

From IT Outsourcing to Digital Sourcing: A Capability-Contingent Perspective on Sourcing Decisions

Research Paper

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Abstract. Rapid digital transformation is fundamentally reshaping how firms innovate and compete. This shift is particularly evident in formerly hardware-centric industries, such as automotive, where software-defined products (SDPs) increasingly make software the primary driver of product design, functionality, and user experience. As a result, firms face growing uncertainty over which software to develop in-house and which to source externally. While IS research increasingly engages with digital sourcing, we still lack insight into which SDP-related capabilities condition actual sourcing decisions and how they shape their viability. We address this gap through a multiple-case study of six automotive OEMs, drawing on 31 interviews and secondary sources. We show that established sourcing directives remain relevant but insufficient in SDP contexts, because viable digital sourcing decisions are capability-contingent rather than object-determined. We identify four SDP-related capabilities that condition such decisions and derive a framework that illustrates the viability of digital sourcing decisions.

Keywords: IT Outsourcing, Digital Sourcing, Software-Defined Products

1 Introduction

Over the past decades, Information Systems (IS) research has developed extensive knowledge on Information Technology (IT) outsourcing, examining why firms externalize IT activities to vendors and how they govern these arrangements (Earl, 1996; Lacity & Willcocks, 1998; Dibbern et al., 2004). Most of this research focuses on traditional IT assets and services, such as data centers, networks, or application development (Lacity & Willcocks, 1995; Apte et al., 1997; Lee et al., 2019). However, rapid digital transformation is changing the nature of IT assets. They are becoming more fine-grained, interdependent, and deeply embedded in firms' core offerings (Baiyere et al., 2023; Willcocks et al., 2024). A practical example is a software-enabled driver-assistance system, in which multiple interdependent software applications must interact seamlessly to ensure reliable and safe steering and braking maneuvers (Yurtsever et al., 2020). This raises the critical question of whether established sourcing guidelines (i.e.,

directives) for ‘static’ IT assets still hold in today’s digital contexts (Oshri et al., 2019; Alt et al., 2020; Krancher et al., 2024).

This transformation is especially pronounced in hardware-centric industries such as automotive, industrial machinery, or medical technology, where software-defined products (SDPs) are increasingly redefining competition. In these contexts, product value is shaped less by mechanical performance alone and more by software-enabled functionality and adaptability (Zhu et al., 2016; Alt et al., 2020; Otto et al., 2025). SDPs increasingly combine embedded hardware, cloud infrastructure, and data-driven intelligence, making software decisive for product design, functionality, and user experience (Yoo et al., 2010; Lyytinen et al., 2016; Oks et al., 2024). A prominent example is the modern vehicle, where functions once controlled mainly by mechanical hardware, such as steering and braking, are increasingly implemented through software-controlled systems such as steer-by-wire and brake-by-wire (Vdovic et al., 2019; Röhr et al., 2025).

In the automotive industry, original equipment manufacturers (OEMs) such as Volkswagen (VW) have traditionally created value by efficiently assembling vehicles from supplier-developed components rather than developing them internally (Jacobides et al., 2016). In line with established sourcing directives, OEMs such as Tesla show how vertically integrated software development and tight platform control can become strategic levers in software-centric competition, where software is increasingly critical for differentiation (Lacity et al., 1996; Teece, 2018). Incumbent OEMs, including VW, have moved in a similar direction by building in-house software units. Yet these efforts have often fallen short of expectations, leading to cost overruns and delayed vehicle launches (Waldersee & Schwartz, 2023). Therefore, recent discussions point to the need for dedicated firm capabilities in SDP development (Yeow et al., 2018; Alt et al., 2020; McKinsey, 2023; Krancher et al., 2024).

