.

Coopetitors and collaboration: coopetitors, entities that uniquely meld competitive drive with a collaborative spirit, significantly enrich the network's resource pool. The service blueprint must delineate this dual role, showing how coopetitors utilize operant (skills, knowledge), and operand (physical goods, technologies) resources to nurture collaboration while managing the competitive tensions inherent to the network. This detailed representation is crucial for a holistic understanding of coopetitors' contributions, spotlighting their distinctive capability to simultaneously compete and collaborate, thus propelling collective innovation and success within the network.

Competitors and innovation: within coopetition networks, the dynamic nature of competitor relationships-marked by the freedom to engage or disengage-underscores the fluidity that drives innovation. The blueprint should portray competitors as autonomous yet interconnected entities within the ecosystem, emphasizing how competitive pressures catalyze continual innovation and improvement. This portrayal reinforces the significance of maintaining an adaptable and responsive blueprint capable of capturing the dynamic interplays that foster a conducive environment for innovation and growth.

3.3. Mapping stages and lanes

In the context of service science, the dynamic interplay between service systems involved in value cocreation underscores the imperative for continuous innovation in value propositions [35]. The challenge lies in innovating and systematically identifying and integrating the resources central to these propositions right from their inception [36]. The goal of improving a value proposition transcends the benefit to the customer or provider alone, aiming instead to enrich the entire ecosystem, with competition catalyzing innovation [37]. Service systems can refine their contributions based on historical insights and future projections, embodying a principle of perpetual enhancement to meet the evolving demands of the market.

Therefore, a service blueprint framework tailored for coopetition networks must adeptly delineate the interaction stages and resource lanes, encapsulating the multifaceted nature of value cocreation. This blueprint should feature: i) cyber frontstage lane-designed to visualize the frontstage interactions that blend human and technological resources, spotlighting the technology-mediated exchanges between cyber customers and providers. It emphasizes the integration of physical and virtual evidence, capturing the essence of digital interactions in the value co-creation process; ii) physical backstage lane-reveals behind-the-scenes resources and activities; this lane unravels the support structures that underpin the co-creation process. It highlights the roles of providers and coopetitors, providing insights into the operational and strategic foundations that enable seamless value delivery; and iii) supportstage lane-captures the expansive network of partnerships, management resources, and coopetition support frameworks. It underscores the external collaborations and resources that bolster the network, facilitating a robust infrastructure for coopetition.

As depicted in a conceptual service blueprint for coopetition networks (Figure 1), these delineated lanes and stages are instrumental in mapping and enhancing value interactions. The blueprint employs dashed lines to represent the shopfloor technology line and the line of internal interactions, symbolizing technological transparency and the seamless flow of information between the shop floor and cyber customers.

Within the support stage lanes, support resources engage in tasks vital to the service process, with their openness and fluid exchange of information demarcated by dashed lines. This representation fosters a clear understanding of the roles and contributions of all network actors, enhancing the governance and strategic decision-making within these collaborative and competitive environments.

At the summit of the comprehensive service blueprint for coopetition, networks lie either cyber or physical evidence or outcomes, which are the fruits of cooperative endeavours between the cyber customer and the digital provider [38]. This section captures the tangible results of collaborative actions, emphasizing the concrete benefits of such partnerships.

By addressing the contemporary demands and intricacies of digital coopetition networks, this enhanced service blueprint offers a strategic framework for organizations to navigate the complexities of digital coopetition. Its comprehensive approach facilitates more profound insights into co-creative interactions and empowers businesses to bolster their collaborative efforts while maintaining competitive edges. Through its application, organizations can ensure the sustainability and success of their coopetition strategies in the digital era, driving innovation and value creation in an increasingly interconnected marketplace.

