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Orchestrating resources and capabilities for platform-based servitization: recommendations for SMEs to overcome tensions

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ABSTRACT

This paper explores how small and medium-sized enterprises (SMEs) can orchestrate internal and external resources and capabilities to achieve platform-based servitization, offering practical recommendations to navigate the tensions and challenges associated with this transformation. The study employs a case study methodology based on 16 in-depth interviews with internal personnel and external actors involved in the digital servitization journey of a SME in the food and beverage sector. The interviews reveal key resources, capabilities, tensions, and solutions associated with the servitization process. The findings reveal that successful digital servitization in SMEs requires a strategic orchestration of internal resources like physical assets and human capital with external contributions from ecosystem actors. Tensions include aligning organizational structures with digital goals, managing financial risks and addressing customer-related challenges. Solutions involve a phased transformation approach, top management commitment, critical assessment of internal resources, leveraging the ecosystem and orchestrating multi-actor collaborations. This paper contributes to the literature on digital servitization by focusing on the under-researched area of SMEs, offering empirical insights and practical recommendations. It highlights the importance of resources and capabilities and ecosystem integration in enabling SMEs to transition to service-oriented business models, providing a valuable roadmap for organizations embarking on a digital servitization journey.

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1. Introduction

Servitization, first coined by [1], has gained increasing relevance, particularly in the context of Industry 4.0. Digital servitization expands the possibilities of traditional servitization by integrating digital technologies, with research highlighting benefits at the business model level [2], [3], [4]. Critical to this process are the orchestration of resources, capabilities, and ecosys-tem collaboration [5], [6] define digital servitization as the development or enhancement of services through digital technologies. This integration, often enabled by digital platforms, transforms value creation in Industry 4.0 environments [7], [8], [9].

Recent literature has deepened our understanding of the barriers and pathways associated with digital servitization in SMEs. Contributions published and related conferences identify a variety of transformation types—from cautious experimenters to strategic

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pioneers—each facing distinct constraints related to technology, organization and customer integration [10], [11]. These studies also highlight how firms struggle to align product-based business logic with digitally enabled service models. Evidence further shows that the performance impact of servitization depends not only on the breadth of the service portfolio but also on the charging model applied, with firm size and product complexity acting as critical moderators [12]. By incorporating these perspectives, this study strengthens its relevance and positioning within current scholarly discussions on SME transformation.

Recent contributions have further expanded the understanding of digital servitization in SMEs. Studies show how SME networks require the orchestration of resources and capabili-ties through co-creation processes and information-system platforms, highlighting the role of inter-organisational collaboration in overcoming resource constraints [13]. Other contributions emphasize business model innovation through customer co-design activities, linking co-creation practices to the development of viable product-service offerings [14]. Together, these studies provide a robust foundation to situate our analysis of platform-based servitization in SMEs.

Despite growing research, most studies focus on large, tech-intensive firms, leaving SMEs underexplored. As digital servitization evolves, more insights are needed into the required resources, organizational change, and transformation processes. While technical aspects are well addressed, organizational and ecosystem-related challenges remain insufficiently studied, especially for SMEs that face similar pressures with fewer resources.

This paper addresses these gaps through a qualitative case study of a traditional manufacturing SME transitioning to a digital service provider. Based on 16 interviews, it explores the resources and capabilities required, the tensions that arise, and how SMEs can orchestrate ecosystem-based solutions. The study investigates: i) *What resources and capabilities (fully or partially) unavailable to the company but available in the ecosystem should be orchestrated for digital servitization?*, and ii) *What are the (internal and ecosystem-related) tensions and what solutions are implemented to successfully manage the servitization journey?* Consequently, this paper focuses on orchestrating the managerial logic underpinning the alignment of internal and ecosystem-based resources and capabilities to manage tensions in digital servitization. The paper contributes by offering actionable insights for SMEs navigating digital servitization, highlighting both the opportunities and challenges within resource-constrained environments.

The paper is structured as follows. Section 1 consists in the introduction formulating the importance, gap and objective of the paper. Section 2 reviews key concepts (platforms, value capture, business model innovation, and resources and capabilities as well as tensions in digital servitization). Section 3 outlines the methodology, followed by results (Section 4), and discussion and conclusions (Section 5).

2. Literature Review on Digital servitization

This review outlines the theoretical foundations of digital servitization in SMEs, focusing on three pillars: platforms and value capture, business model innovation, and the resource and capabilities perspective.

Recent studies have described how firms undergo digital servitization progressively, evolving from product-centric models to digitally enabled ecosystems. These works often highlight transformation paths composed of distinct phases, each requiring new combinations of resources and organizational changes. Understanding these trajectories helps frame the role of capability development, platform engagement and external collaboration as critical mechanisms within the servitization journey [6], [15].

2.1 Platforms and value capture

Digital platforms enable smarter service innovation by connecting ecosystem actors and leveraging data [8]. Modular architectures and IT-enabled interactions support manufacturing firms in transitioning toward advanced services [16], helping resolve the service paradox.

Digital technologies transform value capture by reshaping consumer behavior, processes, and business models [17]. However, digital servitization presents two challenges: cannibalization of traditional products and low marginal costs, which may reduce perceived value [18], [19], [20]. Connectivity allows firms to provide real-time, smart services, creating new value in extended ecosystems [21], [22], [23].

Collaboration within service ecosystems is essential for competitiveness, with platforms enabling flexible and scalable integration of external capabilities [15].

2.2 Business model innovation: a consequence of digital servitization

Digital servitization generates vast data, which feeds business intelligence tools to design or improve

service offerings [24]. For manufacturing firms, this shift demands a rethinking of their business model [3]. While large firms may explore new models in parallel units, SMEs often must transform existing ones with limited resources, making progress difficult without aligned incentives [25].

Digital servitization thus becomes a strategic path to escape the "commodity trap" and create differentiated, long-term value [26], [27].

2.3 Resources and capabilities perspective

This perspective is particularly relevant for SMEs undergoing digital transformation, as it enables understanding of how limited internal resources can be complemented through external partnerships.

The resource-based view highlights the importance of tangible and intangible assets, including human capital, intellectual property, and organizational routines [28], [29]. Capabilities—such as data usage, connectivity, and internal coordination—enable transformation and competitive advantage [30].