While IS research offers extensive insight into sourcing decisions, it has focused predominantly on ‘static’ IT assets and capabilities, rather than product-related development capabilities in digital sourcing (Baiyere et al., 2023; Krancher et al., 2024). Yet, sourcing decisions increasingly depend on firms’ ability to architect, integrate, and continuously evolve SDPs (Svahn et al., 2017; Teece, 2018; McKinsey, 2023). However, little is known about which SDP-related capabilities condition digital sourcing decisions and how they shape the viability of these decisions. Responding to Krancher et al.’s (2024) call for further research, we ask: *Which SDP-related capabilities condition digital sourcing decisions, and how do they shape the viability of these decisions?*

To address this question, we conduct a multiple-case study of six automotive OEMs (Eisenhardt, 1989). Drawing on 31 semi-structured interviews and secondary sources, we identify four SDP-related capabilities and illustrate how they shape the viability of OEMs’ sourcing decisions. Thereby, the study contributes to digital sourcing research in two ways. First, it shows that established sourcing directives remain relevant, yet are insufficient in SDP contexts because digital sourcing decisions are capability-contingent rather than object-determined. Second, it explains how firms’ SDP-related capabilities shape such decisions by deriving an initial capability-contingent framework.

The remainder of the article proceeds as follows: Section 2 reviews digital sourcing literature and conceptualizes SDPs. Section 3 outlines the methodology, Section 4 presents the findings, Section 5 discusses implications, and Section 6 concludes.

2 Background

2.1 Digital Sourcing Decision Process

Seminal IS research has generated substantial knowledge on sourcing decisions, commonly structured around three interrelated questions: *why* firms source, *what* they source, and *which* sourcing arrangement they choose (Loh & Venkatraman, 1992; Grover et al., 1994; Lacity & Willcocks, 1998). Dibbern et al. (2004) integrate these questions into a sourcing decision process. The ‘why’ stage addresses the rationale for sourcing, including expected advantages, such as cost reduction and access to external expertise, and disadvantages, such as reduced flexibility, greater complexity, and monitoring difficulties (Clark et al., 1995; Apte et al., 1997). The ‘what’ stage concerns the (IT) object to be sourced (Loh & Venkatraman, 1992; Ang & Slaughter, 1998). The ‘which’ stage captures the evaluation and selection of sourcing decisions, such as outsourcing and insourcing (Hirschheim & Lacity, 2000; Lee et al., 2019).

IS research has long recognized IT capabilities as a key condition shaping sourcing decisions (Earl, 1996; Feeny & Willcocks, 1998; Lacity et al., 2016). Rather than treating sourcing as a purely economic choice, this literature emphasizes that firms must possess the organizational capabilities required to implement and govern particular sourcing arrangements (Willcocks et al., 2024). To outsource effectively, firms need capabilities such as vendor management, contract design, and performance monitoring (Feeny & Willcocks, 1998). To insource effectively, firms need the technical and integrative capabilities required to develop and coordinate activities internally (Earl, 1996).

These insights remain particularly relevant in digital sourcing, although they must be reconsidered, as the nature of the sourcing object has changed (Krancher et al., 2024; Willcocks et al., 2024). Compared with traditional stand-alone IT applications and services, software in SDPs is more modular, interdependent, and deeply embedded in firms’ offerings and value creation. As a result, sourcing such software requires dedicated SDP-related capabilities, particularly for specification, integration, and orchestration across organizational boundaries (Baiyere et al., 2023; Huber et al., 2024; Krancher et al., 2024). Figure 1 summarizes the conceptual model guiding this study.

