

Strategic and Operational Technology Absorption: Comparative Evidence from Large Brazilian Firms

Antonio Carlos de Oliveira Cruz Junior

antonio.sjc@gmail.com

Universidade de Sorocaba

Rogério Augusto Profeta

Universidade de Sorocaba

Valquíria Miwa Hanai-Yoshida

Universidade de Sorocaba

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Abstract

Technology transfer (TT) has become increasingly dependent on recipient-side organisational capabilities, particularly in emerging economies where firms often exhibit heterogeneous innovation structures despite comparable scale and market exposure. This article examines how two large Brazilian enterprises enact contrasting absorptive capacity configurations during active TT processes. Drawing on a comparative qualitative case-study design, the study combines semi-structured interviews, documentary evidence and ToTAP diagnostic profiles to investigate how organisational culture, innovation governance and R&D orientation shape technology absorption.

The findings reveal two distinct organisational configurations. EMP306, a publicly listed mining conglomerate, is characterised by proactive technology scanning, formal innovation governance, integrated R&D investment and deliberate cultural transformation initiatives. EMP32, a multinational motorcycle assembly subsidiary, reflects a predominantly operational absorption posture centred on process execution, headquarters dependency and limited local innovation autonomy.

Rather than interpreting absorptive capacity as a linear maturity continuum, the study proposes the Dual-Mode Technology Absorption Framework (DTAM) as an exploratory configurational interpretation distinguishing strategic absorption from operational absorption. The article contributes to technology transfer literature by demonstrating that firms with similar size and aggregate maturity indicators may develop fundamentally different organisational architectures for absorbing external technology.

1 INTRODUCTION

Technology transfer (TT) has become one of the most consequential mechanisms through which organisations, industries and nations navigate competitive transformation. As the global economy intensifies its reliance on knowledge-intensive processes, the capacity of recipient firms to effectively absorb, internalise and deploy externally generated technology has emerged as a critical differentiator between organisational growth and stagnation (UNCTAD, 2021; Audretsch; Belitski, 2022). The theoretical foundation underpinning this concern — absorptive capacity — was originally articulated by Cohen and Levinthal (1990) and subsequently elaborated by Zahra and George (2002), who distinguished between potential absorptive capacity (knowledge acquisition and assimilation) and realised absorptive capacity (transformation and exploitation).

A persistent gap exists between the conceptual sophistication of this theoretical tradition and its empirical operationalisation at the firm level. Existing studies have predominantly employed large-sample quantitative designs, which are valuable for statistical patterns but ill-equipped to illuminate the organisational processes, cultural dynamics and strategic decisions through which absorption is enacted or inhibited in real firms (Flatten et al., 2011; Tsai, 2001). This limitation is acute in emerging economies such as Brazil, where extreme heterogeneity in firm capabilities and cultural configurations demands interpretive approaches capable of capturing contextual nuance.

Within the Brazilian industrial landscape, large corporations may appear similarly positioned in terms of size, sector and market exposure, yet display fundamentally different orientations toward incoming technology. Understanding why such divergence occurs, and what organisational configurations drive it, represents both a theoretical imperative and a practical urgency for managers and policy-makers.

This article addresses that gap by presenting a comparative case study of two large Brazilian enterprises: EMP306, a publicly listed mining conglomerate, and EMP32, a motorcycle assembly subsidiary of a German multinational, both engaged in active TT processes. The central research question is: how do organisational culture, strategic orientation, R&D investment and leadership disposition shape the mode of absorptive capacity enacted during technology transfer in large Brazilian firms?

Drawing on semi-structured interviews, documentary analysis and the ToTAP diagnostic framework ([Author], 2024), the study makes three core contributions. First, it provides empirical grounding for the proposition that firm size is a moderating rather than deterministic variable in TT readiness. Second, it proposes the Dual-Mode Technology Absorption Framework (DTAM) as an exploratory configurational interpretation distinguishing strategic from operational absorption. Third, it advances the emerging economies literature on TT by demonstrating how cultural transformation programmes, innovation governance structures and strategic scanning interact to produce contrasting absorptive outcomes within nominally comparable organisations.