Digital servitization requires dynamic capabilities to continuously reconfigure resources [31]. SMEs, often lacking in-house capabilities, rely on ecosystem partnerships and public support [32]. Literature categorizes essential resources (e.g., physical assets, finance, products) and capabilities (digitalization, relational, organizational) relevant for this transformation [4], [33].

2.4 Tensions in digital servitization

Digital servitization processes often give rise to tensions that manifest across different domains, at different stages or in the transition process. For the purpose of the present research, we use the definition of tensions by [34] referred to as *coexisting, contradictory, interrelated differences, within and between organizations, that reflect conflicting, non-combinable viewpoints or intentions.* Multiple classifications exist, with main distinctions between intra- and inter-organizational tensions [35], [36]. Framed through paradox theory, [34] systematically capture strategic (e.g., performance priorities, platform coopetition), operational (e.g., digital upkeep, data utilization), and relational (e.g., professional identity, organizational identity, belonging) tensions within a digital servitization framework. Addressing such tensions becomes essential to enable effective orchestration and long-term transformation efforts [23], [37], and relevant to this is the work of [34], [38], [39] who go beyond the identification of tensions linking them with solutions, responses and action-based operations aimed to solve them.

Taken together, the concepts representing foundational pillars for the present research as well as their relationships, are visually showed in Figure 1.

Tensions emerge precisely at the intersection of internal and external interactions, affecting mainly platform implementation, the business model, and the actor network. Detecting the tensions and proposing solutions for their resolution is essential to design and implement effective servitization strategies.

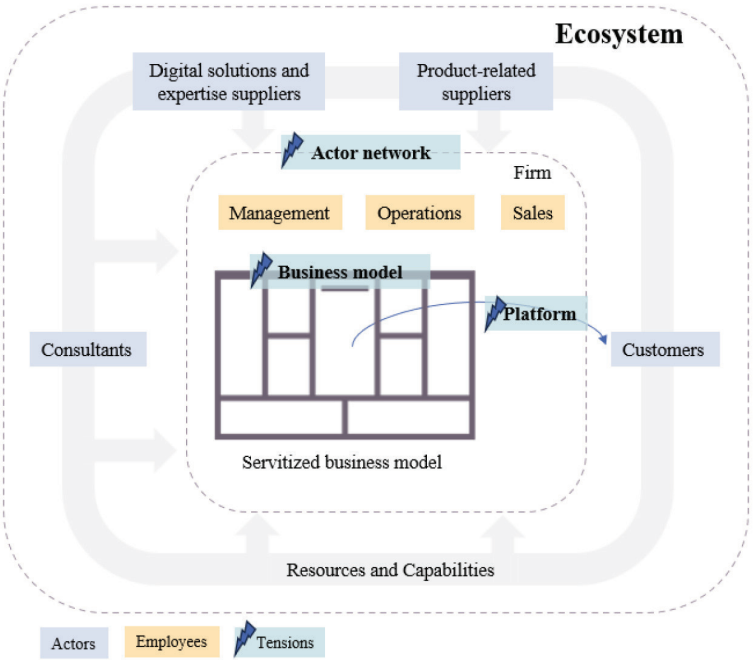

Figure 1. Conceptual framework. Source: own elaboration based on [37]

3. Methodology

3.1 Motivation for the research method

A qualitative case study was chosen to address the exploratory nature of the research questions and to gain in-depth insight into servitization processes within an SME context [41]. This method enables a rich description of events and actor perceptions, aligning with the hallmarks identified by [42]. The methodological process followed is illustrated in Figure 2.

3.2 Selection of the organization and respondents

To complement existing servitization studies—which typically focus on high-tech sectors—we selected a company in a different industry: CoffeeCo, an SME in the food and beverage sector (NACE 10 – tea and coffee processing) located in Girona, Spain. Operating since 1964 with 30 employees, CoffeeCo had an operating revenue of 5.7 M € in 2021, 7.6 M € in 2022 and 8.2 M € in 2023. Its long-term success and transformation towards digital servitization made it a compelling case.

The selection of a single-case design was based on the study's exploratory nature and the need to capture longitudinal dynamics of organizational transformation within a specific SME context. This approach aligns with established methodological guidance for in-depth investigation of contemporary, real-life phenomena in their natural setting. The selected case, CoffeeCo, meets multiple criteria for theoretical sampling: (i) it represents a traditional, non-high-tech SME operating in a resource-constrained environment; (ii) it has undergone a documented transformation towards digital servitization over several distinct stages; and (iii) it involves multiple ecosystem actors—upstream and downstream—allowing analysis of both internal and external orchestration mechanisms. The designation of the case as "successful" is based on observable indicators such as the launch and expansion of connected product-service offerings, integration of IoT-enabled technologies in core business operations, and the firm's sustained market presence and financial stability across the transformation period. These features render CoffeeCo an informative and illustrative case for the study of orchestrated servitization in SMEs.

Sixteen interviews were conducted: eight with internal managers (CEO, operations, IT, sales, marketing) and eight with external actors (clients, consultants, solution providers). Participants were selected via purposive sampling based on: (i) organizational role, (ii) involvement in the transformation, and (iii) representation of both internal and external perspectives. The CEO—second-generation owner and technology advocate—was instrumental in the selection and provided key insights into the company's digital project, "Decoding Coffee."

3.3 Operationalization and interview guideline

The interviews followed a semi-structured guide (see Appendix A) organized into three thematic blocks: (i) respondent's involvement in the transformation, (ii) identification of relevant actors, and (iii) assessment of available resources and capabilities. Especially relevant for the present study are resources and capabilities, on the one hand, and tensions and solutions, on the other hand. Respondents were given total freedom to express in their own words the response provided, as far as the interviewing team did not want to condition the response and one of the

