International Journal of Management and Humanity Sciences (IJMHS)
ISSN (online) 2322-424X
Volume 2 Issue 6 2026
SJIF Impact Factor: 6.261
Page No. 01-22

Beyond Digital Lock-in: Exercisable Exit Options and Accountable Recovery in AI-Enabled Business Models

[1]Dr Muhammad Emdadul Haque, [3]Zsofia Borbely

ABSTRACT: The innovation of digital business models often involves the use of third-party platforms, cloud computing, and artificial intelligence (AI), leading to operational and contractual dependence with experimentation possibilities. The current literature discusses digital transformation, ecosystems, and responsible AI but lacks integrated advice on whether it is possible for a company to substitute a crucial service or correct an important automated decision. In this conceptual article, digital commitment reversibility (DCR) is defined as a commitment-specific capacity that can be tested in advance using predeclared operational experiments. It combines real options, dynamic capabilities, transaction cost economics, resource dependence, modularity, and service-recovery justice. The concept recognises two ways: substituting a service and correcting a decision. Four conditions required for DCR include data and rights transfers, technical replacement of connections, contestable decisions when needed, and staged commercial commitments. There are seven testable propositions dealing with bottlenecks, experimentation, service recovery, environmental conditions, contract learning, customer remedy, and option maintenance cost. Official statistics from Eurostat and research articles are mentioned but do not estimate the effects proposed. The example used for illustrating the bounded incident is the outage of Microsoft 365 that occurred on 12-13 November 2026. DCR is not tested by this bounded incident nor does it serve as a case study for LSST.

KEYWORDS: digital business model innovation; platform dependence; business model adaptation; real options; AI governance; switching costs; data portability; digital strategy

Research highlights

- Distinguishes digital technologisation from the capacity to exit, redesign, or reverse its impact.
- Places digital commitment reversibility in relation to previous literature on strategic reversibility and accountability of artificial intelligence without making a claim for primacy of the idea.
- Clarifies the criteria for testing both technical reversibility and decision reversibility.
- Formulates seven hypotheses applicable to longitudinal and event studies, while acknowledging the value of certain commitments.

1. INTRODUCTION

Indeed, digital transformation might render a firm's products and channels malleable whereas its infrastructure and decision-making process become difficult to displace. While a firm can set up an online channel or even AI-based customer service in just several weeks, the effort required for transferring historical data, duplicating workflow rules, negotiating exit and challenging an automated decision reveals the hidden dependencies of the latter. This is a strategic opportunity in general, not a historical claim of the author. This is relevant for business model innovation, as it concerns with how an organisation creates, delivers and captures value, not with acquiring new software (Teece, 2010; Vial, 2019; Verhoef et al., 2021; Trischler and Li-Ying, 2023).

There is research on a range of types of digital business models, their underlying technologies and external dependencies. Kohtamäki, Leminen and Parida (2024) differentiate between digital business model innovation, Internet of Things business models, platform business models and digital servitisation. Trischler and Li-Ying (2023) explain why it is crucial for the quality of research to differentiate between digital business model change and implementation of a particular technological tool. Such literature makes it possible to study the following digital commitment made by the focal firm, its data, interfaces, contracts and decision-making rights for delivering a value proposition (Kohtamäki, Leminen and Parida, 2024; Trischler and Li-Ying, 2023; Hess, Riedl and Becker, 2024).

This becomes relevant under current policy and adoption environment. According to Eurostat data, AI was used in 8.1% of EU enterprises with at least ten employees in 2023, 13.5% in 2024 and 20.0% in 2025. As for a more specific indicator, 45.2% of EU enterprises bought cloud computing in 2023 and 52.7% used paid cloud services in 2025. These are survey indicators of adoption, but not measures of dependence, lock-in or performance impacts of switching. They are relevant due to context - an increasing number of enterprises might have a managerial problem of managing an external technological commitment (Eurostat, 2023; Eurostat, 2025; Eurostat, 2026a; Eurostat, 2026b).

Table 1. EU enterprise technology adoption indicators published. AI and paid-cloud series refer to different activities. This table reports the directly published figures without inferring 2023 paid-cloud adoption from the rounded change. It is not concerned with causality, switching cost or performance impact. Sources: Eurostat (2023; 2025; 2026a).

Indicator and population	2023	2024	2025	Primary publication
EU enterprises using at least one AI technology; 10+ persons employed	8.1%	13.5%	20.0%	Eurostat (2025), dataset isoc_eb_ai
EU enterprises purchasing paid cloud computing; 10+ persons employed	45.2%	Not reported here	52.7%	Eurostat (2023; 2026a), dataset isoc_cicce_use

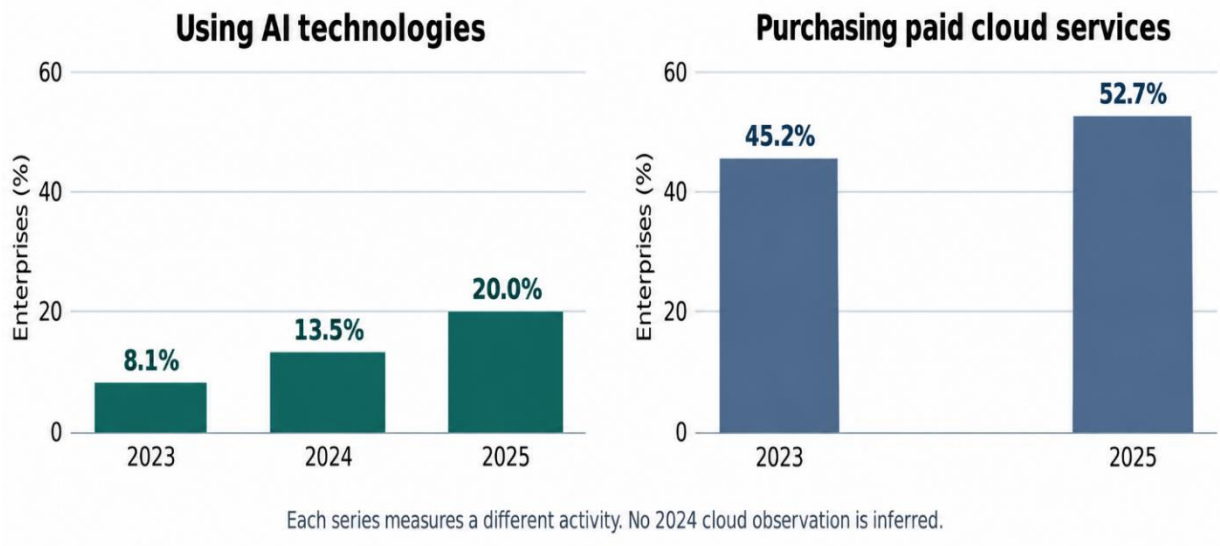


Figure 1. Enterprise usage of AI technologies and paid cloud services in the EU. Values have been separated into individual panels from Eurostat (2023; 2025; 2026a); the missing value in 2024 for cloud usage has deliberately not been estimated. This figure shows the author's visualisation of official secondary statistics and not primary field research.

Disruption of Microsoft 365 on 12-13 November 2026 presents a recent example of the exposure created by interdependent enterprise services. Contemporary reports refer to disruption to email and certain dependent services in multiple scenarios, without testing if any organisation having the option to move to a different supplier experienced less financial loss. Section 5 differentiates the disrupted event from the institutional response and public discourse (Microsoft, 2026; House of Commons, 2026; University of Bath, 2026; Mehta, 2026).

Investigation of cloud infrastructure competition in the UK by the Competition and Markets Authority (CMA) demonstrates more direct evidence of the existence of switching constraints. In its final decision, the investigation found that both technical and commercial barriers can limit the capacity of customers to switch cloud providers or use multiple providers. But the final report also indicates considerable variation in customer experience and suggests that some customers regarded either technical problems or lack of a business case as more significant than data egress costs. Thus, it cannot be used as evidence that all digital supplier relationships are constrained, nor a causal study of generative AI adoption (CMA, 2025; Reimsbach-Kounatze and Molnar, 2024).