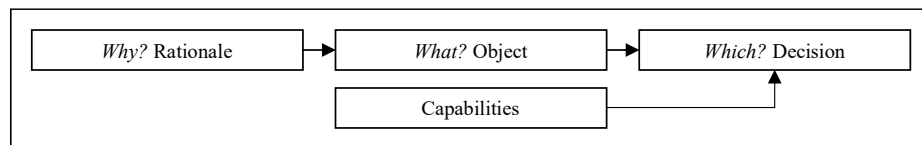


Figure 1. Conceptual model: digital sourcing decision process (based on Dibbern et al., 2004)

2.2 Digital Sourcing Directives

Within IS research, sourcing directives are understood as normative decision rules that guide whether particular sourcing objects should be outsourced or insourced (e.g., Earl, 1996; Lacity et al., 1996). Rather than explaining sourcing decisions *ex post*, they provide prescriptive guidance on how firms should evaluate sourcing options by linking

governance choices to attributes such as strategic importance, asset specificity, measurability, and firm capabilities (Lacity & Willcocks, 1998; Dibbern et al., 2004).

Established sourcing directives in the traditional IS outsourcing literature, although not identical, converge on a few core recommendations: Sourcing objects that are business-critical and central to competitive differentiation should generally be insourced. By contrast, sourcing objects that are standardized, commodity-like, and useful but not critical to business operations are considered more suitable for outsourcing. Useful differentiators are commonly considered suitable for migration or elimination (Grover et al., 1994; Lacity et al., 1996; Lacity & Willcocks, 1998).

Although useful in traditional IT outsourcing, established sourcing directives require reassessment in digital sourcing (Krancher et al., 2024). Earlier IS research treated IT assets as discrete “boxes,” whereas SDP software is more layered, interdependent, and embedded in broader architectures (Baiyere et al., 2023; Grover & Lyytinen, 2023).

2.3 Software-Defined Products and Automotive Software

The emerging concept of SDPs describes physical products whose core value increasingly derives from software rather than hardware alone. In SDPs, software becomes central to product design, functionality, and user experience, while enabling post-deployment change through updates and feature reconfiguration (Zhu et al., 2016; Alt et al., 2020; Otto et al., 2025). SDPs thus extend the notion of smart, connected products in IoT research, where connectivity mainly augments hardware-defined offerings (Porter & Heppelmann, 2014). By contrast, SDPs foreground software as the main mechanism of product evolution (Baskerville et al., 2020; Hurni et al., 2021).

This shift toward SDPs is particularly visible in the global automotive industry. Whereas competitive advantage historically rested on mechanical performance, it increasingly depends on software-driven functionality (Svahn et al., 2017; Otto et al., 2025). As a result, modern vehicles are realized through a three-layered software stack embedded in vehicles’ computing systems (Hylving & Schultze, 2020; Becker, 2022; Liu et al., 2022). First, the *application software layer* sits closest to the user and delivers tangible features such as navigation, voice assistants, and driver-assistance functions. Second, the *operating system layer* provides the runtime environment that connects applications to vehicle hardware and manages computing resources and communication. Third, the *firmware layer* comprises embedded software running on electronic control units and sensors and governs time-critical functions at the hardware level.

3 Methodology

3.1 Case Selection

For this study, we adopted a multiple-case study approach (Eisenhardt & Graebner, 2007) and selected six automotive OEMs as focal cases. Each OEM was treated as an independent case and characterized by its digital sourcing decisions across three vehicle software layers, its SDP-related capability profile, and available secondary material.

We deliberately opted for the automotive industry for two reasons. First, the technological transition toward SDPs is particularly advanced in this industry because automotive combines historically hardware-centric value creation with increasingly software-driven differentiation, layered vehicle software architectures, and strong supplier involvement. Second, incumbent OEMs (e.g., Toyota) and emerging OEMs (e.g., Tesla) exhibit markedly different digital sourcing decisions despite facing similar technological and competitive pressures.

Following the principles of purposeful sampling (Patton, 2024), we aimed to construct a diverse yet representative sample of automotive OEMs. Specifically, to reflect real-world industry dynamics, our case selection includes both incumbent and emerging OEMs (i.e., firms relatively new to the industry), as the latter may possess different capability profiles and therefore pursue digital sourcing differently. Within each group, we selected OEMs with high market relevance, reflected in vehicle sales. Our final dataset comprises the incumbent OEMs VW, Toyota, and BMW, alongside the emerging OEMs BYD, Tesla, and Geely. Table 1 provides an overview and additional information on the selected case companies.