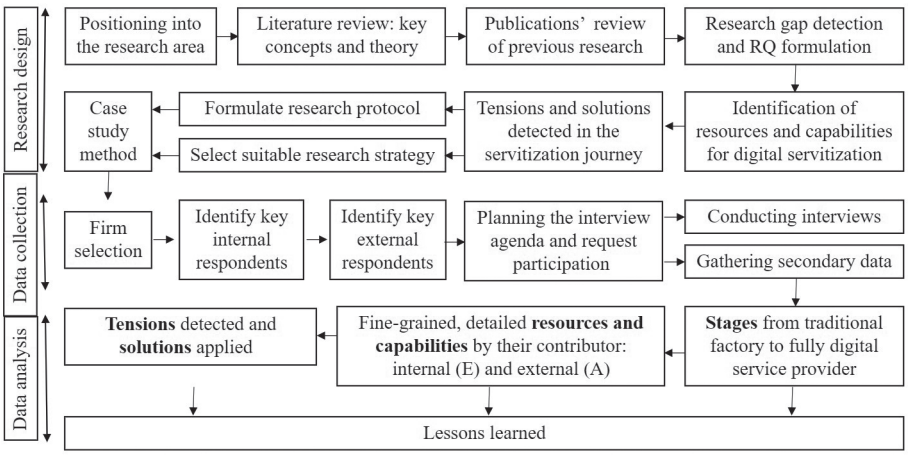

Figure 2. Methodological process. Source: own elaboration

goals was the obtention of a wide range of authentic responses. In all cases, definitions were provided and some examples, if requested. The advantage of proceeding this way rather than providing a closed list, is mainly the obtention of a myriad of responses (that can be categorized in a posterior moment) illustrative for both the *types* of resources, capabilities, tensions and solutions, but also the *quantity* and *order* in which respondent mention them, relevant to capture the importance of each element studied.

Interviews were held virtually, lasted between 60–120 minutes (avg. 67 minutes), and were recorded with participant consent. Anonymity and confidentiality were ensured to promote openness and reliability of responses. Table 1 contains an overview of the participants.

3.4 Coding techniques and data analysis

Transcripts were coded independently by two authors based on themes identified in the literature. Discrepancies were resolved through discussion with a third author. Codes were tabulated in spreadsheets and structured into categories:

- Resources: physical/technical assets, human capital, external assets, finance, intellectual capital, product/service offerings [29].
- Capabilities: digitalization (e.g., data processing, reporting), relational (e.g., internal coordination), and organizational (e.g., ambidexterity, ecosystem orchestration) [4], [33].

The analysis involved both within-case and cross-case content analysis. Within-case analysis focused on the longitudinal development of CoffeeCo across the servitization journey, enabling the identification of temporal patterns and internal transformations. In parallel, cross-case content analysis was applied across the 16 interviews, allowing comparison between internal and external actors, as well as across functions and roles. This dual-layered approach facilitated triangulation and ensured that the coding captured both intra-organizational dynamics and ecosystem-level interactions. First-order concepts were

Table 1. Study participants

Internal Interviewees					
Profile of employee	**Actor type**	**Core business**	**Professional position**	**Years in business**	**Years in position**
E1	General Management	Coffee roasting	Chief Executive Officer	40	27
E2	Sales Management	Coffee roasting	Commercial Director	7	7
E3	Product Management	Coffee roasting	Product Manager	5	5
E4	Data Science	Coffee roasting	Data Science Researcher	2	2
E5	Marketing - Customer Training	Coffee roasting	Point of Sales Technician	18	2
E6	Marketing Management	Coffee roasting	Marketing Director	5	5
E7	Technical Support	Coffee roasting	Technical Support Technician	15	15
E8	Finance Management	Coffee roasting	Chief Operating and Financial Office	32	32

External Interviewees						
Profile of actor	**Actor type**	**Company profile**	**Core business**	**Professional position**	**Years in business**	**Years in position**
A1	Technology	Small	Connected product engineering	Chief Executive Officer	2	2
A2	Consultancy	Small	Food and beverage business consultancy	Chief Executive Officer	8	8
A3	Consultancy	Medium	Consultancy in circular economy and decarbonisation	Chief Executive Officer	12	12
A4	Technology	Small	IoT	Chief Executive Officer	7	7
A5	Management	Medium	Design, production and distribution of professional espresso machines	Director of Iberia	3	3
A6	Consultancy	Small	Innovation and strategy consultancy	Chief Executive Officer	14	14
A7	Business Intelligence	Large	Business intelligence consultancy	Project Manager	7	5
A8	Technology	Large	Big data & data science consultancy	Project Director	4	4

grouped into second-order themes and aggregate dimensions following the Gioia methodology [43]. An abductive reasoning approach [44] combined with axial coding [45] helped refine theoretical categories based on empirical insights.

4. Results

4.1 The servitization journey

The servitization literature frequently refers to the process of servitization as a journey, most often inspired by the concept's definition itself, a gradual transformation of a manufacturer from product-centric offerings to product-related services, with recent evolution into digital services and platformization. Inherent to this transformation, different stages take place [5], and the process is not free from conflicts equivalent to tensions at the different component levels, or in some stage of transition.

This section outlines a comprehensive analysis of CoffeeCo's evolution through the stages of servitization, focusing on the orchestrated changes in internal capabilities and resource management that have facilitated this transformation. The journey is a narrative of progression from a traditional product-centric entity to a digitally-augmented service provider.

The stages of CoffeeCo's servitization journey reflect similar transitions found in other SMEs undergoing digital transformation. For example, the shift from product-centric to hybrid models aligns with findings from [46], who argue that SMEs must rely on ecosystem partners to overcome internal capability gaps. Unlike larger firms that may possess sufficient internal resources, CoffeeCo illustrates how SMEs must adopt a phased, gradual approach, leveraging external capabilities at each stage (Table 2).

