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Article

Rethinking service blueprint for digital coopetition: A new framework for networked collaboration

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Abstract: This study adapts traditional service blueprint methodologies for technology-driven coopetition networks, where companies simultaneously collaborate and compete. Integrating insights from service science, we developed an enhanced service blueprint framework with three key components: the cyber frontstage Lane for digital interactions, the physical backstage Lane for physical operations, and the support stage lane for supporting processes. Empirical validation in the Portuguese stone sector demonstrated the framework's effectiveness in identifying network dysfunctions and its ease of use for industry professionals. Feedback highlights its relevance in capturing the complexities of modern digital coopetition and managing interactions and resources. This research underscores the necessity of updating service blueprint methods to optimize service delivery and value co-creation in digitally evolving sectors.

Keywords: service blueprint; coopetition networks; digital transformation; service science; value co-creation

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 (Geissbauer et al., 2018). It is because scaling enables businesses to meet international customers' diverse and growing demands, facilitating market entry and enhancing global presence and profitability (Medberg and Grönroos, 2020). 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 (Silva et al., 2020).

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 (Di Bella et al., 2023). However, their limited scale can hinder their ability to leverage scaling benefits (Razy et al., 2019). The strategic integration of SMEs into coopetition networks, which combine cooperation and competition (Rouyre et al., 2024), has been identified as a solution (European Commission and Directorate General for Communication, 2020). These networks enhance SMEs' scale and competitive edge, especially within the intricate global digital supply chains (Bouncken et al., 2024).

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 (Tsujimoto et al., 2018; Xie et al., 2023). Insights from the Reeves et al. (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% (Reeves et al., 2019). In contrast, smaller firms may become overly dependent on these dominant players, exacerbating their collaboration challenges (Corbo et al., 2023; Razavi et al., 2010). 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 (Reeves et al., 2019).

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. A report from the Economist Intelligence Unit (2021) further highlights this issue, identifying a pronounced lack of cooperation among European SMEs, thus impeding their digital progress.

In the digital age, businesses are increasingly embedded in complex, digitally interconnected environments, emphasizing the need for methodologies that capture and optimize intricate service processes. The service blueprint, a strategic tool developed to visually depict service processes (Ryu et al., 2020), 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 (Pöppel et al., 2018). However, the advent of coopetition networks, propelled by advancements in the Internet of Things (IoT) (Bacon et al., 2020), 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 (Corbo et al., 2023), 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 step of service delivery. These deficiencies hinder the identification of critical process failures, which are central to understanding the reasons behind the premature demise of coopetition networks (Estrada and Dong, 2020). This leads to an urgent question: Which service blueprinting framework is suitable for efficiently mapping and enhancing service processes within technology-enabled coopetition networks?

Confronting the intricacies of digital coopetition networks requires a novel approach, and service science (Demirkan and Spohrer, 2015), rooted in Service-Dominant (S-D) Logic, emerges as a promising solution (Vargo et al., 2024). This transdisciplinary field, focusing on service systems as its primary object of study, champions the cocreation of value across service ecosystems (Hartmann et al., 2018). It advocates for a multidisciplinary method to integrate cutting-edge technologies into service systems seamlessly. Such an approach is central for enhancing scale and competitiveness and facilitating the transition toward more digitally-focused and globalized service and manufacturing networks (Maglio and Spohrer, 2013; Silva et al., 2020).

This research aims to leverage the principles of service science to fill the gaps currently observed in the service blueprint method, 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 precisely mapping 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 (actors), 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 S-D 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 navigate modern coopetition networks' digital complexities and multi-actor engagements, 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 advanced by Stephen L. Vargo and Robert F. Lusch in 2004 with the introduction of S-D Logic (Vargo and Lusch, 2004). 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 (Michel et al., 2008). This perspective challenges traditional goods-centric paradigms, positioning products merely as vessels for service delivery and underscoring the importance of derived benefits and utilities (Vargo and Akaka, 2012).

S-D 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 (Siltaloppi and Vargo, 2017). This framework posits that value is collaboratively crafted, leveraging the resources available to actors within these exchanges (Vargo and Lusch, 2017).

S-D Logic provides essential insights into coopetition networks—where competition and collaboration co-occur among actors (Bicen et al., 2021). These networks represent a complex layer of interactions vital for service ecosystems' dynamism (Gnyawali and Ryan Charleton, 2018). Coopetition networks are seen as intricate relationships enriched by digital technologies and governed by institutional mechanisms that foster mutual value creation despite competitive tensions (Barile et al., 2016; Lusch and Nambisan, 2015).