Table 1. Overview of case companies: incumbent and emerging OEMs (N = 6)

Category	Case	Headquarter	Founded	Vehicles sold in 2023 ¹
Incumbent	VW	Germany	1937	9,240,000 (+12%)
	Toyota	Japan	1937	8,821,872 (+7%)
	BMW	Germany	1916	2,554,183 (+6%)
Emerging	BYD	China	1995	3,024,417 (+61%)
	Tesla	USA	2003	1,845,985 (+35%)
	Geely	China	1986	1,686,516 (+18%)

Note: ¹ = retrieved from OEMs' newsrooms and annual reports of 2022 and 2023

3.2 Data Collection and Analysis

Consistent with our qualitative multiple-case study approach (Eisenhardt, 1989; Eisenhardt & Graebner, 2007), we collected data between April 2024 and October 2025 through 31 semi-structured interviews with 12 senior industry leaders and experts, totaling 1,655 minutes. Interviewees were purposefully selected from three groups, namely OEMs, suppliers, and consulting firms, based on two criteria: (1) active involvement in digital sourcing decisions at one or more of the selected OEMs (e.g., key account lead, function owner, and software strategist) and (2) sufficient seniority as reflected by their role and years of industry experience (Patton, 2024). While OEMs remain the focal decision makers, suppliers and consultancies provide knowledgeable and boundary-spanning perspectives, as they are closely involved as sourcing partners or advisors in the evaluation, design, and implementation of digital sourcing decisions (Eisenhardt & Graebner, 2007). Interview rounds varied according to informants' cross-case visibility, availability for follow-up clarification, and relevance for validating emerging case characterizations. All interviews were conducted virtually via MS

Teams using a standardized interview guide. Each interview followed three steps: (1) discussion of the dominant sourcing decisions for each software component and case, (2) discussion of the SDP-related capabilities shaping sourcing decisions, and (3) examination of how these capabilities condition sourcing decisions. Table 2 provides an overview of the interviews.

Table 2. Overview of data collection: interviewed industry leaders and experts (N = 12)

Segment	ID	Role	Rounds	Total length
OEM	I1	Chief technology officer (CTO)	1	60 min
	I2	Chief strategy officer (CSO)	1	45 min
	I3	Member of the board	1	60 min
	I4	Senior director	4	120 min
	I5	Director	1	90 min
Supplier	I6	Chief executive officer (CEO)	1	60 min
	I7	Senior vice president	4	240 min
	I8	Vice president	4	200 min
	I9	Director software sales	5	300 min
Consultancy	I10	Senior managing partner	4	180 min
	I11	Managing partner	1	60 min
	I12	Associate partner	4	240 min
Total			31	1,655 min

Given the sensitive nature of sourcing decisions in today's automotive landscape, none of the interviewees consented to audio recording. To address this constraint, at least two researchers attended each interview, took detailed notes independently, compared their notes immediately afterward, resolved discrepancies, and consolidated them into a shared case record. Informed by Gioia et al. (2013), we coded the interview material in three steps. First, we identified recurring constructs related to SDP development and deployment across cases, such as modular software components, shift-left testing, release automation, joint prototyping, and partner control. Second, we aggregated these constructs into broader SDP-related capabilities. Third, we linked these capabilities to the sourcing decisions they appeared to support across cases. Multiple researchers coded the interview material independently and then engaged in coder alignment and iterative discussion to establish a shared interpretation of emerging categories and their relationships. To strengthen analytical credibility through triangulation (Yin, 2018), we triangulated interview data with secondary sources, including management presentations provided by interviewees, OEM newsrooms, annual reports, and publicly available materials. These sources were used to characterize each case, cross-check reported sourcing decisions where possible, and contextualize each OEM's software architecture and digital sourcing activities.