The first stage was characterized by minimal digital influence, with manual processes and direct human interactions defining the company's business operations. This early stage focus on product quality is consistent with the findings of [47], who highlight that manufacturing firms often begin servitization efforts by enhancing product excellence before integrating services. CoffeeCo's realization of the need to integrate more services mirrors the typical journey of SMEs aiming to differentiate themselves in competitive markets. In second stage, we observe an embryonic integration of digital assets, initiating the use of data platforms and beginning to engage with the digital economy. [48] also highlight the critical role of adapting organizational structures and strategies in response to market demands, a principle mirrored in CoffeeCo's evolving approach towards integrating digital and service-oriented capabilities. The integration of data platforms and the early steps toward digital engagement align with [49], who emphasize that firms must start small when adopting digital tools in servitization. CoffeeCo's initial exploration of digital capabilities reflects the cautious and incremental approach advocated in the literature, particularly for resource-constrained SMEs. The importance of effectively utilizing existing data was critical in this stage, reflecting findings from [50] showing that they can significantly enhance operational efficiency and innovation when leveraged. This early exploration of data management served as the foundation for CoffeeCo's eventual digital integration. Next stage came when digital capabilities started to play a crucial role in shaping customer experiences and service delivery. The development of these capabilities aligns with the framework proposed by [51], which highlights how, in their shift to service-oriented models, manufacturing firms must adapt by building new competencies and effectively leveraging existing resources. This stage reflects the adoption of value co-creation principles with CoffeeCo beginning to actively involve customer network actors in the creation of value [52]. Moreover, this stage of the journey corresponds with what [53] named as Tensions of Digital Transformation wherein industrial firms must manage the complexities of integrating new technologies while balancing the clash between traditional operations and the demands of digital innovation. CoffeeCo mitigated this tension by incrementally introducing digital tools that supported its service-oriented goals while maintaining its traditional operations. The company began harnessing data to drive insights, moving towards a connected ecosystem of services that extended beyond the traditional confines of a coffee vendor. Additionally, this stage of the journey corresponds with the concept of [54], where value is created by involving multiple stakeholders in a platform-based environment. CoffeeCo's partnership with technology providers exemplifies this, allowing it to enhance customer experiences through digital services. This stage of CoffeeCo's journey exemplifies the principles of value co-creation, as described by [52]. The last stage represents the zenith of CoffeeCo's digital servitization journey. The company now exhibits a mature, data-driven business model, seamlessly integrating advanced digital services. This transformation resonates with the findings of [55], who highlight the critical role of digital competencies and agile capabilities in the successful development of digital business models for industrial companies. By cultivating inter-

Table 2. The servitization journey of CoffeeCo

	1st Stage	2nd Stage	3rd Stage	4th Stage
Brief description	Traditional coffee manufacturing factory with physical coffee products	Integration of basic digital tools like online ordering systems and inventory management software	Advanced digital analytics, supply chain optimization, and automated processes, with connected devices and IoT sensors	Fully digital coffee service provider offering subscription models, smart coffee machines, and personalized data-driven services for business customers
Technology-driven services	- Manual production and packaging systems - Basic ERP (Enterprise Resource Planning) for inventory tracking - Traditional sales channels (e.g., retail, wholesale)	- E-commerce platforms for online ordering - Basic inventory management software - CRM (Customer Relationship Management) for customer interactions - Digital payment systems	- IoT sensors for tracking machinery and production lines - AI-driven analytics for demand forecasting and supply chain optimization - Warehouse automation (e.g., robotic systems) - Cloud-based solutions for data storage and management - Customer training on digital platforms	- Digital Twin for real-time machine monitoring and predictive maintenance - Smart coffee machines with IoT connectivity - Subscription-based models via app interfaces - Big Data-driven personalized services (e.g., consumption insights) - AI-driven customer experience platform - Mobile apps for customer ordering and service management - Corrective, preventive and predictive maintenance based on data generated by smart machines
Platform strategy	Absence of digital initiatives	Transition period with growing awareness about the potential of digitalization	Embracing digital readiness, exploring digital expansion	Execution of digital initiatives, exploiting servitization dynamics
Business Model Adaptation	Pure product focus: selling roasted coffee beans and related products	Emergence of dual business models integrating products and services. Early digital awareness	Shifting focus towards services. Exploring digital possibilities Planning expansion	Transition to data-driven business model. Exploiting servitization dynamics for a more comprehensive customer experience
Actor Network	A closed, internal production-focused network composed mainly of traditional departments such as operations (E4), sales (E7), production (E3), and technical service (E8). Customer relationships were transactional and handled via conventional retail and wholesale channels. External collaboration was minimal and limited to product-focused suppliers like Quality Espresso (A5). There was no involvement of digital actors or service-oriented partners at this point.	The network began to open selectively through early digital initiatives. Nova Group (A2) supported the implementation of e-commerce systems; Mercanza (A7) introduced CRM and ERP solutions. Internally, the roles of marketing (E2) and training (E5) gained prominence, and the GPV (Gestor Punto de Venta) model started acting as a hybrid interface between technical, commercial and client-facing responsibilities. Customers began to be considered as active participants in the learning and service process.	Significant expansion and specialization of the actor network. Apparattum (A1) led the development of the connected product platform; IoT Giant (A4) enabled sensor-based data collection through smart machines; Eurecat (A8) introduced advanced analytics and AI tools. Internally, the data science function (E6) was institutionalized, while engineering (E3) and training (E5) adapted to support a data-driven service architecture. The network became hybrid, with fluid data and service integration across internal and external actors.	Evolution into a digitally orchestrated and strategically aligned ecosystem. Sustainability experts like Inèdit (A3) and legal partners such as Exit Law (A6) joined to address emerging needs in regulation, data governance, and impact measurement. Internally, new roles such as Customer Success and Data Strategy (E6) became central. Marketing (E2) and operations (E4) aligned around platform-based customer engagement. The client evolved into a co-creating actor within a digital and service-centric ecosystem.

nal competencies and working closely with external partners, CoffeeCo was able to offer its customers advanced, real-time service solutions. As explored by [8], the use of platform-based Industry 4.0 technologies significantly boosts product-service innovation and plays a crucial role in the servitization pathways of manufacturers. The evolution of CoffeeCo's platform strategy and business model, particularly in the shift towards digital initiatives and servitization dynamics, mirrors the findings of [56], who emphasize the pivotal role of platform ecosystems in enhancing service offerings in manufacturing firms. The robustness of this stage is reflected in the sophistication of resources and capabilities employed (see Appendix A), emphasizing a model where data analytics and IoT are deeply embedded into every operational facet from supply chain management to customer engagement. CoffeeCo's full integration of digital services and its use of IoT-driven solutions echoes recent discussions on Industry 4.0 technologies. As [8] suggest, platform-based ecosystems and data analytics can significantly boost product-service innovation, allowing firms like CoffeeCo to lead in servitization.

4.2 Orchestrating resources and capabilities

The summary of the key results is presented in Table 3. The different contributors have been grouped into external and internal ones and classified according to the expertise they contribute with. The different resources and capabilities showed in the table appear classified according to pre-established categories (for detailed information see Appendix B) and they have been qualified as high (H), medium (M) and low (L) according to the frequency mentioned. This is equivalent to the importance of the resource and/or capability for the digital servitization initiative. At the same time, a resource or capability qualified as high and contributed externally means a low availability in the company.