Service science, inspired by S-D Logic, emphasizes innovation and value co-creation within service systems (Breidbach and Maglio, 2016). It calls for a multidisciplinary approach, integrating technology to enhance competitiveness across service and manufacturing sectors (Spohrer and Pakkala, 2019). 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 (Maglio et al., 2009; Silva et al., 2020).

3. Methodology

Adopting a service science perspective requires the service blueprint to evolve, capturing real-time value co-creation processes within service systems' resources (Akaka et al., 2023). This service science view is adopted 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 (Bicen et al., 2021).

Initially introduced by Shostack (1982) and further developed by Kingman-Brundage (1989), the service blueprint has been a fundamental tool for visualizing and innovating service processes (Shostack, 1982). It effectively separates customer and provider domains, using conceptual lines and stages to detail the sequence of service actions (Kingman-Brundage, 1989). This method captures both tangible and intangible aspects of service delivery. It facilitates a deep understanding of the interactions between service providers and recipients, crucial for identifying and improving key elements of service delivery (Pöppel et al., 2018).

In today's digital coopetition networks, advanced technologies such as the Internet of Things (IoT), among others, play essential roles in enhancing connectivity and interactions among network participants (Chandler et al., 2019). 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 (Bagheri et al., 2019). 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 (Bicen et al., 2021).

To meet these challenges effectively, the coopetition service blueprint must be intricately layered, showcasing digital connections and interactions across the entire network at every stage. It should explicitly map out direct connections between factories shop floors and customers, ensure the alignment of interests among various stakeholders, and vividly delineate the sharing of resources throughout each phase of service delivery. This refined blueprint will leverage digital tools to offer a dynamic, real-time perspective of the service ecosystem. This approach illuminates areas of potential discord or misalignment and 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 S-D Logic, service science, and digital technology operant capabilities offers a framework for understanding and navigating the complexities of modern service delivery within technology-enabled coopetition networks. This methodological evolution promises to enrich our comprehension of service processes and foster more resilient, adaptive, and collaborative service ecosystems.

4. Evolving the service blueprint: Addressing the complexities of digital coopetition networks

The service blueprint, as conceptualized by Kingman-Brundage, has historically been an important tool in delineating customer and supplier activities through the customer interaction line. This line has been instrumental in visualizing direct interactions between customers and suppliers, covering a spectrum of communication methods from in-person engagements to digital correspondences such as emails and telephone conversations (Ryu et al., 2020). Its primary function has been to provide a clear and structured visualization of these interactions, thereby enhancing the understanding of service processes and facilitating the identification of potential areas for improvement. The advent of digital technologies and the rise of technology-driven coopetition networks have significantly expanded the scope and nature of these interactions (Bouncken et al., 2024). The traditional service blueprint, well-suited to static, linear interactions, now faces challenges in capturing the dynamic and multifaceted exchanges that characterize modern digital ecosystems (Matthies et al., 2016).

4.1. Inter-connectivity visualization

In digital coopetition networks, interactions are no longer confined to straightforward customer-supplier exchanges (Xie et al., 2023). Instead, they involve a complex web of engagements among multiple stakeholders, including competitors, who cooperate to create and deliver value. These networks leverage advanced digital platforms, Internet of Things (IoT) technologies, and real-time data exchanges, further complicating the service delivery landscape (Akaka et al., 2023), as illustrated in **Figure 1**.