4 Results

4.1 Digital Sourcing Decisions of Automotive OEMs

Drawing on 31 interviews with 12 experts, this section examines digital sourcing decisions across six automotive OEMs and three vehicle software layers: application software, operating systems, and firmware. For each layer, we compare observed decisions with established IS sourcing directives (Lacity et al., 1996) to assess their fit in SDP contexts. The analysis shows that actual decisions only partly follow these directives. OEMs diverge from expected sourcing patterns across layers and increasingly use partnering as an additional mode. We define partnering as collaborative co-development that goes beyond arm's-length outsourcing but stops short of full internalization in contemporary practice (Flak et al., 2022).

Table 3. Digital sourcing decisions along core vehicle software layers

Object (<i>What?</i>)	Business relevance	Competitive positioning	Decision (<i>Which?</i>)	Observed cases
Application software	critical	differentiate	outsource	-
			partnering	BMW, Toyota, VW
			insource *	BYD, Tesla, Geely
Operating system	critical	commodity	outsource*	Toyota, VW
			partnering	BMW, BYD, Geely
			insource	Tesla
Firmware software	useful	commodity	outsource*	BMW, Geely, Toyota, VW
			partnering	-
			insource	BYD, Tesla

* = established sourcing directive by Lacity et al. (1996)

Application software primarily refers to software that delivers specific customer functions. Interviewees mainly referred to innovative functions related to in-vehicle entertainment (e.g., AI-powered voice assistants, streaming services, and seamless phone integration), as well as autonomous driving functions (e.g., automated parking, traffic sign recognition, and intelligent route planning). The CTO (I1) of an OEM described application software as central to customer value, as buyers increasingly pay for distinctive digital functions rather than engineering alone. Accordingly, the interviewees suggest that application software is both highly relevant to the business and a differentiating factor. At the same time, they indicate that OEMs pursue different sourcing approaches, including partnering (i.e., BMW, Toyota, VW) and insourcing (i.e., BYD, Tesla, Geely). Interviewee I10 described BYD, Tesla, and Geely as treating core software as a competitive domain they build internally, while VW still relies on suppliers for critical components after difficulties with similar ambitions.

Operating systems constitute a core software layer that manages hardware resources, coordinates interfaces, and enables vehicle functions to run reliably. Interviewees described operating systems as necessary for business operations because they are critical for running application software. However, as customers do not recognize them directly, they are generally treated as less differentiating by the interviewees. Interviewee I7 explained that customers rarely notice the underlying operating system, although it remains essential for delivering vehicle functions. Nevertheless, our interview data reveal a heterogeneous sourcing pattern, including outsourcing (i.e., VW, Toyota), partnering (i.e., BMW, BYD, Geely), and insourcing (i.e., Tesla), suggesting that even for this less customer-visible layer, sourcing decisions do not follow a single established logic. A senior director (I4) noted that many OEMs expect operating system ownership to improve speed and scalability, but Tesla is among the few that has achieved this through strong software development capabilities.

Firmware software refers to the foundational software layer embedded in hardware, such as sensors and control units, and enables basic control functions. Because all vehicle hardware contains firmware software, interviewees described this layer as useful but not critical in terms of business relevance. Due to its basic functions and relative inflexibility, interviewees generally regarded it more as a commodity than as a differentiator. Interviewee I9 characterized firmware as foundational and expected, but not as a visible source of customer differentiation. Within this software layer, we observe two sourcing decisions: outsourcing (i.e., BMW, Geely, Toyota, VW) and insourcing (i.e., BYD, Tesla). A CSO (I2) of an OEM described firmware as the technical foundation of the vehicle and noted that emerging OEMs insource it to leverage software capabilities, whereas incumbents often prioritize more differentiating software layers.