The results from 16 in-depth interviews with key stakeholders (internal managers, external consultants, and partners) were thematically coded using a grounded theory approach. Key themes including 'digital transformation' and 'resource orchestration' emerged and were corroborated across multiple respondent types. This coding process allowed for a clear understanding of the alignment between internal and external resources. There were no significant discrepancies between internal and external respondents. However, internal respondents tended to focus more on operational and organizational challenges, while external respondents highlighted the importance of ecosystem collaboration and external resources in driving the servitization process.

Key finding deriving from the interviews are mainly three. First, along the servitization journey, CoffeeCo's strategically aligned its internal resources and capabilities with external ones. The company's commitment to sustainability and market responsiveness, coupled with a progressive infusion of technology, in constant evolution. Key to this process were the resources and capabilities available and needed, which are presented in detail in Appendix B. Second, different resources and capabilities appeared to be key in the process. One of the key resources is the espresso coffee machine itself. Interviewees commented on it as an external asset:

> *"We invested in the best espresso machines available. (E6, Marketing Manager). We customized our machines for unique brewing methods. (A5, Distribution Manager of Espresso coffee machine). Our machines are now IoT-enabled for a better service provision. (E7, Technical Support). Espresso machines are self-diagnosing and they organise maintenance. (A7, Business Intelligence responsible)."*

The company employs an innovative approach consisting in creating and implementing a customer data platform. The interviewees commented on this aspect in these ways:

> "We maintained customer records manually. (E5, Marketing & Customer training). We launched our first digital customer database. (A2, Sector-specific Consultancy). Our platform now offers personalized experiences. (E6, Marketing Manager). The platform is fully integrated with our IoT devices. (A3, CE Consultant)."

One of the most original capabilities is sector pedagogy, explained in the words of different interviewees:

> "In the first stage we started by educating the market on the value of high-quality coffee. (E6, Marketing Manager). Then, our efforts were directed at educating the sector on sustainable practices set by industry standards. (A6, Consultant). In the connected cafeteria phase, we became leaders in sector pedagogy initiatives on integrating technology into coffee services. (E1, General Manager). Finally, Cafeteria 4.0 sets the trend for the future of coffee tech pioneering in the industry. (A1, Technology provider)."

We can also highlight the capability of ambidexterity, illustrated by the following quotation:

> We balanced traditional coffee crafting with modern business practices. (E1, General Manager). We simultaneously developed our product line and tech capabilities. (A2, Sector-specific consultant). Ours is a managed dual focus on high-quality coffee and digital integration. (E2, Sales Manager). In the end, we achieved a balance between innovative technology and maintaining the coffee tradition. (A3, Circular Economy consultant).

Third and in all instances, it appears evident from

the results that a minimum internal base is necessary for any resource and/or capability. Major internal lacks can be surmounted by intense external contribution, but still, some internal capability in absolutely necessary as an ability to integrate and deploy external knowledge and expertise. This further resonates with the concept of absorptive capacity, or a firm's ability to recognize the value of new information, assimilate it, and apply it to new ends.

From the results it became evident that a smart orchestration, consisting in the combination of resource and capabilities available in-house with the ones provided by external actors, was the way to successfully achieve the envisioned Cafeteria 4.0, the technologically most sophisticated platform and the strategically most innovative business model.

4.3 Tensions and solutions

Connected to the previous, for each resource and capability respondents were requested to mention tensions and corresponding solutions that were applied for their resolution. A summary of the key findings corresponding to tensions and solutions is showed in Table 4, structed in three distinct thematical sections, namely platform, business model and actor network, as critical aspects emerging from the interviews. During the servitization journey, CoffeeCo has encountered various tensions and barriers inherent to the servitization process, resonating with the findings of [37], who identify key barriers to digital servitization in manufacturing SMEs, emphasizing organizational and customer-related challenges.

CoffeeCo faced hurdles in aligning its organizational structure and culture with digital servitization goals, and in addressing customer concerns related to data privacy and security in the digital realm. The tensions faced by CoffeeCo, including financial constraints and internal resistance to service-oriented models, align with the barriers identified by [37] in digital servitization. The gradual integration of services reflects the phased approach advocated by [49], which helps firms manage financial risks and ease internal transitions.

The detailed findings of CoffeeCo's servitization journey paint a picture of a company that has not only adapted to the digital era but has also anticipated and shaped its future. CoffeeCo's narrative from bean roaster to digital service trendsetter is testament to the transformative potential of servitization, having faced tensions and found solutions in all areas concerned (platform, business model, actor network) when executed with strategic foresight and an unwavering commitment to innovation. In line with the insights from [16], CoffeeCo's transformation underscores the efficacy of a platform approach in servitization, lever-

Table 3. Resources and capabilities for digital servitization

	External contributors			Internal contributors			
Expertise	Technology	Consultancy	Operations	Management	Sales and Marketing	Operations	
Actor involved	A1, A4, A8	A2, A3, A6	A5, A7	E1	E2, E5, E6	E3, E4, E7	
			Resources				**Tension**
Physical and technical assets	M	M	M	M	M	M	BM2, BM4
Human capital	H	H	-	-	-	H	AN1
External assets	M	M	M	L	H	M	BM3
Finance	M	-	M	M	M	M	BM1
Intellectual capital	M	M	M	M	M	M	P1, P2
Product & service	M	M	M	M	M	M	AN2
			Capabilities				
Digitalization	M	M	M	M	M	H	P1, BM3
Relational - Internal coordination	M	M	L	M	M	M	P2, AN1
Relational - Integrate and coordinate value activities	M	M	M	M	M	M	BM1, BM2, BM4
Effective Knowledge Transformation	M	L	H	M	M	M	AN2
Organizational capabilities	H	H	-	M	M	H	BM5

Notes: A – actor; E – employee; H – high; M – medium; L – low; P – Platform; BM – Business model; AN – Actor network.
Grey shadows visually mark intensities of contribution.