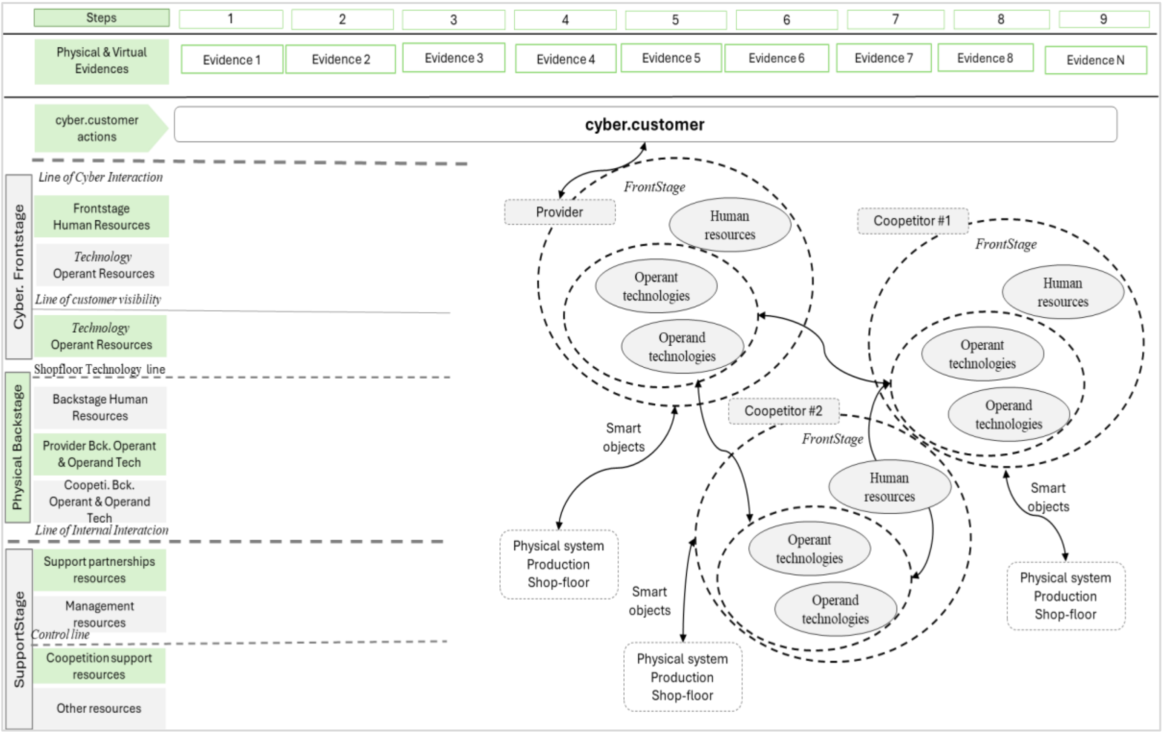

Figure 1. Service blueprint framework for coopetition networks

4. EMPIRICAL VALIDATION OF THE SERVICE BLUEPRINT

To empirically validate the proposed service blueprint, thirty interviews were conducted with managers from diverse Portuguese stone manufacturing companies, a sector crucial to the Portuguese economy [39]. These companies, primarily SMEs, collectively provide over 16,600 direct jobs, significantly contributing to employment in inland regions [40]. Despite ongoing challenges, this sector has seen sustained export growth, positioning Portugal as a leading player in the international ornamental stone market [41].

These interviews aimed to assess the utility of the new service blueprint framework for technology enabled coopetition networks within the stone manufacturing industry. It explored each company's adoption of digital technologies, ranging from digital production machines to collaborative marketplace technologies, to gauge the digital maturity of respondents on a scale from DL#0 (no digital integration) to DL#4 (fully digital operations).

A streamlined questionnaire was distributed to participants, focusing on two principal areas: i) introduction: this section emphasized the construction sector's forthcoming transition towards building information modeling (BIM) technology and its repercussions for materials procurement [42]. The discussion centred on stone companies' need to augment their scale, price flexibility, and delivery timeliness through collaborative efforts with competitors to sustain market competitiveness; ii) presentation of the new service blueprint framework: respondents assessed the framework's ease of use and effectiveness in identifying potential dysfunctions in inter-company relationships within a network, assigning a rating on a scale from 1 to 5. The face-to-face interviews, conducted from October 1st to November 1st, 2023, revealed the framework's growing relevance as firms enhance their digital capabilities, with findings illustrated in Figure 2.