Across the software layers, comparing observed digital sourcing decisions reported in our interviews with the directive of Lacity et al. (1996) shows only partial alignment. As application software is described as critical to core vehicle functionality and as a driver of differentiation, the directive recommends insourcing. However, some OEMs, including BMW, Toyota, and VW, rely on partnering approaches. Our results show that operating systems represent a critical software layer, as they are necessary for developing and deploying application software. However, because they do not directly differentiate the vehicle for customers, the directive suggests outsourcing. Yet, the analyzed OEMs combine outsourcing, partnering, and insourcing. According to the interviewees, firmware is useful for vehicle operation but neither critical to the business nor a source of competitive differentiation. Thus, the directive points to outsourcing. Most observed OEMs appear to follow this approach, whereas BYD and Tesla insource.

Overall, the findings suggest that established sourcing directives only partly explain sourcing decisions in automotive SDP contexts and therefore require qualification in SDP settings. The interviewees further suggest that this variation is closely linked to SDP-relevant development capabilities, which play a crucial role in sourcing decisions in SDP contexts. This capability-related interpretation is also reflected in the interview data. Interviewee I8 emphasized that vehicles shaped by software require software talent, as ambitious sourcing strategies can stall when internal capabilities are insufficient.

4.2 Firm Capabilities in Software-Defined Product Contexts

Based on the interviews, we identify four SDP-related capabilities: platform-driven agile development, continuous software deployment, collaborative software development, and ecosystem governance. Following capability research (e.g., Winter, 2017), we define them as organizationally embedded, repeatable routines for software development and deployment. Although these capabilities may apply in other digital contexts, we conceptualize them as SDP-related because they address software embedded in layered, hardware-coupled products. We next describe each capability in the SDP context and outline digital sourcing decisions it supports. Table 4 summarizes the capabilities, viable sourcing decisions, and supporting interviews. The bullet points in the first column represent recurring constructs derived from the case records.

Table 4. SDP-related capabilities and viable sourcing decisions

SDP-related capability	Supported sourcing decisions	Interviews
<i>Platform-driven agile development</i>		
• Modular and reusable software components across vehicle lines • Fast build-measure-learn cycles (shift-left testing and validation)	• Supports insourcing • Supports partnering	I1, I3, I4, I6, I7, I8, I9, I10, I12
<i>Continuous software deployment</i>		
• Rapid fix-and-release iteration (short release cycles) • DevOps-enabled toolchain (automated build, test, release)	• Supports insourcing • Supports partnering	I3, I6, I7, I8, I10, I11, I12
<i>Collaborative software development</i>		
• Joint experimentation and rapid prototyping • Joint problem resolution (shared debugging, clear escalation)	• Supports partnering	I2, I3, I5, I10, I11, I12
<i>Ecosystem governance</i>		
• Partner selection by capability fit (clear scope and accountability) • Partner control via acceptance-based integration (sign-off)	• Supports outsourcing • Supports partnering	I2, I3, I4, I5, I6, I8, I11, I12

Platform-driven agile development is described by interviewees as a cornerstone of software development in modern vehicles. This capability is particularly evident among emerging OEMs. In particular, the experts refer to organizational routines that follow agile principles (e.g., fast build-measure-learn cycles) to create modular and reusable software components. The interviewees outlined that the industry long relied on rigid stage-gate processes to ensure reliability. In SDP contexts, however, interviewees suggested that these approaches lead to slower development and reduced competitiveness. A CEO (I6) described traditional waterfall cycles as too slow for SDP contexts and

emphasized decoupling hardware and software, agile development, and earlier testing. Our interviews suggest that this capability supports insourcing by enabling OEMs to build and evolve modular software components internally, while also supporting partnering by making selective co-development across clearer component boundaries more feasible and reviewable. Interviewee I8 described agile development capabilities as necessary for OEMs to build or jointly develop software with partners successfully.