This research asks: In what circumstances does having executable options to exit, reconfigure or correct a material digital commitment help with business model innovation and customer value preservation, and in what circumstances do such options come at unnecessary cost? Digital commitment reversibility (DCR) is developed as a commitment-specific capability, which depends upon the nature of the dependency, the triggering event, the executable alternative and the resource necessary to maintain the alternative. The empirical definition of DCR has been differentiated from downstream commercial results, because success must not be defined by the outcome the theory is designed to explain. The contributions of this paper include: definition of DCR at the level of commitment, differentiation between paths of bounded experimentation and accountable service recovery; and falsifiable conditions that can reverse the seeming benefits of flexibility (McGrath, 1997; Jacobides, Cennamo and Gawer, 2018; Papagiannidis, Mikalef and Conboy, 2025).

The qualification of originality is essential. Goutagny (2026) has already explored strategic reversibility of organisations in consecutive crises; and the research on AI accountability has already demonstrated the significance of audit trails and review (Raji et al., 2020; Papagiannidis, Mikalef and Conboy, 2025). Originality of this study lies in the limited contribution: definition of DCR at the level of a supplier or decision commitment that has proven exit capability and accountable correction, alongside the measured commercial results. It does not pretend to originality of the idea of reversibility nor implies that the concept of AI audit has been invented here (Goutagny, 2026; Raji et al., 2020; Kim, 2026).

2. LITERATURE AND THEORETICAL POSITIONING

2.1. Business models and the consequences of external dependence

Digital business models alter the value proposition, delivery mechanisms, and revenues or costs through use of data, connectivity, automation, and collaboration. Simply using technology is not enough to demonstrate innovation in business model – significant alteration in value creation and value capture is needed. Review research reveals the scope and fragmented nature of this topic, as well as the way recent qualitative research shows how generative AI can be used to produce several types of value proposition in IT industry (Teece, 2010; Ancillai et al., 2023; Trischler and Li-Ying, 2023; Teng, Ye and Martinez, 2025).

A digital service is typically not produced solely by the focal company. Platform owners, cloud service providers, AI service providers, application developers, data managers, and customer-oriented intermediaries could own complementary assets. Ecosystem theory stresses mutual dependencies and specific investments necessary for coordinated value creation. Such investments can generate value exactly due to their difficulty of replacement; hence, being ready for exit is not always an alternative to integration. The key point is what dependencies should be protected and what is to be invested into in

order to make a commitment efficient (Adner, 2017; Jacobides, Cennamo and Gawer, 2018; Goertler et al., 2025).

The case of data portability demonstrates the ambiguity. OECD concludes that portability will facilitate switching, stimulate interoperability, and provide users with choice, yet the efficiency of portability depends on conditions of transferring and actual usage of the data, which might be complicated by issues of privacy, security, and higher costs for smaller companies. The same is considered in Kim's (2026) economic model that examines benefits from decreased switching costs and risks related to security. The latter is a theoretical model, not empirical evidence of any breach rate effect. Therefore, file transfer is not necessarily a sign of interoperability and economically optimal switching decision (Reimsbach-Kounatze and Molnar, 2024; Kim, 2026; CMA, 2025).

2.2. Real options, dynamic capabilities and productive commitment

Real options thinking recognizes the benefit in retaining the right, without obligation, to grow, redirect or discontinue an investment given uncertain future conditions. In technological investments, staged commitment allows learning, though delayed decisions are expensive. Dynamic capability research discusses the processes by which organizations sense, seize, and reconfigure resources, while studies on digital transformation recognize the significance of continuous strategic renewal. Neither of the two strands of theories demonstrates that each platform contract or automated process in an organization is replaceable or modifiable (McGrath, 1997; McGrath and Nerkar, 2004; Teece, 2007; Warner and Wäger, 2019).

Thus, an important conceptual distinction can be made between the more generic concept of flexibility and an exercisable real option. In industry, for example, Linde et al. (2021) identified traps in evaluating a digital business model based on research focused on eight manufacturers, thus underlining the need for analyzing the digital opportunity prior to a full commitment. However, such research does not provide empirical evidence for the existence of the DCR concept presented in this paper. The innovation consists of the fact that in this paper, it is assumed that the cost and feasibility of altering the selected commitment is quantified, not the executive's generalized confidence in the organization's flexibility (Linde et al., 2021; McGrath and Nerkar, 2004; Warner and Wäger, 2019).

2.3. Responsible AI governance and the object of correction

AI brings another form of reversibility. An organization might be capable of changing its software vendor, but not to trace back or contest a particular recommendation or action already taken with regard to its client. On the contrary, it might have an effective human escalation path yet depend economically on just one cloud service. Ethical AI research identifies ethical principles and organizational structures that are separate from each other. NIST's AI Risk Management Framework and its generative-AI profile provide voluntary risk management guidelines rather than legal requirements or proof of any financial consideration of benefits (Tabassi, 2023; Autio et al., 2024; Papagiannidis, Mikalef and Conboy, 2025). With regard to the present paper, decision contestability means the presence of authorized mechanisms that would allow for investigation, intervention and solution of the case at issue when such an intervention is necessary with regard to customer value proposition. This condition is conditional: in the case of a low-risk internal tool, model output could simply be discarded, whereas in the case of a service for a customer, correction rights and audit trail could be significant. This is aimed at avoiding misinterpretation of human oversight of the decision as evidence of its reversibility. Algorithmic auditing literature underlines the significance of audit trail and review mechanisms at all stages of systems lifecycle; however, it does not prove the success of any particular intervention process (Raji et al., 2020; Papagiannidis, Mikalef and Conboy, 2025; Autio et al., 2024).

2.4. A bounded synthesis of the available evidence

This is an integrative analysis of theory and concepts, rather than a systematic review, primary survey, or meta-analysis. Studies were chosen on the basis of relevance to construct definition, theoretical

explanation, empirical design, or official documentation of switching conditions. There was no exhaustive search strategy, no PRISMA diagram, no measure of intercoder reliability, and no source sample involved. In Table 2, verifiable properties of eight published studies and, importantly, what each one can and cannot demonstrate in support of the current thesis are indicated. Review samples may be overlapping and must not be summed to create a hypothetical evidence base (Ancillai et al., 2023; Trischler and Li-Ying, 2023; Papagiannidis et al., 2025).

Table 2. Source-verified empirical designs and evidential constraints, paraphrased from the original literature (Ancillai et al., 2023; Trischler and Li-Ying, 2023; Kohtamäki et al., 2024; Uršič and Čater, 2025; Papagiannidis et al., 2025; Li et al., 2025; Teng et al., 2025; Linde et al., 2021). The figures refer to separate published studies, not to a composite sample.

Study	Published design / reported base	Support for the present argument	Evidential limitation
Ancillai *et al*. (2023)	Systematic review; 106 articles	Technology-enabled business model change	No DCR effect estimated
Trischler and Li-Ying (2023)	Targeted review; 57 publications	Construct clarity for digital business model innovation	No supplier-exit test
Kohtamäki *et al*. (2024)	Bibliometric review; 101 studies	Four thematic digital business model clusters	Not a causal firm study
Uršič and Čater (2025)	Review with bibliometric/topic analyses; 684 articles	Multi-level digital innovation research	No firm-level reversibility treatment
Papagiannidis *et al*. (2025)	Scoping review; 48 papers	Organisational responsible-AI governance	No switching-outcome comparison
Li *et al*. (2025)	Two-wave survey; 238 firms	Reported links between digital transformation, resilience and sustained performance	Observational design; does not test DCR
Teng *et al*. (2025)	Qualitative study; 32 interviews and archival data	New generative-AI value propositions in IT firms	Non-representative industry context
Linde *et al*. (2021)	Qualitative study focused on eight manufacturers	Digital-business-model opportunity assessment	Cannot estimate population effects

It is true that the data provides support for the importance of digital dependencies and governance but does not show any proof about the revenue generation or loss reduction due to the investment in DCR technology. The theory integration described in section 2.5 explains the reason behind taking the technical substitutes availability, supplier bargaining power and customer remedies as independent variables. This is a theoretical prediction that requires empirical confirmation on its own right. This is an essential requirement for a conceptual paper (McGrath, 1997; Li et al., 2025; CMA, 2025; Papagiannidis, Mikalef and Conboy, 2025).