2 THEORETICAL FRAMEWORK

2.1 Technology Transfer: Mechanisms and Recipient-Side Challenges

Technology transfer encompasses the systematic transmission of knowledge, skills, methodologies and technological artefacts from a source organisation to a recipient (Audretsch; Belitski, 2022; Bruun; Bennett, 2002). Lasserre (1982) and Villani, Rasmussen and Grimaldi (2017) draw a consequential distinction between embodied transfers – involving material changes in both emitter and receiver – and disembodied transfers, which modify only the recipient through the migration of knowledge and tacit practices. Disembodied transfer is considerably more demanding of the recipient's infrastructure, requiring genuine cognitive and cultural assimilation rather than mere physical installation.

Bozeman's (2000) contingent effectiveness model positions absorptive capacity alongside technology quality and institutional environment as the three co-determinants of TT success. Rebentisch and Ferretti (1995) extend this by demonstrating that scope mismatches constitute a leading cause of TT failure. Both perspectives converge on a conclusion central to this study: recipient-side readiness is at least as consequential as the quality or novelty of the technology itself.

2.2 Absorptive Capacity: Theory and Organisational Practice

Cohen and Levinthal's (1990) foundational definition of absorptive capacity as the firm's ability to recognise the value of new external information, assimilate it and apply it to commercial ends established a construct generating an extensive multidisciplinary research programme. Zahra and George (2002) decomposed the construct into potential absorptive capacity (acquisition and assimilation) and realised absorptive capacity (transformation and exploitation).

A critical insight is that absorptive capacity is not uniformly constituted across its dimensions. A firm may possess strong acquisition capacity while lacking the cultural, structural or human capital conditions required for effective assimilation. Tsai (2001) demonstrated this asymmetry in intraorganisational networks. More recently, Garcia et al. (2024) and Ferraz (2025) showed that regional and organisational absorptive capacities moderate the spillover effects of foreign direct investment on innovation in Brazil, confirming that the construct operates differently in emerging economy contexts.

Despite these advances, absorptive capacity has rarely been operationalised through qualitative empirical investigation of actual TT processes. This article addresses that gap through a comparative case study design generating thick description of absorptive capacity as an organisational accomplishment rather than a statistical self-report.

2.3 Organisational Culture as a Moderator of Absorptive Capacity

Among the dimensions of organisational readiness for TT, culture has emerged as a particularly consequential moderator. Drawing on the Competing Values Framework of Quinn and Rohrbaugh (1983), Cameron and Quinn (2006) identify four dominant cultural orientations with distinct implications for openness to external knowledge. Adhocratic cultures, which prize innovation and entrepreneurship, are structurally predisposed toward both acquisition and transformation dimensions of absorptive capacity. Hierarchy cultures, emphasising stability and coordination, are associated with lower propensity for knowledge absorption (Hogan; Coote, 2014).

[Authors] (2022) demonstrated that clan culture frequently functions as a constraining force on innovation capacity in Brazilian micro and small enterprises. The present study extends this argument to large enterprises, examining whether cultural transformation programmes can effectively shift an organisation's absorptive posture from passive to active.

2.4 R&D Investment, Leadership and Strategic Orientation

The relationship between R&D investment and absorptive capacity has been theorised since Cohen and Levinthal (1990), who argued that the same investment that generates innovations also builds the capacity to recognise and assimilate external knowledge. Winklebach and Walter (2015) extended this to

science-to-industry TT contexts, demonstrating that absorptive capacity moderates the value creation potential of complex knowledge transfers.