Continuous software deployment is described by the interviewees as another core SDP-related capability, particularly as software is typically updated and improved after deployment. In particular, the experts described routines for rapid fix-and-release iteration, supported by a suitable toolchain that enables automated build, test, and release activities (e.g., continuous integration and deployment). The interviewees emphasized that traditional automotive development largely treated software delivery as a one-time event tied to the vehicle launch. In SDP contexts, however, interviewees stressed that software must be continuously maintained, updated, and validated throughout the vehicle lifecycle. Interviewee I10 described Tesla's single codebase as enabling continuous testing, validation, and deployment, and linked such architectural control to both internal development and effective partnering. Our data indicate that continuous deployment supports insourcing because it requires sustained internal ownership of release, validation, and post-deployment improvement processes, while also enabling partnering where external actors can be tightly integrated into these ongoing routines.

Collaborative software development is described as a core SDP-related capability, particularly when OEMs rely on partners for strategically relevant software domains. In particular, the experts refer to routines for joint experimentation and rapid prototyping, as well as for joint problem resolution through shared debugging and clear escalation paths. The interviewees emphasized that traditional automotive collaboration was characterized by dyadic supplier relations. In SDP contexts, interviewees suggested that development increasingly takes place within broader ecosystems of independent actors, requiring interactive collaboration across firm boundaries. Interviewee I12 described BMW's partnership with Momena as the joint development of an AI-enabled autonomous driving system, requiring close technical coordination rather than a simple software purchase. This capability supports partnering, as it enables OEMs to coordinate strategically relevant and technically interdependent development with external actors.

Ecosystem governance is described by interviewees as another core SDP-related capability, particularly when OEMs rely on external suppliers for software development in modern vehicles. In particular, the experts refer to routines for selecting suppliers based on capability fit, with clearly defined scope and accountability, and for controlling their contributions through acceptance-based integration and formal sign-off. The interviewees emphasized that traditional supplier management in automotive often focused on stable delivery against fixed specifications. In SDP contexts, however, interviewees stressed that OEMs must evaluate suppliers not only by cost and scale, but also by their software capabilities and their ability to integrate into evolving architectures. Interviewee I11 noted that selecting software suppliers is difficult, but controlling whether their code fits the system is even harder. Our interviews link ecosystem governance primarily to outsourcing and partnering, as it enables OEMs to select, evaluate, and control external software contributions under conditions of evolving architectures.

5 Discussion

Drawing on a multiple-case study of six automotive OEMs, we show that digital sourcing decisions in SDP contexts are capability-contingent rather than object-determined. Established IS sourcing directives rooted in IT outsourcing remain relevant in SDP contexts, yet are insufficient to account for digital sourcing decisions on their own (Earl, 1996; Lacity et al., 1996; Feeny & Willcocks, 1998). Our findings suggest that firms' SDP-related capabilities help identify viable sourcing decisions in SDP contexts. Specifically, we identify four SDP-related capabilities that condition such decisions. On this basis, we offer two contributions to the IS sourcing literature and propose an initial framework for evaluating viable digital sourcing decisions in SDP contexts.

Our findings offer two theoretical contributions to IS sourcing research. First, we refine established IS sourcing directives by suggesting that, in SDP contexts, their applicability depends not only on the sourcing object's business relevance and competitive positioning, but also on firms' SDP-related capability endowments (Lacity et al., 1996; Feeny & Willcocks, 1998). This extends prior sourcing research, which has acknowledged capabilities primarily in relation to corporate IT, by showing that digital sourcing in SDP settings is better understood as capability-contingent rather than object-determined (Feeny & Willcocks, 1998; Quinn, 1999; Dibbern et al., 2004). Second, responding to recent calls for research, we specify four SDP-related capabilities and link them to different viable sourcing decisions across cases (Alt et al., 2020; Krancher et al., 2024). In doing so, we move beyond treating capabilities as generic enablers and provide a more fine-grained account of how firms' capability endowments shape the viability of digital sourcing decisions in SDP contexts.