2.5. Theoretical integration: dependence, architecture and customer recovery

Transaction Cost Economics (TCE) and Switching-Cost Economics help to explain why what seems like a good digital bet may turn out to be difficult to reverse. Asset specificity, contractual mechanisms, and uncertainty can influence the relative cost of transacting, negotiating, or internalizing an activity. With a specific investment made by a company in relation to the data structure, training, and integration of the vendor, moving workloads is not necessarily the same as shifting a generic input. The Klemperer model illustrates the impact of switching costs on competitive markets but does not estimate switching costs in current cloud computing and artificial intelligence markets. With regard to DCR, TCE indicates that the value of keeping the tested alternative and the cost of this action are dependent on the level of specific investments, credible alternatives, and importance of cooperation with partners.

Resource dependence theory (RDT) adds Resource dependence theory (RDT) introduces bargaining power and exposure to external control. While the provider might hold critical access to information, interfaces, licences and operational know-how, the customer might be unable to negotiate from a position of strength at all. Dependence can be mutual, though, and partnership, alliance and integration can give access to resources that would otherwise get lost due to exit. Therefore, supplier concentration needs to be distinguished from contract switching costs and from a proved ability to exercise the alternative. At any given technical readiness, lack of bargaining power might impede exit; conversely, strong mutual dependence might enable negotiated protection without exit. These are different predictions to be studied further, not the findings of the original RDT review (Hillman, Withers and Collins, 2009; Adner, 2017; Jacobides, Cennamo and Gawer, 2018).

Modularity theory offers an explanation for a technical aspect of the mechanism. Modules and disciplined interfaces allow easier replacement and reconfiguration. However, an API might look exchangeable, but reconstruction of critical fields, business logic, provenance, client authorisations or complements might not be feasible. The decisive proof of modularity is successful substitution rather than the assertion of ‘modular architecture’. Modularity thus needs to be modelled as an antecedent or enabler of service-substitution DCR rather than a synonym or guarantee of DCR or financial gain. Strong mutual optimisation across modules might bring efficiency gains that substitution would destroy (Baldwin and Clark, 2000; Linde et al., 2021; CMA, 2025; Reimsbach-Kounatze and Molnar, 2024).

Service recovery and justice theory explains why mere restoration of technical availability does not necessarily secure customer value. In a study of customer complaints, Tax, Brown and Chandrashekaran (1998) identify distributive, procedural and interactional aspects of justice and study their relationship with trust and commitment. This mechanism can be applied to algorithmic errors and AI-supported decision-making as an innovation in this paper, which was originally developed without considering either of them. Thus, the effective path to a credible DCR would include correct analysis, accessible process, proper restitution and clear explanation. Customer-focussed assessment should thus be based on customer data rather than on the logs of internal recovery procedure (Tax, Brown and Chandrashekaran, 1998; Raji et al., 2020; Papagiannidis, Mikalef and Conboy, 2025).

The roles of each of the theories are clearly differentiated: TCE, switching cost and resource dependence theories explain exposure to loss; modularity describes the technical substitutability; real options and dynamic capabilities explain staged reconfiguration; and service recovery and justice describe customer evaluation following a remedy. None of them alone explains universal benefit from DCR. Thus, other potential explanations, including IT maturity, provider quality, size and client trust, need to be studied independently (Williamson, 1979; Klemperer, 1987; Hillman, Withers and Collins, 2009; Baldwin and Clark, 2000; McGrath, 1997; Teece, 2007; Tax, Brown and Chandrashekaran, 1998).

Table 3. Alignment of theory and mechanism. Author-developed classification; the foundational sources do not test DCR. The final column suggests discriminating instead of established tests.

Theory / literature	Distinct mechanism	Observable implication for DCR	Main proposition or counter-test
TCE and switching-cost economics (Williamson, 1979; Klemperer, 1987)	Specific investments and transfer frictions	Record contractual exposure, retraining and unrecoverable asset costs independently of drill success	P4 / P7; exit may destroy profitable specificity
RDT (Hillman, Withers and Collins, 2009)	Asymmetrical interfirm control	Measure supplier concentration, counterparty leverage and alternative-provider availability	P4; mutual dependence may support negotiated continuity
Modularity (Baldwin and Clark, 2000)	Bounded component substitutability	Test interfaces, semantic interoperability and minimum viable service on an alternative	P1 / P2; nominal modularity may not yield executable exit
Real options and dynamic capabilities (McGrath, 1997; Teece, 2007)	Staged learning and reconfiguration	Compare decision gates and rehearsal history with actual subsequent decisions	P2 / P5 / P7; option cost may exceed flexibility value
Service recovery and justice (Tax, Brown and Chandrashekaran, 1998)	Procedural, distributive and interactional fairness	Independently assess review timeliness, remedy fairness and customer understanding	P3 / P6; service repair need not restore trust

3. DEFINING DIGITAL COMMITMENT REVERSIBILITY

3.1. Definition and level of analysis

Digital commitment reversibility (DCR) Digital commitment reversibility (DCR) is the ability of the focal firm, in respect of a particular material digital arrangement, to successfully carry out a legal and technically feasible service substitution or decision-correction task to meet predeclared operational criteria. Such task-level criteria are completeness of transfer, functionality, decision-making authority and exercise feasibility; any customer retention, revenue or loss outcome variables arise after that. The unit here is a commitment-pathway combination, not the maturity level of the whole firm. Specificity of asset, concentration of dependency, and the modularity of the service are antecedents or context variables, not components that make successful reversibility happen automatically (Williamson, 1979; Hillman, Withers and Collins, 2009; Baldwin and Clark, 2000). Commitment can be about a distribution pathway of a platform, workload in the cloud, an AI service, proprietary interface, or automated decision making. Pathway tells which specific item will be changed, whereas the ex-ante test protocol defines the minimal acceptable levels of completeness, functionality, legality and decision-making authority (McGrath, 1997; Jacobides, Cennamo and Gawer, 2018; CMA, 2025; Autio et al., 2024).

Elements

DCR definition implies five observables: dependency that matters for value creation, a realistic triggering situation, an alternative or a corrective pathway, predeclared threshold values of acceptance criteria, and empirical evidence from a controlled experiment, switch or remediation procedure. A subsequent event or a business outcome cannot be used as a predictor in the DCR effects test. Without an executable route, a policy statement is planned preparedness rather than DCR. An execution that has resulted in a technically successful export, but data is unusable, is insufficient. The same company can have a high score for one type of commitment and low – for another. It helps to avoid mislabelling a company as DCR-effective because of easily reversible commitment (Reimsbach-Kounatze and Molnar, 2024; CMA, 2025; Tabassi, 2023).

3.2. Four conditional capability conditions

Transferable data and rights refer to completeness, intelligibility, source, and proper use rights of important data. The mere downloading of the file is insufficient in cases where records lack semantics, access rights, or valid usage rights. Replaceable execution paths relate to interfaces, operating procedures, personnel knowledge, and the capacity to shift the operation of the service without reconstructing all of the other dependent operations. These conditions apply to service substitution, but the level of portability varies depending on the particular case (CMA, 2025; Reimsbach-Kounatze and Molnar, 2024; Goertler et al., 2025).

Contestable AI-driven decisions require the necessary rights and records to investigate, escalate, and remediate the consequences of such decisions. Commercial staged decisions are a cross-cutting condition: rights, duties, and gates of transition that enable an organization to delay, change, or cancel an agreement before incurring undesirable consequences. Thus, commercial staging is a cross-cutting condition in figure 2, where the sequence includes interfirm dependency and technical modularity before exit or correction and commercial consequences after. Contestability is inapplicable in cases where the dependency lacks any automated decision-making. However, mere termination of a contractual agreement does not create any usable options (McGrath and Nerkar, 2004; Papagiannidis, Mikalef and Conboy, 2025; Kim, 2026; Autio et al., 2024).

Table 4. Proposed operational conditions. These are author-developed operational conditions based on existing literature and guidance, but not survey items validated by research and not a claim that all four dimensions are always necessary (McGrath, 1997; Baldwin and Clark, 2000; CMA, 2025; Papagiannidis et al., 2025; Reimsbach-Kounatze and Molnar, 2024).