Table 4. Tensions and solutions in servitization

Tensions related to...	Solutions
Platform	**Platform**
P1. General management of the project on a day-to-day basis	Project manager figure
	Focus and expertise
	Clear roles and responsibilities
	Stakeholder management
	Project monitoring and control
P2. Gap between what management wants and what the organization as a whole does	Detailed plan of the strategic vision
	Alignment and clarity
	Communication and engagement
	Actionable steps and milestones
	Resource allocation and coordination
	Measurement and evaluation
Business model	**Business model**
BM1. Financial risk	Risk mitigation plan
	Customer retention and loyalty
	Value-based pricing and long-term contracts
	Continuous innovation and adaptation
	Data-driven decision-making
	Alliances and long-term relationships
BM2. Risk of not being a manufacturer of a key hardware (Espresso Ma-chine)	Access to manufacturing capabilities
	Shared resources and cost-sharing
	Focus on core competencies
	Collaborative innovation and agility
	Supplier reliability and quality control
BM3. Hardware and software obsolescence	Risk mitigation plan
	Continuous monitoring and assessment
	Robust technology roadmap
	Vendor partnerships and agreements
	Modular and scalable architecture
BM4. Uncertainty of being the first	Pilot
	Learning and adaptation
	Stakeholder engagement
	Proof of concept
	Risk mitigation
	Business continuity planning
	Digital transformation and agility
	Diversification of revenue streams
	Supply chain resilience
	Collaborative partnerships
BM5. Unpredictable events activating contingency plans	Scenario planning and risk management
	Financial preparedness
	Customer-centric approach
	Employee support and well-being
	Continuous monitoring and learning
Actor network	**Actor network**
AN1. Staff rotation	Training and education
	Well-trained field agents
	Knowledge and skill transfer
	Consistency in implementation
	Continuous support and engagement
	Business Case (Demonstrating ROI)
	Professional training
	Pilot projects
AN2. Very traditional sector: unprepared and very aggressive sector focused on cost reduction and not on processes optimization	Collaboration and partnerships
	Customized solutions
	Change management and training

aging digitalization to enrich customer engagement and operational efficiency. By orchestrating external partnerships, CoffeeCo was able to mitigate many of these tensions, an approach also supported by [16], who emphasize the role of ecosystem collaboration in overcoming resource limitations.

5. Discussion and conclusions

5.1 Interpretation of the main findings

The main findings of this study underscore the critical role of integrating internal and external resources to enable SMEs like CoffeeCo to embark on a successful digital servitization journey. This study aimed to investigate how SMEs like CoffeeCo can successfully orchestrate internal and external resources to achieve digital servitization. The findings address a gap in the literature regarding the specific strategies SMEs use to compensate for limited internal capabilities by leveraging ecosystem partnerships. As demonstrated, CoffeeCo's dual approach—relying on both internal strengths and external actors—reveals a pathway to servitization that is distinct from large firms with more extensive internal resources. While internal resources like human capital and organizational capabilities are fundamental, external actors within the ecosystem provide essential digital capabilities that fill internal gaps. The orchestration of these resources leads to significant improvements in business models, specifically through the shift from product-centric models to hybrid models that incorporate both products and services.

This research directly addresses the gap in the servitization literature concerning how SMEs, with their limited internal digital resources, can leverage external ecosystem actors to achieve servitization. Given that prior research, including [46], has primarily focused on larger firms with greater internal resources, this study offers new insights into the strategies SMEs can employ to balance internal weaknesses by tapping into external capabilities. Moreover, the role of IoT data utilization, as highlighted by [50], was pivotal in enabling CoffeeCo to transition to a data-driven service model. The company's ability to illuminate and act on previously underutilized data supported the creation of new value propositions, reinforcing the need for SMEs to harness their digital potential to drive innovation. The study also reveals the presence of multiple tensions in the servitization process, such as financial risks, capability gaps and sector-specific challenges like high staff turnover in the HORECA channel. CoffeeCo's ability to leverage external ecosystem capabilities, particularly through digital platforms, resonates with the framework of [54], in which collaboration across various stakeholders is essential for creating scalable, digital services. This finding supports the view that platform ecosystems are crucial for enabling SMEs to overcome internal resource constraints and develop competitive service offerings in a digital economy.

CoffeeCo's ability to leverage external ecosystem actors such as consultants and technology providers played a crucial role in overcoming these challenges. The case study also highlights the pivotal role of leadership and vision in navigating the complexities of servitization, suggesting that effective leadership is key to managing the inherent tensions. Additionally, [53] highlight the complexities CoffeeCo faced in balancing traditional business practices with the demands of digital integration. As noted, industrial players often encounter tensions between maintaining their core competencies and embracing digital technologies. CoffeeCo's approach of adopting a phased, incremental digital transformation helped mitigate these tensions, allowing it to gradually build the necessary capabilities without overwhelming its existing business operations.

Our findings align with prior work that underscores the importance of both internal and external orchestration mechanisms. The case of CoffeeCo shows how SMEs rely on digital platforms to integrate knowledge and coordinate resources, echoing the critical role of networks and information systems in enabling complex product-service solutions [13]. In parallel, the challenges and opportunities we identify in aligning product- and service-based logics are consistent with contributions highlighting the importance of co-creation activities [14].

5.2 Theoretical contributions

This research advances the theory of digital servitization by focusing on the orchestration of internal and external resources in small and medium-sized enterprises (SMEs), a context often overshadowed by studies on large multinational companies. By identifying categories of resources and capabilities necessary for digital servitization, such as human capital, relational capabilities and digitalization capabilities, this study enriches our understanding of how SMEs can adopt and implement servitization strategies.

The findings are synthesized into an orchestration framework (Figure 3) that illustrates how SMEs stra-

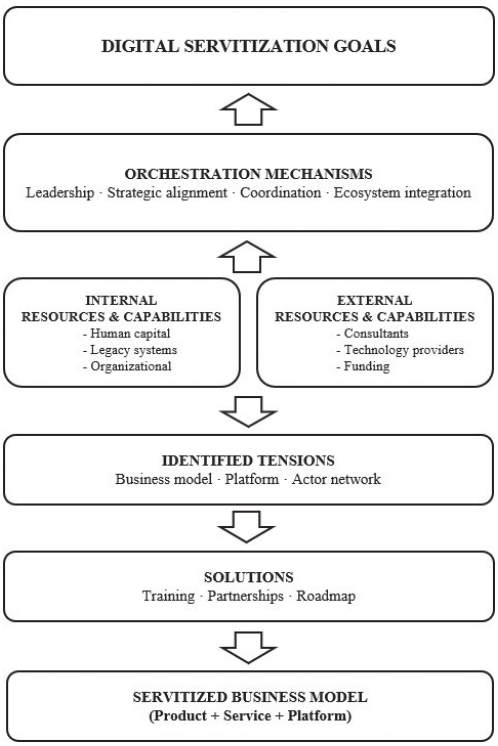

Figure 3. Digital servitization orchestration framework for SMEs

tegically combine internal and external capabilities to manage tensions and enable the development of hybrid business models. The model highlights the central role of orchestration mechanisms—such as leadership, strategic alignment, coordination, and external collaboration—in transforming tensions into actionable solutions throughout the servitization process.