Figure 2 synthesizes our case evidence into an initial decision framework for digital sourcing in SDP contexts. Grounded in the established sourcing criteria discussed in Section 2.2, it retains migration/elimination for useful differentiators as the directive baseline and qualifies viable sourcing decisions through SDP-related capabilities (Lacity et al., 1996; Feeny & Willcocks, 1998). Rather than prescribing an optimal choice, the framework maps the sourcing decisions that appeared viable across our six OEM cases under different combinations of object characteristics and capability endowments. In this sense, the framework formalizes our empirical observation that similar software can be sourced differently when firms possess different SDP-related capabilities. We therefore view our framework as an empirically grounded, capability-contingent extension of established sourcing directives in SDP settings.

Managers can use the framework as a practical decision aid for two activities. First, before making sourcing decisions, they should assess their firm's current SDP-related capabilities. This assessment should draw on observable indicators such as processes, organizational structure, talent base, and toolchain maturity to judge whether the organization can reliably support SDP development for the intended sourcing decision. Second, managers should align sourcing decisions with the resulting capability profile rather than with strategic ambition alone. Where capabilities are limited, partnering or selective outsourcing may be the more viable option. Where capabilities are more advanced, firms can internalize a broader range of software activities while using the framework to identify priorities for further capability development.

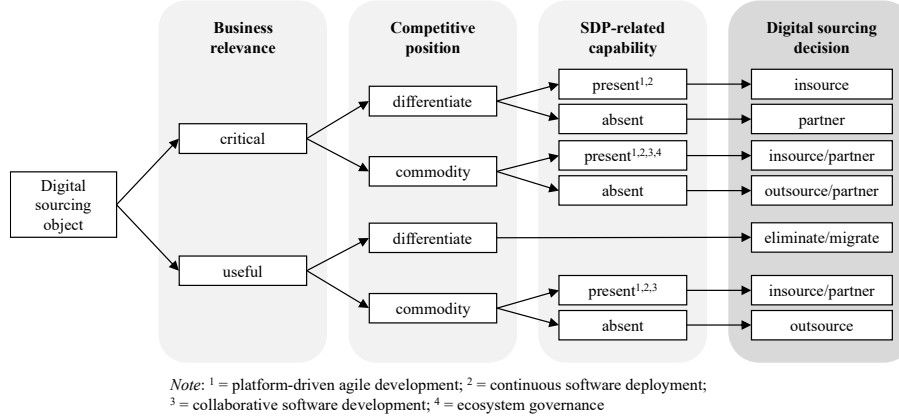


Figure 2. Proposed viable sourcing decisions in SDP contexts

This study has limitations that suggest avenues for future research. First, the findings draw on a limited number of cases in one industry, which may constrain generalizability. Second, the data may reflect informant bias and retrospective interpretation, particularly because suppliers and consultants may hold commercial interests in specific sourcing arrangements. Moreover, as interviews were not audio-recorded or transcribed, the analysis relies on independently taken and consolidated researcher notes. Third, the proposed framework reflects observed sourcing decisions rather than demonstrated sourcing success and does not yet specify whether all SDP-related capabilities must be present simultaneously. Future research should examine additional industries, such as industrial manufacturing and medical technology, and investigate whether capability-contingent sourcing directives are associated with superior outcomes.

6 Conclusion

As SDPs reshape competition in hardware-centric industries, firms must decide which software components to develop internally and source from external partners. This study shows that sourcing in SDP contexts is capability-contingent rather than object-determined. Drawing on a multiple-case study, we extend IS sourcing literature by showing that IT outsourcing directives remain relevant but need refinement for SDP contexts. We identify four SDP-related capabilities and derive a capability-contingent framework for digital sourcing decisions. For practitioners, the framework offers actionable guidance for assessing viable sourcing decisions. For researchers, it supports moving from observing sourcing decisions to examining outcomes.

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