Dimension	What must be demonstrable	Typical documentary or test evidence	Important constraint
Data and rights transferability	Essential records can be recovered, interpreted and lawfully reused	Data export/re-import test; data dictionary; contract and permissions review	Data protection and incomplete semantics
Execution-path replaceability	Critical customer service can operate through an alternative	Sandbox migration; interface test; continuity rehearsal	Complementarities and reconfiguration cost
Decision contestability, where applicable	An authorised reviewer can investigate, correct and communicate an outcome	Incident log; audit trail; escalation/override test	Access, intelligibility and procedural fairness

Dimension	What must be demonstrable	Typical documentary or test evidence	Important constraint
Staged commercial choice	The firm can exercise a known stop, change or exit route at a stated cost	Contract clauses; pilot decision gates; agreed transition plan	Exit charges, lost discounts and partner incentives

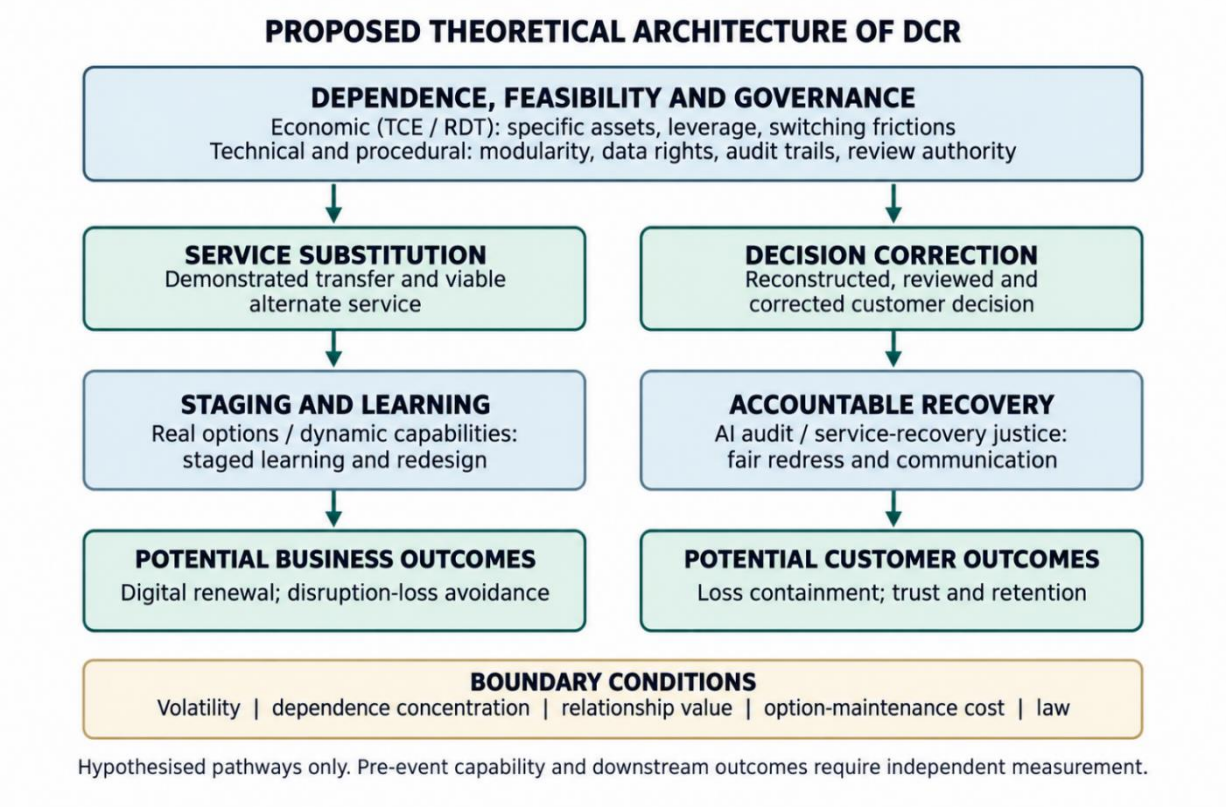


Figure 2. Framework for digital commitment reversibility. The transaction cost and resource dependence approaches determine vulnerability; modularity and accountability reviews provide different approaches; real options and dynamic capabilities deal with their implementation; and service justice processes influence post error assessment by customers. These arrows represent proposed approaches rather than any estimates of causal effects. Figure source: Author's synthesis drawing on Williamson (1979); Klemperer (1987); Hillman et al. (2009); Baldwin & Clark (2000); McGrath (1997); Teece (2007); Tax et al. (1998); Raji et al. (2020).

3.3. Distinction from neighbouring constructs and earlier reversibility scholarship

DCR cannot be simply equated to agile capabilities as a synonym. Agile capabilities relate to quick response, modularity relates to separation of technical components, resilience relates to continuation and recovery, and dynamic capabilities relate to renewal. DCR tells us whether a specific and important digital change is possible within certain limitations. Data portability and contract rights could make such digital change possible, but they don't ensure protection of customer value in any way. It could be empirically proven since two companies with similar agility ratings could differ significantly in their timely migration or accountable correction test (Teece, 2007; Warner and Wäger, 2019; Reimsbach-Kounatze and Molnar, 2024; Li et al., 2025).

Strategic reversibility in the context of organisational strategy amid recurrent disruptions is provided by Goutagny (2026), and there already are procedures for internal audit of algorithms and governance of responsible AI. Hence, the paper does not claim terminological novelty and/or innovation in terms

of contractual options, modular systems or customer protection. The main proposed contribution is the combination of interfirm dependence, pre-event test of service exit and correction of customers at a particular digital commitment. Whether it's an incremental or significant contribution is up to the academic community to judge (Goutagny, 2026; Adner, 2017; Raji et al., 2020; Papagiannidis, Mikalef and Conboy, 2025).

4. MECHANISMS AND TESTABLE PROPOSITIONS

4.1. Applicable bottlenecks rather than an average flexibility score

The failure of operational reversal might be due to one link that cannot be reversed. When the system design includes modules and even a non-portable interface or permission record cannot be reversed, the whole service substitution will not succeed. Therefore, modularity is considered as a potential enabler of service substitution but not as its observation (Baldwin and Clark, 2000; Reimsbach-Kounatze and Molnar, 2024). Data portability would have little practical use when the receiving service cannot process it; an alternative technical engine cannot be used when the contract does not allow the transfer; human review is impossible when there is no sufficient authority or evidence. Complementary activity structures are emphasised by ecosystem studies, and official cloud findings include the actual problems of substitution. This may indicate the weakest-link effect per path, but only among indispensable dimensions in the context of the specific exit or correction pathway (Adner, 2017; Jacobides, Cennamo and Gawer, 2018; CMA, 2025; Reimsbach-Kounatze and Molnar, 2024).

P1 (pathway bottleneck). In a particular material digital commitment, the minimum readiness score among the indispensable conditions of the particular pathway will better predict the observed reversibility than an arithmetic mean of the four conditions, controlling for general digital capability.

Testing of various models for predicting the reversibility can be conducted using alternative models and pass/fail switching/correction exercises. The hypothesis will be rejected if the lack of a crucial dimension is always compensated by a capability in another noncritical dimension or if an average score provides the same predictive ability.

4.2. Bounded experimentation and business model renewal

An option gains its value in the moment the firm acquires some knowledge prior to further investment. The availability of a viable fallback will lessen the expected loss from the failure of digital pilot and allow testing other customer offers or distribution channels. However, the mere conducting of numerous pilots is not innovation; the experiment should yield some interpretive results and trigger business decisions. Past research links digital transformation with iterative strategic renewal and warns about the risk of commercialising digital opportunities without proper evaluation (McGrath, 1997; Warner and Wäger, 2019; Linde et al., 2021; Trischler and Li-Ying, 2023).

P2 (experimentation). Digital capability readiness will have a positive impact on the subsequent digital business model innovation due to more validated experimentation and faster reaction to disconfirmatory data with a viable alternative, subject to management's ability to act on the acquired information.

The mediation effect can be ruled out in case exit readiness does not relate to validated trials after controlling for past innovation capability or in case additional trials do not contribute to any value creation/capture.