The study further proposes a dual approach in which SMEs do not need to choose between internal and external resources. Instead, they can selectively rely on ecosystem actors to complement their internal capabilities. This perspective offers a nuanced theoretical contribution by expanding existing models to better reflect the strategic realities of resource-constrained firms navigating digital business environments. Our study contributes to the growing body of literature on SME servitization by offering a nuanced understanding of how external partnerships complement internal capabilities in resource-constrained environments. Unlike studies focused on large firms, this research emphasizes the phased nature of servitization in SMEs, where gradual integration of services allows firms to manage financial risks and overcome capability gaps. The research extends the work of [46] and [16] by demonstrating how SMEs can achieve competitive advantage through ecosystem collaboration.

Furthermore, this study expands on the servitization literature by providing a nuanced understanding of the different phases SMEs undergo in their transition to service-oriented business models. Unlike large firms that may have the resources to adopt servitization more rapidly, SMEs require a phased approach that allows for gradual capability-building and resource alignment. This insight adds depth to the existing theory of phased servitization pathways, particularly as SMEs must prioritize ecosystem collaboration to compensate for resource deficiencies. This study adds to the literature on servitization and digital transformation by highlighting the importance of ecosystem collaboration and data utilization. By integrating insights from [50], [55], this research underscores the need for SMEs to develop both digital competencies and agile processes to successfully transition to service-oriented business models. The role of co-creation in digital platforms, as discussed by [54], also provides a framework for understanding how SMEs can orchestrate value creation across a network of partners.

5.3 Practical contributions

This study provides a clear roadmap for SMEs transitioning from traditional business models to service-oriented models through digital servitization. CoffeeCo's experience illustrates that SMEs can achieve this shift without compromising their core competencies. However, they must first assess their

internal capabilities and strategically integrate external actors to address gaps. SMEs should actively engage in ecosystem collaboration, leveraging the expertise of consultants, technology providers and other stakeholders. Collaborating with external actors allows SMEs to access resources and capabilities that may not be available internally, enabling smoother transitions and reducing the risks associated with servitization. Leadership is another crucial factor. Servitization initiatives are most successful when driven by strong leadership that articulates a clear vision and actively engages both internal teams and external partners. Effective leadership is necessary to manage the tensions and uncertainties that arise during the transformation process. Furthermore, SMEs must adopt an ambidextrous management approach to balance resources between their traditional product-based business models and new service-oriented ventures. Effective resource allocation ensures that core operations remain competitive while new service models are developed and refined. The findings also indicate that SMEs must develop the capability to dynamically manage external relationships, fostering partnerships with consultants, technology providers and even customers to create a robust service offering. As CoffeeCo's experience illustrates, success in servitization for SMEs is highly dependent on their ability to orchestrate a collaborative ecosystem while keeping a strong focus on customer-centric innovations.

The five practical recommendations that derive from our study are: i) leverage ecosystem collaboration: SMEs should collaborate with external partners such as consultants and technology providers to compensate for internal limitations and gain access to new technologies and expertise; ii) adopt a phased approach to servitization: implementing servitization incrementally allows SMEs to test and refine new service offerings while managing risks and minimizing disruptions to existing operations; iii) strengthen leadership and vision: effective leadership is crucial to driving servitization projects. Leaders must clearly communicate the vision for digital transformation and ensure alignment across internal and external teams; iv) invest in employee training and development: as servitization introduces new roles and responsibilities, SMEs must invest in training their workforce to develop the skills necessary for service delivery and customer engagement, and v) balance core business and new ventures: SMEs need to maintain a balance between their existing business models and new service-based ventures by strategically allocating resources to both, ensuring ongoing competitiveness. These five recommendations provide a clear framework for SMEs seeking to adopt digital servitization without overwhelming their existing operations. By focusing on gradual implementation, strong leadership and external collaboration, SMEs can balance resource constraints while enhancing their service offerings and maintaining core business strengths.

To support SME decision-makers and practitioners, a practical roadmap was developed based on the case findings. This roadmap outlines five sequential phases—assessment, foundation, integration, orchestration, and consolidation—each with specific actions and transformation goals. It captures the logic behind CoffeeCo's transition and translates it into a structured, adaptable guide that other SMEs can use when planning their own servitization journeys. Figure 4 visualizes this roadmap, providing a step-by-step overview of the transformation process.

5.4 Limitations

While the CoffeeCo case study provides valuable insights, the study is limited by its focus on a single SME in the food and beverage sector, potentially affecting the generalizability of the findings to other industries. In all instances the findings have been framed and elaborated going beyond the single case study aiming to serve for SMEs, in general. For this purpose, the selection of the case study from a traditional, non- or low technology sector usually classified

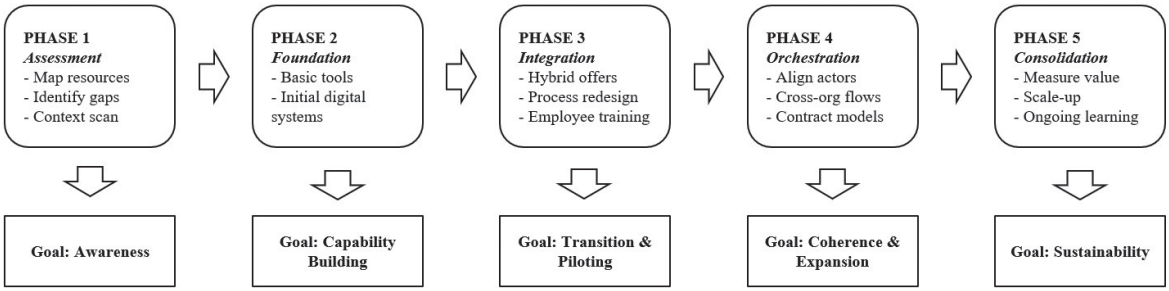

Figure 4. Practical roadmap for SMEs envisioning digital servitization

as belonging to process industry was important. The reliance on qualitative interviews also introduces potential biases related to respondent perspectives. Future research could explore the impact of servitization in different sectors, particularly by integrating quantitative methods to provide a broader understanding of how servitization affects long-term SME performance.