Leadership disposition and strategic intent constitute a further axis of analysis. Scaliza et al. (2022) demonstrated that open innovation strategies are mediated by cultural orientation and leadership commitment – consistent with Teece, Pisano and Shuen's (1997) positioning of sensing, seizing and reconfiguring capabilities as organisational foundations of competitive advantage.

2.5 Theoretical Propositions

Synthesising the foregoing literature, three theoretical propositions guide the empirical analysis:

P1: In large Brazilian enterprises, organisational culture orientation – rather than firm size or financial resources – constitutes the primary determinant of absorptive capacity mode during technology transfer.

P2: The presence of a dedicated innovation governance structure distinguishes strategic absorption from operational absorption as qualitatively distinct organisational configurations.

P3: Organisations exhibiting operational absorption – characterised by passive reception of embodied technology from headquarters without local R&D – are structurally predisposed to dependency on external knowledge sources.

3 METHODS

3.1 Research Design

This study employs a comparative case study design consistent with methodological guidelines established by Yin (2018) for investigating contemporary phenomena within real-life contexts. The qualitative approach is motivated by the research objective – to understand how absorptive capacity is organisationally constituted during TT – which demands interpretive depth rather than statistical breadth (Merriam; Tisdell, 2016).

The comparative dimension is central: by selecting two cases that contrast sharply along cultural orientation, R&D investment and strategic intent while sharing surface-level characteristics (both are large enterprises engaged in active TT), the study maximises analytical leverage. This design follows theoretical sampling logic (Glaser; Strauss, 1967), selecting cases for their capacity to illuminate theoretical categories.

3.2 Case Selection

Cases were selected from the broader quantitative phase of the ToTAP research programme ([Author], 2024), which assessed absorptive capacity readiness across 326 Brazilian companies. EMP306 and EMP32 were selected on four criteria: (a) both had been classified as High Maturity in the ToTAP

quantitative assessment; (b) both had undergone or were actively engaged in TT at the time of the study; (c) both were large enterprises, controlling for firm-size effects; and (d) both agreed to participate in an extended qualitative interview phase and to permit document analysis.

3.3 Data Generation and Participant Profile

Primary data were generated through in-depth, semi-structured interviews with senior managers in each firm. Table 1 summarises the participant profile.

Table 1
– Interview participants

Case	Position	Experience	Interview Duration
EMP306	Senior Innovation Manager	18 years	87 min
EMP32	Industrial Process Supervisor	12 years	64 min

Source: *Elaborated by the research team.*

The interview protocol was organised around six thematic domains: (1) innovation orientation and technology scanning; (2) organisational culture and knowledge-sharing; (3) R&D investment and capacity; (4) technology evolution awareness and acquisition strategy; (5) economic environment and governance; and (6) physical infrastructure for technology development. Transcripts were produced verbatim and returned to participants for member checking (Lincoln; Guba, 1985).

Secondary data sources included organisational charts, governance documents, corporate sustainability reports and publicly available financial disclosures. For EMP306, audited annual reports and innovation strategy presentations provided documentary triangulation. For EMP32, training documentation and process improvement records were made available.

3.4 Analytical Procedures

Data analysis proceeded through three sequential stages. In the first stage, interview transcripts were subjected to exploratory lexical analysis using CAQDAS software. Word-cloud visualisations served as a supplementary diagnostic technique rather than as a primary analytical procedure; the primary analytical interpretation emerged from thematic coding, cross-case comparison and documentary triangulation.

In the second stage, thematic content analysis was conducted following Bardin’s (2016) framework, structured around the six ToTAP dimensions and the three theoretical propositions. Analysis involved open coding of interview segments, axial coding to establish relationships between categories, and selective coding to develop the overarching interpretive framework. Table 2 summarises the coding structure.

Table 2
– Qualitative coding structure

First-order codes	Second-order themes	Aggregate dimensions
"technology scanning"	Proactive innovation posture	Strategic absorption
"training routines"	Operational learning	Operational absorption
"startup acquisition"	Ecosystem integration	Strategic absorption
"headquarters dependency"	Knowledge passivity	Operational absorption
"cultural transformation programme"	Strategic cultural management	Strategic absorption

Source: Elaborated by the research team.