4.3. Accountable recovery following service or AI failure

Reestablishing a service and remedying its consequences are not equivalent activities. If similar untested assumptions, data or incentives persist, the new model may replicate a flawed decision. For AI-based consequential decisions, it may be necessary for a business to keep the decision record,

appoint an authorised reviewer and have an understandable remedy in addition to re-establishing technical service. Service-recovery justice explains how the procedural justice, remedy and communication of recovery may be important factors to consumers regardless of restoring service; extending this reasoning to AI decision-making outcomes is still a hypothesis (Tax, Brown and Chandrashekaran, 1998; Raji et al., 2020). AI governance framework identifies appropriate organisational procedures, while transformation and resilience surveys point to the importance of recovery process, yet both do not give any direct evidence about the suggested DCR pathway (Papagiannidis, Mikalef and Conboy, 2025; Tabassi, 2023; Autio et al., 2024; Li et al., 2025).

P3 (accountable recovery). In the aftermath of material disruption to a digital service or an error in AI-supported decision, capability for the appropriate recovery pathway - substitution of the service or decision correction - will predict a lower level of customer service loss through quicker and defensible resolution, taking into account the severity of the incident and resilience capabilities of the organisation beforehand.

The suggested proposition will not be supported if recovery outcomes are determined by incident characteristics, response actions of suppliers or general organisational capabilities rather than executable recovery pathways.

4.4. Dependence concentration and environmental volatility

Indeed, the economic value of maintaining the option to switch can increase as a function of the likelihood of future changes, the size of the revenue or service that is supplied through a single dependency, and the higher exit costs associated with it. Both transaction cost economics and RDT emphasise that concentration of suppliers does not necessarily entail lock-in since relationship-specific investments and mutual dependence can generate efficiencies or lead to contractual safeguards against problems (Williamson, 1979; Hillman, Withers and Collins, 2009; Klemperer, 1987). The CMA market investigation provides evidence for switching frictions, whereas the ecosystem literature suggests that supplier concentration can provide access to important complementary resources. The conditional nature of the prediction rather than an automatic recommendation to use multiple clouds or suppliers is thus justified (McGrath and Nerkar, 2004; Jacobides, Cennamo and Gawer, 2018; CMA, 2025; Kim, 2026).

P4 (boundary conditions). The positive effect of DCR on downside-adjusted value preservation is contingent upon critical digital dependence being concentrated and the environment changing frequently.

Dependence concentration should be determined prior to the occurrence of the shock since otherwise researchers might confuse the effects of supplier diversification following an incident on firm performance.

4.5. Learning-oriented staging and commercial discipline

Having a short-term contract or a pause clause is not enough to provide an option that is worth exercising. Organisations should have decision gates, proof of feasibility, and the ability to take action based on the new information. Otherwise, the staging process may be an indefinite postponement as data, employees' habits and customer's expectations get increasingly entwined with the incumbent. This point is based on the main difference between options as a possibility and knowing how and when to exercise it (McGrath, 1997; McGrath and Nerkar, 2004; Linde et al., 2021).

P5 (staging complementarity). Staged commitments will predict larger demonstrated DCRs when paired with pre-specified learning milestones and exit or correction rehearsals, in comparison with having flexible contracts but no procedures.

An example that could contradict the hypothesis is when the organisation uses standardised technology and the providers could change right away without rehearsal exercises. These examples are valuable and should not be omitted.

4.6. Customer remedies and observable value

Recovery is possible despite the loss of customer confidence due to lack of adequate explanation and correction on behalf of the affected party. Meanwhile, remedy is still useful even in the absence of configuration changes in the service. Service recovery justice enhances this mechanism by pointing out that technical corrections might still be unfavorable when the process itself is unclear, redress inadequate, or the communication used is dismissive. Extension of this concept to AI-supported decision making is suggested here; Tax, Brown and Chandrashekaran (1998) researched complaints handling, not AI. This prediction builds on the link between responsible AI governance and outcomes for business models; it is not one of the effects identified by NIST or the mentioned scoping review. Externally observable customer evidence is thus necessary for the final test (Tax, Brown and Chandrashekaran, 1998; Teece, 2010; Papagiannidis, Mikalef and Conboy, 2025; Autio et al., 2024).

P6 (customer remedy). The correlation between demonstration of correction capability and customer retention following an error made in the process of AI-supported service will be higher if the affected customers received timely and clear remedies rather than any internal correction.

4.7. The costs of excessive options

Dedicated substitutability capability may necessitate duplication of infrastructure and capabilities, lower degree of customisation integration and repeated rehearsal costs. Data transmissions could also make it easier for the organisation to face security and privacy threats. On the other hand, strong relationships within ecosystems could lead to the scale, learning and investments by partners which will suffer from interchangeable nature. Hence, the optimal level of DCR could be determined by the potential losses and costs of keeping the alternative, but not by the goal of achieving maximum flexibility (Adner, 2017; Jacobides, Cennamo and Gawer, 2018; Reimsbach-Kounatze and Molnar, 2024; Kim, 2026).

P7 (option-cost frontier). In case of relative stability, net value link of DCR investments will at some point flatten or become negative when maintenance, security, coordination and lost specialisation costs surpass anticipated avoidance benefits.

It is an empirical statement, not the observed inverted-U pattern. TCE suggests an opposite opportunity: protection costs for avoiding switching may be wasteful in case of durable and relationship-specific partnership creating beneficial coordination (Williamson, 1979; Baldwin and Clark, 2000). Both costs of maintaining options and real avoidance benefits should be estimated instead of assessing how complicated the backup solution is.

Table 5. Proposed propositions and counter-explanations. All rows are untested expectations proposed in this paper; not empirically supported results (McGrath, 1997; Teece, 2007; CMA, 2025; Papagiannidis et al., 2025).

Proposition	Mechanism or condition	Proposed test	Main rival explanation
P1	Applicable weakest-link bottleneck	Predict actual rehearsal success from critical minimum vs mean readiness	General IT competence

Proposition	Mechanism or condition	Proposed test	Main rival explanation
P2	Validated experimentation	Time-ordered mediation into business model changes	Innovation culture / finance
P3	Accountable recovery	Incident-level loss and time-to-remedy analysis	Incident severity / supplier response
P4	Environmental and concentration contingency	Interaction using pre-event concentration and volatility	Scale and market power
P5	Learning-oriented staging	Contract flexibility x exercise records	Routine operational excellence
P6	Customer-visible remedy	Post-incident retention comparison	Baseline reputation / price changes
P7	Cost frontier	Net value vs documented option-maintenance cost	Unobserved technological complexity

5. REGULATORY, SERVICE-CONTINUITY AND CONTEMPORARY EVIDENCE

5.1. Data rights, interoperability and competition policy

One practical example of institutional consideration of switching barriers is the EU Data Act (Regulation (EU) 2023/2854), which contains provisions related to data-processing service switching; in particular, Article 29 provides for the staged reduction and the subsequent ban on switching charges in the scope of the regulation. According to the European Commission, the ban on switching charges, including data egress charges subject to the above-mentioned provisions, is set to come into force on 12 January 2027; by 17 November 2026, this deadline is still in the future. One should not consider the above-mentioned regulation as already eliminating all such charges nor expect it to equally apply its obligations to any AI service or contract (European Parliament and Council of the European Union, 2023; European Commission, n.d.).

The 16 October 2026 proposed decision of the UK CMA raises additional concerns about barriers to switching and integrating business software, including AI services, and launches a consultation about designating Microsoft with strategic market status in its business software ecosystem. The CMA reports negotiations with large cloud providers regarding interoperability and transfer fee changes. That is an ongoing competition assessment and policy process, not a finalised statement of any violation of law or an evidence of any higher profits obtained by implementation of DCRs (CMA, 2025; CMA, 2026).

That is important even from a theoretical point of view because lowering a contractual or price barrier does not ensure an alternative environment able to interpret data, support customer workflows and save decisions history. On the other hand, the mandate for interoperability may have some effects on the cost incentives of small providers and their security exposure. An empirical study should make clear distinctions between changes in legal possibilities, technological ability and a full alternative business model (CMA, 2025; Reimsbach-Kounatze and Molnar, 2024; Kim, 2026).