Garnering a favorable average manager rating of 3.6 out of 5, the feedback compellingly affirms the efficacy of the newly developed service blueprint framework. This framework is particularly adept at uncovering and rectifying dysfunctions in the relationships among interconnected companies. Its proven utility and relevance in promoting collaborative dynamics underscore its indispensable role in sectors undergoing digital transformation.

The observed exponential growth highlights the intensified inclination towards digitalization, signaling a marked shift towards more digitally oriented operations. However, the relatively modest magnitude of this exponent (0.1467) may also indicate that companies at a lower digital maturity level-predominantly representing the majority within this sector-may experience slower progress towards digitalization. This suggests a pressing need for public initiatives aimed at catalyzing the digital transformation journey.

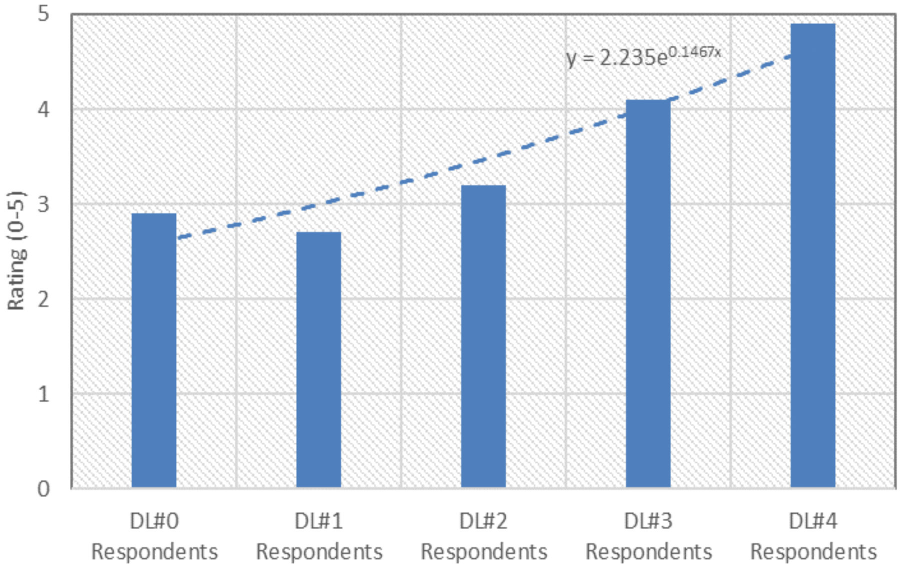

Figure 2. Service blueprint's user-friendliness evaluation in coopetition networks

5. CONCLUSION

Despite the acknowledged versatility of the service blueprint methodology, its application to technology-enabled coopetition networks has been surprisingly limited, marking a gap in the existing business and management literature. The unique dynamics of these networks, characterized by the simultaneous collaboration and competition among actors, necessitate a more sophisticated framework capable of capturing the nuanced interconnectivity and the multifaceted engagements that define these digital ecosystems. Building upon the insights from service science literature, this study proposes an enhanced service blueprint framework that addresses these identified gaps. This knowledge-based service blueprint framework is tailored to the intricacies of coopetition networks, facilitating innovation in value cocreation interactions and offering a robust tool incorporating the cyber. Frontstage lane, physical backstage lane and supportstage lane highlight the value cocreation interactions and resource allocations within technology-enabled coopetition networks. This framework aims to provide a holistic view of the interactions and value co-creation processes, emphasizing the roles of customers, providers, and coopetitors in fostering innovation and enhancing value propositions.

The empirical validation of the service blueprint demonstrates its utility in identifying potential dysfunctions within coopetition networks, with positive feedback from the Portuguese stone sector highlighting its user-friendliness and relevance. The study's findings validate the proposed framework's effectiveness in fostering a deeper understanding of the digital nuances and multi-actor engagements characteristic of today's coopetition environments.

The study sheds light on the need for continuous adaptation of service blueprint methodology and illustrates the potential for such frameworks to facilitate more effective management of service processes. Future research should refine and test the service blueprint framework across different sectors and geographies to validate its universality and applicability. Additionally, exploring the integration of emerging technologies, such as artificial intelligence and blockchain, into the service blueprint could offer deeper insights into optimizing service delivery and value co-creation processes.

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