In the third stage, findings were compared through a cross-case synthesis matrix. The ToTAP radar chart profiles of each firm served as visual anchors for the comparative analysis.

Artificial intelligence tools were used in the preparation of this manuscript for language assistance and copy-editing purposes, including grammar, spelling and readability improvements to author-generated text. All intellectual content, interpretive claims and conclusions are the exclusive work of the authors, who take full responsibility for the final version of the manuscript.

3.5 Validity, Reliability and Ethical Considerations

Although the study relies on a limited number of focal interviews, theoretical saturation was pursued through triangulation with documentary evidence, longitudinal organisational records and cross-case comparison. The purpose was not statistical representativeness but analytical depth consistent with qualitative case-study logic. Credibility was established through triangulation, member checking and prolonged engagement with the research context (Lincoln; Guba, 1985). All participants provided written informed consent prior to the interviews. Company identities were anonymised; codes EMP306 and EMP32 are retained for consistency with the quantitative phase of the ToTAP programme.

4 FINDINGS AND DISCUSSION

Findings are presented through six thematic categories derived from the ToTAP diagnostic framework, followed by a cross-case synthesis grounding the proposed Dual-Mode Technology Absorption Framework. Direct interview excerpts are presented in quotation marks in italics; all have been translated from Portuguese by the authors.

4.1 Lexical Orientation and Strategic Discourse

Exploratory word-cloud analysis of the two interview transcripts revealed a differentiated lexical landscape functioning as a first-order indicator of contrasting organisational orientations. In the EMP306 interview, the most frequently deployed terms were innovation, strategy, technology, transformation,

sustainability, decarbonisation and portfolio – vocabulary suggesting an organisation embedding technology within a strategic discourse connecting external scanning to internal capability development.

The EMP32 interview generated a lexical field dominated by process, assembly, Germany, materials, flow and training. This vocabulary indicates an organisation conceptualising technology in operational terms – as something received from an external authoritative source and implemented through established procedures. The EMP32 respondent spoke more about how things are done than about where the organisation wants to go.

4.2 Organisational Culture and Cultural Transformation

The cultural dimension revealed the most consequential divergence. EMP306's senior manager described a sustained, institutionally resourced cultural transformation programme:

These recent events had a profound impact on the company, and so a major cultural transformation began – reducing risks, reorganising assets, reorganising the entire company to develop this sense of risk awareness and care. [...] The Vice-President of People created a specific area dedicated to cultural transformation.

The creation of a dedicated unit for cultural transformation reporting to a Vice-President signals that culture is treated not as a background condition but as an actively managed strategic resource. The linkage between cultural transformation and risk management suggests development of what Teece, Pisano and Shuen (1997) term a dynamic sensing capability. The cultural model draws explicitly on the Toyota Production System while developing a proprietary variant – illustrating what Kogut and Zander (1992) term combinative capability. The programme reaches approximately 80,000 direct employees and 50,000 contractors.

EMP32's cultural profile presents a stark contrast. The respondent's account was primarily expressed through references to training and process compliance:

The company makes courses available [...] we are very focused on internal training too [...] the company makes available for people to do well there, and also pays part of this group, and internal training.

Training is present, but framed as task-specific skill development rather than a mechanism for building innovation orientation or external knowledge receptivity. This cultural orientation aligns with what Cameron and Quinn (2006) term a hierarchy culture, associated with lower propensity for knowledge absorption (Hogan; Coote, 2014).

4.3 Innovation Governance and Strategic Orientation

EMP306 has developed a sophisticated innovation governance architecture positioning innovation explicitly as a strategic function. The interviewee described a tripartite posture – leading, fostering and acquiring – mapping directly onto the sensing, seizing and reconfiguring dynamic capabilities framework:

Innovation can basically be separated into three types: leading, when the company needs to lead the development of the innovation it requires [...]; fostering – there are incubators, accelerators, the company's own R&D [...]; and acquiring startups with technological discoveries.