5.2. The November 2026 Microsoft 365 outage: a bounded illustration

Microsoft 365 had a service incident across multiple regions on 12–13 November 2026, identified with codes EX1550543 and MO1550821. Service-health communications preserved in the University of Pennsylvania indicated connection problems, especially with Exchange Online, as well as disruption of other Microsoft 365 software functionality relying on the impaired infrastructure. Later updates defined

the situation as technical, with no indication that it was the consequence of cyberattacks or autonomous AI agents. As post-incident technical explanations can be further elaborated, the description should not be treated as a conclusive, independently established causal diagnosis of all affected elements (Microsoft, 2026; House of Commons, 2026).

Operational communications issued by the University of Bath provided notice of disruption to email, calendar and other Microsoft 365-related services, recommended alternative ways to get in touch with the university and later announced service resumption. This is the example of how one organisation responded to the incident; it cannot be used to calculate how many classes were missed or to prove that multi-cloud strategy or complete supplier migration would have helped. (University of Bath, 2026; Microsoft, 2026).

An article in the LSST Life dated 13 November 2026 discussed the issue of concentration of technological dependencies. Kunal Chan Mehta cited experts on this matter, including the statement made by LSST VLE Administrator Imran Termezy regarding the need for true alternatives and continuity plans. It is the commentary from the professionals, not an incident report, quantitative research or any proof that LSST suffered from that outage for some time or incurred financial damage. The UK House of Commons recognised business and public services disruption but also stated that emergency services stayed functional in spite of that incident. These sources should not be mixed (Mehta, 2026; House of Commons, 2026; University of Bath, 2026).

In terms of the DCR construct, the case demonstrates the need for dependency mapping, alternative means of communication and preparation for service continuity. However, a workaround solution is not equivalent to changing a key supplier, and service availability is not an evidence of being able to reconstruct and remedy the problem with the help of AI. Thus, the case serves as a basis for a research question, but not for proving P1–P7 hypotheses or a positive impact of DCR (Microsoft, 2026; University of Bath, 2026; McGrath, 1997; Teece, 2007).

Table 6. Source-bounded evidence related to the 2026 Microsoft 365 service incident in November. Records contain information about disruption, official evaluation or expert commentary; none of them measure DCR or reveal a causal effect of the treatment. Sources: Microsoft (2026); University of Bath (2026); Mehta (2026); House of Commons (2026).

Document / status	What the source documents	What it cannot establish
Microsoft service-health updates (archived)	Affected services and incident identifiers; reported technical status and recovery updates	Independent causal effect of any firm's DCR investment or comprehensive final root-cause proof
University of Bath operational notice	Institution-specific disruption, continuity guidance and subsequent restoration notice	A cross-university impact total, supplier-switching success or a profit effect
LSST Life article (Mehta, 2026)	Expert commentary about dependence and the need for alternatives and backup arrangements	Measured LSST downtime, institutional financial impact or experimental proof
House of Commons statement	Reported disruption across businesses and public services, with essential services continuing	Complete incidence counts, uniform impacts or DCR effectiveness

5.3. A hypothetical commitment-level diagnostic

In order to illustrate the proposed process, one could imagine a scenario where an independent retailer uses a customer service solution that consists of a commerce platform, a third-party cloud data storage

and a generative AI recommendations service. In such a case, it may be found during a test that product data can be exported but the metadata associated with the customer permissions cannot be integrated; that an alternative solution can be implemented but there is no way of reconstructing output decisions; and that a migration clause exists but the time it will take would lead to significant downtime for the organisation. No data from any company, numbers or field observations are used in this example.

6. EMPIRICAL DESIGN FOR VALIDATING THE FRAMEWORK

6.1. Measurement and data provenance

DCR must be gauged via tests of exercisability and not just by strategic flexibility as indicated via self-reports. The distinct baseline explanatory covariates are asset specificity (special investments and retraining), bargaining asymmetry (concentration and alternative suppliers), technical modularity (interface substitutability) and quality of justice service (client perception of procedure, recourse and interaction). None is imputable by post facto profit, retention or speed of recovery; theory-consistent measures require piloting (Williamson, 1979; Hillman, Withers and Collins, 2009; Baldwin and Clark, 2000; Tax, Brown and Chandrashekaran, 1998). The protocol for testing each relevant commitment captures the dependency; the data and system permissions; the triggering scenario; the service and client threshold; the named decision authority; the contingency route; and the outcome of the controlled exercise. Where the dimension is irrelevant to the case, it should be recorded as non-applicable with a rationale, rather than scored zero which disqualifies the whole case. All threshold values should be established ahead of the exercise or the incident in order to preclude retrospective grading (CMA, 2025; Reimsbach-Kounatze and Molnar, 2024; Tabassi, 2023; Autio et al., 2024).

Table 7. Measurement candidates for research readiness. Measures and thresholds require independent validation in an empirical study; estimates of reliability, validity, profitability or real recovery time are not offered here (Li et al., 2025; CMA, 2025; Autio et al., 2024).

Variable	Candidate measure	Source of evidence	Major validation issue
Baseline demonstrated DCR	Independently scored completion of pre-specified operational exercise	Baseline sandbox logs or rehearsal evidence	Criticality; non-applicable dimensions; scorer independence
Data transferability	Usable and lawfully portable critical records	Export/re-import audit; permissions review	Semantic completeness
Technical substitution	Recovery of minimum viable customer service	Alternative integration/rehearsal logs	Hidden downstream dependencies
AI decision contestability	Correctable cases and time to defensible remedy	Incident logs; independent reviewer assessment	Reviewer independence and fairness
Validated experimentation	Trials producing explicit continue/pivot/stop decisions	Product, board or change-decision records	Trial quality vs trial count
Later net business value	Post-baseline performance and observed loss exposure, net of documented option costs	Independent finance, incident, customer and contract records	Counterfactual attribution; unrelated demand changes

A single reflective scale may mask the proposed dependency between the conditions. Criterion contamination needs to be avoided since a migration rehearsal that would provide the score on the baseline level of DCR cannot simultaneously be used as an indicator of DCR effects on loss prevention or customer retention. Possible alternatives might include comparison of a bottleneck index, formative composite, and specific pathway configuration in relation to success of test. Reporting needs to include the measurement inter-rater reliability for migration rehearsal outcomes, discriminant validity in relation to digital agility and resilience, and sensitivity to critical commitment. The goal here is not to ensure a desired statistical effect, but to determine whether DCR contributes to the explanation (Teece, 2007; Warner and Wäger, 2019; Li et al., 2025).

6.2. Predeclared exercises, independent outcomes and adjudication

One practical approach starts by selecting a value-relevant commitment according to an established criterion, rather than finding a reversible practice after observing the result. Prior to the test, the researcher and participating organisation would agree on the exit/correction condition, the records and interfaces that should continue working, the body authorising the drill, data protection limitations and unambiguous success/failure criteria. Reviewers who had no involvement in designing the mechanism would evaluate the exercise and note down any failure, any lack of information and unforeseen dependencies. The classification would not change based on the organisation's performance at a later stage (Raji et al., 2020; CMA, 2025; Reimsbach-Kounatze and Molnar, 2024).

In case a December 2026 incident at Microsoft motivates the future empirical study, the researchers would need organisation-level data collected independently from media reports, which would include reliance on affected elements; availability of a tested backup before 12 November; invocation of the backup and its timing; customer implications; as well as comparable non-exposed or differently prepared organisations. Institutional press release and other public discussion cannot reveal counterfactual performance figures. This is a suggested study design, not the research undertaken for this article (Microsoft, 2026; University of Bath, 2026; Mehta, 2026; Li et al., 2025).

At a later observation date, new documents would account for changes in the suppliers, disruptions in services, customer remedies and expenses related to maintenance of the options. Losses of customers and associated financial implications would be considered only in the presence of valid comparison period or comparative cases. Any revealed connection should withstand adjustment for existing baseline resources of the company, seriousness of the incident and prior performance; a successful drill cannot be proof of profitability. Researchers would need to document any excluded cases and any failed tests, protect confidential contracts and determine whether disclosure of any additional information poses security or privacy threat (McGrath, 1997; Li et al., 2025; Reimsbach-Kounatze and Molnar, 2024; Papagiannidis, Mikalef and Conboy, 2025).