The exclusion of customer perspectives in this study is also a limitation. While the focus was on internal and external actors directly involved in the servitization process, incorporating customer feedback could have provided valuable insights into the demand-side challenges and opportunities for digital servitization.

5.5 Future Research

Future research could replicate this study across different industries and sectors to enhance generalizability. Incorporating quantitative data such as surveys and financial performance indicators would offer more robust evidence of the impact of servitization on SMEs. Additionally, examining customer perspectives on digital services could provide valuable insights into how SMEs can tailor their offerings to enhance satisfaction and loyalty. Future studies should also investigate the long-term sustainability of servitization strategies, and particularly how SMEs maintain competitive advantage over time.

Exploring the role of emerging technologies such as artificial intelligence, blockchain and IoT in driving SME servitization, and conducting cross-industry studies to assess sector-specific dynamics, would provide timely contributions to both theory and practice. Future work should also consider longitudinal studies to assess how SMEs maintain competitive advantages and adjust to market changes over time.

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Appendix A: Interview protocol

Section	Topic	Questions
		Company characteristics Respondent characteristics
1	Servitization journey	Please explain … 1. *How* and *why* the company began the transformation to offer product-service systems and the challenges this posed for the organization. 2. … the servitization journey: refer to *stages, considerations, successes* and *difficulties*. 3. How this servitization journey has been *organized* for your organization? *Who* assumes the function/operation of servitization and how has this organization evolved? 4. What stage has your organization reached? Explain the most important changes compared to the pure product-centric model. 5. What are the *next steps* in the servitization journey? 6. What were the *main difficulties* encountered during the servitization journey? 7. What *structures, processes, procedures or methods* have been used to ensure consistency in the organisational response to the servitized business?
2	Actors	8. Who are the key players who contributed in the transformation towards servitization? *A key player refers to any agent (organization, company, etc.) that has contributed valuable resources and/or capacities without which it would not have been possible to reach the current point of maturity.*
3	Resources and capabilities Tensions and solutions	9. Please briefly explain each element of the following table *A table template was provided to respondents with a heading referred to:* Actor Capability and definition Type of interaction: Uses/Adapts/Co-develops Resource(s) Organizational change required for integration Tensions *A tension is defined as coexisting, contradictory, interrelated differences, within and between organizations, that reflect conflicting, non-combinable viewpoints or intentions.* Solutions *The heading was commented and documented for each stage of the servitization journey mentioned by the respondent*

Appendix B. Resources and capabilities

Table A. Resources for servitization

Resources	A1	A2	A3	A4	A5	A6	A7	A8	E1	E2	E3	E4	E5	E6	E7	E8
Physical and technical assets																
Sensors to capture data on product usage	x			x							x	x				
Customer data platform		x	x										x	x		
Pilot platform to test with early adopters					x		x		x						x	
Training on maintenance, repair and troubleshooting of the Espresso Machine						x		x		x						x
Human capital																
Well-trained field agents		x		x							x	x				
External assets																
Well-directed product distribution channel	x		x							x			x			
Professional espresso machines					x		x							x	x	
Data servers		x				x			x	x						
Algorithms				x				x				x	x			
Finance																
Financial aid from the administration			x				x								x	x
Investment financing	x					x					x		x			
Amortisation of the Espresso Machine		x			x					x				x		
Profitability of the operation				x				x	x			x				
Intellectual capital																
Harmonised and standardised processes and protocols for product development	x	x									x		x			
Harmonised and standardised processes and protocols for product transformation			x		x									x	x	
Predictive maintenance of the Espresso Machine						x	x			x						x
Commercial policies and incentive systems				x				x	x			x				
Key Performance Indicators	x				x								x		x	
Product & service																
Product portfolio adapted to the customer's educational level		x		x							x	x				
Product quality assurance	x		x							x				x		
Product and services offerings					x		x		x						x	
Sustainability						x		x					x			x

Note 1: E1 - General Management; E2 - Sales Management; E3 - Product Management; E4 - Data Science; E5 - Marketing - Customer Training; E6 - Marketing Management; E7 - Technical Support ; E8 - Finance Management [E – key employee in a specific function]

Note 2: A1 – Technology; A2 – Sector-specific Consultancy; A3 – CE Consultancy; A4 – IoT Technology; A5 – Management; A6 – Innovation Consultancy; A7 - Business Intelligence; A8 – BD Technology [A – key actor from the ecosystem]

Table B. Capabilities for servitization

Capabilities	A1	A2	A3	A4	A5	A6	A7	A8	E1	E2	E3	E4	E5	E6	E7	E8
Digitalization																
Data processing	x			x					x			x				
Intelligent functionalities		x	x							x	x					
Connectivity functionalities		x			x				x			x				
Predicting customer insights					x	x								x		
Value visualisation and reporting			x				x				x				x	
Relational - Internal coordination																
Leadership	x							x	x							x
Future vision	x	x							x	x						
Proactive identification of opportunities		x	x							x	x					
Risk taking, management of uncertainties and risk mitigation	x			x	x		x		x			x			x	x
Project management methodology			x		x						x		x			
Communication: deployment of the strategy throughout the organisation		x				x				x				x		
Relational - Integrate and coordinate value activities																
Learning and adaptation				x			x					x			x	
Listening to the customer					x			x					x			x
Transfer of the company's vision to the market	x					x			x					x		
Acquisition of commercial talent for servitization		x	x							x					x	
Customer segmentation			x	x							x	x				
Early-adopters identification					x	x							x	x		
Customer retention and loyalty							x	x							x	x
Differentiation	x	x							x	x						
Value co-creation		x	x								x	x				
Value quantifying				x	x							x	x			
Hybrid (product and services) offerings design, selling and deploying	x	x				x	x		x	x				x	x	
Innovation: technology development			x			x					x			x		
Effective Knowledge Transformation																
Change management							x	x							x	x
Customer training					x		x						x		x	
Sector pedagogy	x					x			x					x		
Organizational capabilities																
Ambidexterity		x	x						x	x						
Ecosystem Orchestration and Expansion	x			x							x	x				