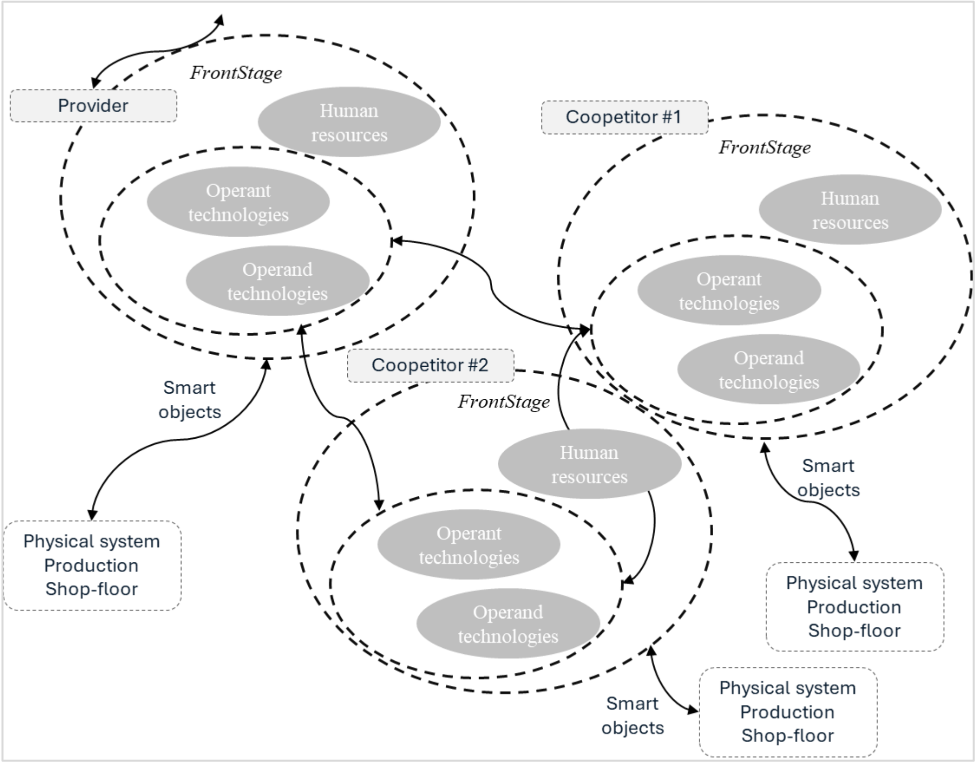

Figure 1. Digital coopetition networks.

Therefore, the evolution of service blueprints must account for these new realities. The traditional Customer Interaction Line needs to be re-envisioned to include digital touchpoints and critical cyber interactions in today's service environments (Mosch et al., 2023). This re-envisioning involves recognizing that service interactions now span physical and virtual realms, requiring a more sophisticated framework to capture both the tangible and intangible elements of service processes. Moreover, the role of technology in these interactions has shifted. While technology was once primarily an operand resource—tools used by human operant to deliver services—it is increasingly becoming an operant resource in its own right (Kleinaltenkamp et al., 2023). Advanced technologies such as artificial intelligence and machine learning systems can now perform tasks autonomously, interacting directly with customers and other stakeholders without human intervention (Silva et al., 2024). This shift necessitates a service blueprint that accurately represents these autonomous interactions and their implications for service delivery and value co-creation (Vargo et al., 2024). In this regard, while the foundational principles of the service blueprint articulated by Kingman-Brundage remain relevant, there is a critical need for its evolution. To effectively serve the modern service ecosystem, the service blueprint must incorporate the complexities introduced by digital technologies and coopetition networks. It must provide a comprehensive framework that maps direct interactions and captures the broader, more intricate web of relationships and value exchanges that define contemporary service environments.

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 this method to more accurately reflect the complex and immediate connections 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 interconnectivity 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 digital coopetition networks, fostering a deeper comprehension of how value is co-created in these innovative service ecosystems.

4.2. Actors in technology-enabled coopetition networks

At the heart of service science and S-D 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 (Vargo et al., 2023).

Under the S-D 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 (Jaakkola et al., 2024). 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.

Central to the ethos of S-D 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, 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. 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.

4.3. Mapping stages and lanes

For service science, the dynamic interplay between service systems involved in value cocreation underscores the imperative for continuous innovation in value propositions (Kleinaltenkamp et al., 2023). The challenge lies in systematically identifying and integrating the resources central to these propositions' inception (Breznik and Lahovnik, 2014). 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 (Hüttinger et al., 2012). 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 (Silva and Gil, 2020).

To effectively support coopetition networks, a tailored service blueprint framework must delineate the interaction stages and resource lanes, encapsulating the multifaceted nature of value co-creation. This advanced blueprint is designed to feature several critical components, each serving a distinct purpose in the visualization and management of these complex networks (**Figure 2**).

Figure 2. Service blueprint framework for coopetition networks.

The cyber frontstage lane is designed to visualize frontstage interactions that blend human and technological resources, spotlighting the technology-mediated exchanges between cyber customers and providers. It emphasizes integrating physical and virtual evidence, capturing the essence of digital interactions in the value co-creation process by mapping these digital touchpoints. The cyber frontstage lane highlights how technological interfaces facilitate seamless communication and interaction, ultimately enhancing the service experience.