6.3. A feasible longitudinal programme

A three-wave design might be able to convincingly demonstrate temporal ordering better than a single questionnaire wave. In the baseline survey, the researchers could measure material commitments, tested reversibility, technology complexity, general IT capacity, company size, previous performance, dependence concentration and regulatory exposure. During the observation period, they could record changes in providers, contract renewal, occurrences of issues, any policy changes and experiments. In the final wave, they could evaluate business model change, recoverable customers and financial results. The sample size and statistical power would be based on the results of a pilot study and not made up in this conceptual article (Li et al., 2025; Warner and Wäger, 2019; Teng, Ye and Martinez, 2025).

Events-based analysis might be useful when an external shock to the organisation is independent from its previous preparedness. However, there is a non-uniform distribution of shocks in the world, and those companies that have more resources will both invest in the DCR and do better. Therefore, researchers should pay attention to comparison of matched observations, firm and time fixed effects,

pre-event covariates, the timing of the mechanism, and sensitivity tests; yet even these measures do not provide automatic identification of causation. Process tracing of positive and negative cases will make it possible to understand the missing constraints (CMA, 2025; Li et al., 2025; McGrath and Nerkar, 2004).

Negative cases must be analysed as well. Negative cases include the firm that does good despite supplier lock-in; the firm with portability in principle that does not pass the substitution test; the business in which the review process compensates the result without supplier changes; and the small resource-strapped firm, for which the cost of maintenance of another technical environment exceeds a plausible exposure. They will help the researcher understand the limits of the framework and avoid the circular definition in which only successful cases count as reversibility (Jacobides, Cennamo and Gawer, 2018; Reimsbach-Kounatze and Molnar, 2024; Linde et al., 2021).

7. IMPLICATIONS FOR DIGITAL MANAGEMENT

Rather than asking whether everything can be made interchangeable, senior management needs to know which commitments are important and what will happen if the important provider, model or decision-making process fails. A proportional inventory must tie each of its dependencies to the customer value process, contractual right, a testable alternative and an accountable owner. Senior management then has a basis for comparing the cost of maintaining the option to the specific risk associated with a downside event rather than using portability as an end in itself (CMA, 2025; Reimsbach-Kounatze and Molnar, 2024; McGrath, 1997).

Procurement and product managers should establish conditions for testing migration before entering into significant agreements on what records and metadata can be accessed, usage rights upon termination of the agreement, how interoperability would be demonstrated, who pays for the transition, and what service performance levels will be achieved by the alternative. AI product managers should additionally determine how often a customer-facing output can be verified, corrected and communicated. These are proposed controls for management rooted in identified dependencies and governance guidance; their economic effectiveness remains to be determined empirically (European Parliament and Council of the European Union, 2023; CMA, 2025; Papagiannidis, Mikalef and Conboy, 2025; Autio et al., 2024).

The Microsoft 365 experience implies three separate managerial checks rather than a standard recommendation to drop a substantial supplier: 1) can the organisation communicate and maintain critical records when its identity or collaboration tools fail; 2) can it migrate the critical process and records to a permissible alternative; and 3) can it investigate and fix an important automated decision? The checks correspond respectively to continuity, supplier substitution and decision contestability. The economic efficiency of such checks cannot be derived from the experience alone; organisational testing and cost data are required (Microsoft, 2026; University of Bath, 2026; Mehta, 2026; CMA, 2025; Papagiannidis, Mikalef and Conboy, 2025).

Directors may utilise four indicators with caution: the proportion of critical commitments for which there is an authorised alternative that passed the test; time to restore the minimal viable service; the percentage of AI-dependent results for which there is an efficient way to investigate and correct the problem; and the recurring cost of keeping such options. Board reports must not confuse the existence of a policy with successful implementation; an uneventful period does not constitute evidence that control was effective. The most valuable evidence is a failed drill identifying a preventable bottleneck before the incident occurs (Raji et al., 2020; CMA, 2025; Tabassi, 2023; Autio et al., 2024).

SMEs may benefit more from targeted checks and preparations than from full-fledged costly infrastructure; a tested export procedure, documented rights, knowledge transfer, contingency and appropriate reviewer may offer sufficient protection. This is a managerial conclusion; there is no proven

effect on SME profitability yet. There is a need for the measurement of the firm size, dependence concentration, regulatory requirements and workforce capabilities before generalising for particular sectors (Eurostat, 2026b; Linde et al., 2021; Reimsbach-Kounatze and Molnar, 2024).

8. LIMITATIONS AND CONCLUSION

This work offers a theoretical contribution grounded in selective literature synthesis and secondary literature. It contains no original empirical results or samples, no interviews or experiments, no estimated coefficients, causal tests or verifiable effects of DCR on business outcomes. Reversibility and associated theories are known in academic tradition; originality is concerned about their operationalisation and testing through material digital business model commitment. The four conditions might not be equally relevant for all industries, and the value of exit might be smaller than the value of reliable and relationship-specific commitment. Inter-firm power, modularity and fairness of the remedial measures to customers might each moderate different results; confusing them will constitute an identification error (Williamson, 1979; Hillman, Withers and Collins, 2009; Baldwin and Clark, 2000; Tax, Brown and Chandrashekaran, 1998). Moreover, the actual regulation assessment will depend on timing, location, nature of the agreement and specific technology under discussion (Goutagny, 2026; Williamson, 1979; Jacobides, Cennamo and Gawer, 2018; European Parliament and Council of the European Union, 2023).

The disruption of 365 services in 2026 is a demonstrative event rather than a case study itself. Even though it is a useful source for specification of the failure environment, neither LSST nor individual university reports can offer a comparison of DCR capabilities or prove better organisational outcomes. This descriptive evidence is thus inapplicable to any claims about the testability of the seven propositions (Mehta, 2026; University of Bath, 2026; Microsoft, 2026; House of Commons, 2026).
The core of the argument is purposely conditional. Digital strategy widens the range of options for firms, and further value generation might be contingent on the capability of exercising them once a commitment becomes irrelevant rather than just the description thereof. Two paths - the service substitution and decision correction with accountability - are suggested as testable alternatives. Future research should answer questions regarding conditions, consequences and costs of their utilisation in innovation of business models and protection of customer value. Any good theory of digital strategy needs to account for not only fast development of the new arrangements, but also responsible and effective switching.

REFERENCES

1. Adner, R. (2017) ‘Ecosystem as structure: An actionable construct for strategy’, *Journal of Management*, 43(1), pp. 39–58. https://doi.org/10.1177/0149206316678451.
2. Ancillai, C., Sabatini, A., Gatti, M. and Perna, A. (2023) ‘Digital technology and business model innovation: A systematic literature review and future research agenda’, *Technological Forecasting and Social Change*, 188, 122307. https://doi.org/10.1016/j.techfore.2022.122307.
3. Autio, C., Schwartz, R., Dunietz, J., Jain, S., Stanley, M., Tabassi, E., Hall, P. and Roberts, K. (2024) *Artificial Intelligence Risk Management Framework: Generative Artificial Intelligence Profile*. NIST AI 600-1. Gaithersburg, MD: National Institute of Standards and Technology. https://doi.org/10.6028/NIST.AI.600-1.
4. Baldwin, C.Y. and Clark, K.B. (2000) *Design Rules, Volume 1: The Power of Modularity*. Cambridge, MA: MIT Press. https://doi.org/10.7551/mitpress/2366.001.0001.
5. Competition and Markets Authority (CMA) (2025) *Cloud infrastructure services: Final decision report*. London: CMA. Available at: https://www.gov.uk/cma-cases/cloud-services-market-investigation (Accessed: 17 November 2026).
6. Competition and Markets Authority (CMA) (2026) ‘CMA takes first steps to ensure choice in business software’, *Press release*, 16 October. Available at: https://www.gov.uk/government/news/cma-takes-first-steps-to-ensure-choice-in-business-software (Accessed: 17 November 2026).

7. European Commission (n.d.) *Data Act explained*. Available at: https://digital-strategy.ec.europa.eu/en/factpages/data-act-explained (Accessed: 17 November 2026).
8. European Parliament and Council of the European Union (2023) 'Regulation (EU) 2023/2854 of 13 December 2023 on harmonised rules on fair access to and use of data (Data Act)', *Official Journal of the European Union*. Available at: https://eur-lex.europa.eu/eli/reg/2023/2854/oj (Accessed: 17 November 2026).
9. Eurostat (2023) '45% EU enterprises bought cloud services in 2023', *Eurostat News*, 8 December. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20231208-1 (Accessed: 17 November 2026).
10. Eurostat (2025) '20% of EU enterprises use AI technologies', *Eurostat News*, 11 December. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20251211-2 (Accessed: 17 November 2026).
11. Eurostat (2026a) '53% EU enterprises used paid cloud services in 2025', *Eurostat News*, 3 February. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20260203-1 (Accessed: 17 November 2026).
12. Eurostat (2026b) *Digitalisation in Europe: 2026 edition*. Available at: https://ec.europa.eu/eurostat/en/web/interactive-publications/digitalisation-2026 (Accessed: 17 November 2026).
13. Goertler, T., Papert, M., Fischer, I. and Schmidt, M. (2025) 'Building digital platform ecosystems: A synthetization of fundamental design topics from a literature review', *Digital Business*, 5(1), 100109. https://doi.org/10.1016/j.digbus.2025.100109.
14. Goutagny, P.-B. (2026) 'When recovery becomes the new normal: Strategic reversibility for organizational robustness', *Organizational Dynamics*, 55(4), 101289. https://doi.org/10.1016/j.orgdyn.2026.101289.
15. Hess, T., Riedl, R. and Becker, L. (2024) 'Digital Business as a field for research and education', *Electronic Markets*, 34, article 46. https://doi.org/10.1007/s12525-024-00726-y.
16. Hillman, A.J., Withers, M.C. and Collins, B.J. (2009) 'Resource dependence theory: A review', *Journal of Management*, 35(6), pp. 1404–1427. https://doi.org/10.1177/0149206309343469.
17. House of Commons (2026) 'Microsoft 365 outage', Hansard, 16 November. Available at: https://hansard.parliament.uk/Commons/2026-11-16/debates/e288cc19-6f86-4405-8f1e-b5a03978eeb7/CommonsChamber (Accessed: 17 November 2026).
18. Jacobides, M.G., Cennamo, C. and Gawer, A. (2018) 'Towards a theory of ecosystems', *Strategic Management Journal*, 39(8), pp. 2255–2276. https://doi.org/10.1002/smj.2904.
19. Kim, J.-Y. (2026) 'Data portability and interoperability between digital platforms', *Journal of Economics & Management Strategy*, 35(2), pp. 219–232. https://doi.org/10.1111/jems.12643.
20. Klemperer, P. (1987) 'Markets with consumer switching costs', *The Quarterly Journal of Economics*, 102(2), pp. 375–394. https://doi.org/10.2307/1885068.
21. Kohtamäki, M., Leminen, S. and Parida, V. (2024) 'Conceptualizing digital business models (DBM): Framing the interplay between digitalization and business models', *Technovation*, 133, 103013. https://doi.org/10.1016/j.technovation.2024.103013.
22. Li, G., Du, K., Liu, L. and Su, F. (2025) 'Digital transformation and organizational resilience: Unveiling the path to sustainable performance in adversity and crisis', *International Journal of Information Management*, 84, 102934. https://doi.org/10.1016/j.ijinfomgt.2025.102934.
23. Linde, L., Sjödin, D., Parida, V. and Gebauer, H. (2021) 'Evaluation of digital business model opportunities: A framework for avoiding digitalization traps', *Research-Technology Management*, 64(1), pp. 43–53. https://doi.org/10.1080/08956308.2021.1842664.
24. McGrath, R.G. (1997) 'A real options logic for initiating technology positioning investments', *Academy of Management Review*, 22(4), pp. 974–996. https://doi.org/10.5465/amr.1997.9711022113.
25. McGrath, R.G. and Nerkar, A. (2004) 'Real options reasoning and a new look at the R&D investment strategies of pharmaceutical firms', *Strategic Management Journal*, 25(1), pp. 1–21. https://doi.org/10.1002/smj.358.

26. Mehta, K.C. (2026) 'When Microsoft goes down, how much of the country stops working?', LSST Life, 13 November. Available at: https://www.lsst.ac/blogs/when-microsoft-goes-down-how-much-of-the-country-stops-working/ (Accessed: 17 November 2026).
27. Microsoft (2026) 'Users may be unable to connect to multiple Microsoft 365 services', service-health updates for incidents MO1550821 and EX1550543, 12–16 November (archived by the University of Pennsylvania). Available at: https://mailservices.isc.upenn.edu/computing/email/penno365/alerts/ms-incidents.html (Accessed: 17 November 2026).
28. Papagiannidis, E., Mikalef, P. and Conboy, K. (2025) 'Responsible artificial intelligence governance: A review and research framework', *The Journal of Strategic Information Systems*, 34(2), 101885. https://doi.org/10.1016/j.jsis.2024.101885.
29. Raji, I.D., Smart, A., White, R.N., Mitchell, M., Gebru, T., Hutchinson, B., Smith-Loud, J., Theron, D. and Barnes, P. (2020) 'Closing the AI accountability gap: Defining an end-to-end framework for internal algorithmic auditing', *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency*, pp. 33–44. https://doi.org/10.1145/3351095.3372873.
30. Reimsbach-Kounatze, C. and Molnar, A. (2024) 'The impact of data portability on user empowerment, innovation, and competition', *OECD Going Digital Toolkit Notes*, 25. Paris: OECD Publishing. https://doi.org/10.1787/319f420f-en.
31. Tabassi, E. (2023) *Artificial Intelligence Risk Management Framework (AI RMF 1.0)*. NIST AI 100-1. Gaithersburg, MD: National Institute of Standards and Technology. https://doi.org/10.6028/NIST.AI.100-1.
32. Tax, S.S., Brown, S.W. and Chandrashekaran, M. (1998) 'Customer evaluations of service complaint experiences: Implications for relationship marketing', *Journal of Marketing*, 62(2), pp. 60–76. https://doi.org/10.1177/002224299806200205.
33. Teece, D.J. (2007) 'Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance', *Strategic Management Journal*, 28(13), pp. 1319–1350. https://doi.org/10.1002/smj.640.
34. Teece, D.J. (2010) 'Business models, business strategy and innovation', *Long Range Planning*, 43(2–3), pp. 172–194. https://doi.org/10.1016/j.lrp.2009.07.003.
35. Teng, D., Ye, C. and Martinez, V. (2025) 'Gen-AI's effects on new value propositions in business model innovation: Evidence from information technology industry', *Technovation*, 143, 103191. https://doi.org/10.1016/j.technovation.2025.103191.
36. Trischler, M.F.G. and Li-Ying, J. (2023) 'Digital business model innovation: Toward construct clarity and future research directions', *Review of Managerial Science*, 17, pp. 3–32. https://doi.org/10.1007/s11846-021-00508-2.
37. University of Bath (2026) 'Microsoft 365 global outage', announcement, 13 November (updated 14 November). Available at: https://www.bath.ac.uk/announcements/microsoft-365-global-outage/ (Accessed: 17 November 2026).
38. Uršič, D. and Čater, T. (2025) 'Digital innovation in management and business: A comprehensive review, multi-level framework, and future research agenda', *Journal of Business Research*, 197, 115475. https://doi.org/10.1016/j.jbusres.2025.115475.
39. Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J.Q., Fabian, N. and Haenlein, M. (2021) 'Digital transformation: A multidisciplinary reflection and research agenda', *Journal of Business Research*, 122, pp. 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022.
40. Vial, G. (2019) 'Understanding digital transformation: A review and a research agenda', *The Journal of Strategic Information Systems*, 28(2), pp. 118–144. https://doi.org/10.1016/j.jsis.2019.01.003.
41. Warner, K.S.R. and Wäger, M. (2019) 'Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal', *Long Range Planning*, 52(3), pp. 326–349. https://doi.org/10.1016/j.lrp.2018.12.001.
42. Williamson, O.E. (1979) 'Transaction-cost economics: The governance of contractual relations', *The Journal of Law and Economics*, 22(2), pp. 233–261. https://doi.org/10.1086/466942.