The physical backstage lane includes the behind-the-scenes resources and activities essential to the co-creation process. It unravels the support structures that underpin value delivery, highlighting the roles of providers and coopetitors. By providing insights into the operational and strategic foundations that enable seamless value delivery, the physical. Backstage lane showcases the essential background operations that support the visible frontstage activities. This comprehensive view ensures that all aspects of service provision, from production to logistics, are effectively managed and integrated. The support stage 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. By detailing the contributions of various external stakeholders, the support stage lane illustrates how external partnerships and resource integrations contribute to the network's overall stability and effectiveness. This lane is crucial for understanding how external factors and collaborations influence coopetition networks' internal dynamics and success.

Together, these components form a holistic framework that maps out the intricate interactions and resource allocations within technology-enabled coopetition networks and provides a robust tool for enhancing value co-creation. This comprehensive approach ensures that all facets of the network are accounted for, facilitating a deeper understanding of the complex, multi-actor engagements that drive innovation and success in the digital age.

The number of steps where physical & virtual evidence occur depends on the specific case, represented here as "*N*". Traditionally, technology was an operand resource. In contrast, human resources were the sole source of operant resources. However, in the digital era, some technologies can act independently, becoming operant resources. Therefore, it is necessary to distinguish between skill resources (human) and operant technology resources on the front stage. Within the support stage lane, 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 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 (Kocsi and Oláh, 2017). 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.

5. Empirical validation of the service blueprint framework for digital coopetition networks

To empirically validate the proposed service blueprint, a hundred and thirty interviews were conducted with managers from diverse Portuguese stone manufacturing companies, a sector crucial to the Portuguese economy (Silva et al., 2024). These companies, primarily SMEs, collectively provide over 16,600 direct jobs, significantly contributing to employment in inland regions. Despite ongoing challenges, this sector has seen sustained export growth, positioning Portugal as a leading player in the international ornamental stone market (Silva and Marques, 2023).

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

A streamlined questionnaire was distributed to participants: (1) Questionnaire introduction: Emphasizing the construction sector's forthcoming transition towards Building Information Modeling (BIM) technology and its repercussions for materials procurement. 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. (2) 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. They assigned a rating on a scale from 1 to 5.

The sample selection process targeted managers from Portuguese stone manufacturing SMEs. Selection criteria included companies' active involvement in the industry and varying levels of digital integration. Participants were selected to represent a diverse range of digital maturities, from no digital integration (DL#0), one computerized machine (DL#1), three computerized machines in operation for two years back (DL#2), production machines integrated with ERP (DL#3) and fully digital operations (DL#4). All respondents held managerial positions with significant experience in the stone manufacturing industry, averaging 15 years of professional experience. Most had at least a bachelor's degree, with some holding advanced degrees in engineering, business management, or related fields.

Several steps were undertaken to ensure the questionnaire's reliability and validity: The questionnaire was pilot tested with a small group of industry experts to refine the questions and ensure clarity. Reliability was measured using Cronbach's Alpha, which yielded a value of 0.83, indicating high internal consistency. Expert reviews ensured content validity, whereas industry professionals evaluated the questionnaire for relevance and comprehensiveness. Construct validity was assessed by correlating the questionnaire items with established measures of digital maturity and collaborative effectiveness.

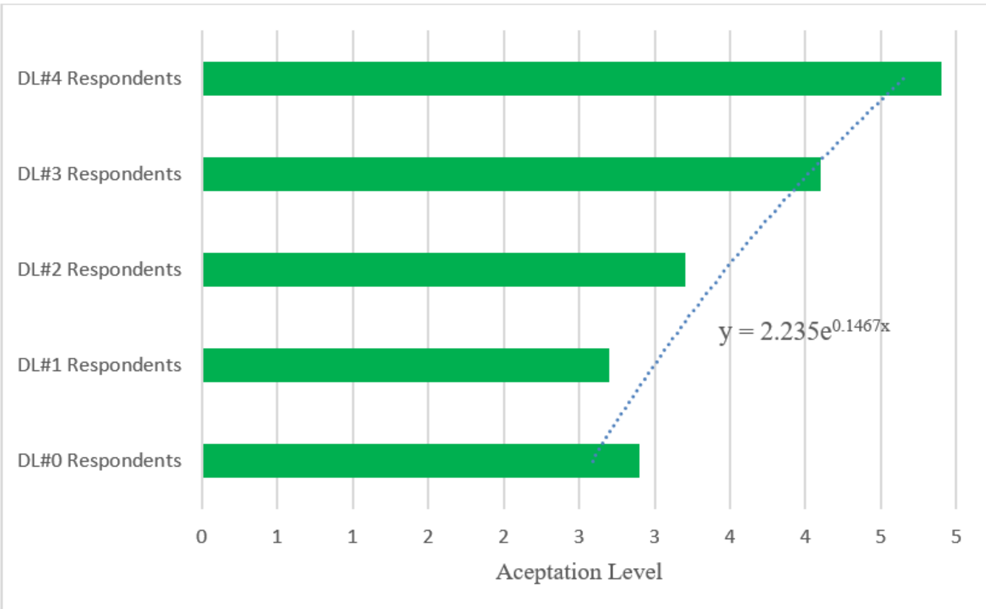

Figure 3. Service blueprint's evaluation for coopetition networks.

The face-to-face interviews, conducted from 1 October to 1 November 2023, revealed the framework's growing relevance as firms enhance their digital capabilities. The findings are illustrated in **Figure 3**.

Dependent variable (y): Rating the frameworks' effectiveness (scale 1–5). Independent variable (x): Levels of framework implementation. Intercept (2.235): Initial effectiveness rating. Growth rate (0.1467): Indicates a 14.67% increase in effectiveness with each unit increase in x.

The regression model relates to the effectiveness of the new service blueprint framework in coopetition networks within the construction sector, particularly concerning BIM adoption. The exponential increase suggests a significant improvement in effectiveness as the framework is more thoroughly implemented. With an average rating of 3.6/5 from managers, the feedback validates the new service blueprint framework's effectiveness in identifying and addressing dysfunctions in the relations among networked companies, demonstrating its applicability and value in facilitating cooperative dynamics in digitally evolving sectors.

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.

6. Conclusions and future directions

Despite the acknowledged versatility of the service blueprint method, 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.

This study presents an innovative service blueprint framework tailored for digital coopetition networks, specifically within the context of the Portuguese ornamental stone SMEs. By integrating service science and S-D Logic principles, this framework addresses the unique challenges posed by digitally interconnected and collaborative environments. The empirical validation conducted through structured interviews with industry managers indicates that the proposed framework effectively enhances the visualization of value co-creation processes, identifies potential dysfunctions in inter-company relationships, and supports the integration of digital technologies.

The critical distinctions between the proposed service blueprint framework and traditional models lie in its ability to capture digital coopetition networks' complex and dynamic interactions. Traditional service blueprints primarily focus on linear, often static interactions between customers and service providers. In contrast, the proposed framework incorporates the multifaceted roles of coopetitors, the fluid nature of digital interactions, and the seamless integration of human and operant technological resources. This holistic approach ensures a more accurate and comprehensive representation of value co-creation in modern digital ecosystems, highlighting its relevance and applicability in digitally evolving sectors.

Despite its contributions, this study has several limitations that should be acknowledged. The empirical validation was conducted with a relatively small sample size of thirty managers from Portuguese stone manufacturing SMEs. While this provides valuable insights, a more extensive and diverse sample could offer a more comprehensive validation. The study is focused on the Portuguese ornamental stone sector, which may limit the generalizability of the findings to other industries and regions. Future research should explore the applicability of the proposed framework across different sectors and geographical contexts. The assessment of digital maturity levels was based on a self-reported scale, which might introduce biases.

Building on the findings and limitations of this study, several avenues for future research are recommended. Future studies should involve a more extensive and diverse sample of companies across various industries and regions. This would enhance the robustness and generalizability of the findings. Conducting longitudinal studies to track the long-term impacts of the service blueprint framework on coopetition networks would provide deeper insights into its sustainability and effectiveness over time. Integrating objective measures and metrics to assess digital maturity levels could offer a more accurate and unbiased evaluation of the framework's applicability and success. Further comparative analysis between the proposed framework and traditional service blueprint models across different contexts would help clearly delineate the new framework's innovations and advantages. By addressing these future directions, research can continue to refine and expand the proposed service blueprint framework, ensuring its relevance and effectiveness in the rapidly evolving landscape of digital coopetition networks.

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