This taxonomy reveals an organisation that has institutionalised multiple channels of technology acquisition. Active startup acquisition represents what Chesbrough (2003) terms open innovation – deliberate use of external knowledge flows to accelerate internal capability development.

EMP32's innovation profile is fundamentally different. The company operates with no formal innovation department, no local R&D and no structured process for technology scanning:

Regarding research and development, the company does not have a sector focused on that. The projects come consolidated – what we receive is basically training on how it will be done, and there is no department focused on research and partnerships with universities.

This crystallises the operational absorption mode: knowledge arrives pre-packaged, the local role is implementation rather than adaptation, and the organisational structure provides no infrastructure for the assimilation and transformation stages of absorptive capacity. This creates what Winklebach and Walter (2015) term a dependency trap – a structural condition in which the subsidiary's absorptive capacity is permanently constrained by its position as a receiver rather than a co-creator.

4.4 R&D Investment and Knowledge Infrastructure

EMP306 maintains an internal R&D budget of approximately R\$3 billion annually, structured across mining engineering, process optimisation, product portfolio management and environmental technology:

The company has a very large R&D structure [...] the engineering entering to think about the best recovery, with the least waste, with the best mass recovery possible, and this engineering category enters the entire treatment of improving the product, portfolio of product, optimising process.

This describes R&D deeply integrated with core operational processes – precisely the configuration that Cohen and Levinthal (1990) predicted would maximise absorptive capacity. EMP306's R&D posture has been further galvanised by the decarbonisation imperative, which forced proactive acquisition of new technologies through startup acquisition rather than waiting for suppliers.

EMP32's R&D profile stands in sharp contrast. All research and development is conducted at the German headquarters:

The machines come from Germany, and for every project there are trips that our people make to Germany, or even the German sales people come to Brazil to transfer the assembly technology, the process, the process improvement.

While this ensures access to sophisticated technology, it structurally prevents development of local absorptive capacity. The subsidiary's engineering team can assemble and maintain transferred

technology, but lacks the research infrastructure to adapt, improve or generate it. This distinction — between knowing how to use and knowing how to improve — is central to the difference between operational and strategic absorption.

4.5 Economic Environment and Governance

EMP306's governance architecture is characterised by institutional rigour: the company operates within the Brazilian Novo Mercado and is dual-listed on the Dow Jones index:

It is a company listed on the Novo Mercado and has shares on the Dow Jones, so a true corporation [...] a company with very rigid governance, working within the SAP system, with a very independent audit.

This formal accountability structure creates an organisational environment in which strategic decisions — including technology acquisition — are subject to systematic evaluation and documentation. Such formalisation appears, in EMP306's case, to support rather than constrain innovation by providing a disciplined framework for scaling technological investments.

EMP32's governance context is fundamentally different: as a subsidiary, financial decisions are ultimately governed by the German parent. The semiconductor shortage during COVID-19 reveals the subsidiary's limited strategic latitude — the local management's primary response was reactive and externally constrained rather than strategically adaptive.

4.6 Technology Evolution and TT Process Management

EMP306's senior manager described an evolution in the company's TT posture over the past decade — from acquiring embodied technology to acquiring embedded knowledge:

These are the climate changes that are really the driver of the next commodity cycle, and this industry has been moving and having great technological discoveries [...] which has forced us to look for [new technology].

The decarbonisation imperative has functioned as what Zahra and George (2002) term an activation trigger — mobilising realised absorptive capacity. The company now seeks not merely operational knowledge but project and fabrication knowledge — the tacit, design-level understanding that enables genuine capability development.

EMP32's engagement with TT reflects a more passive posture. Technology is received through a standardised protocol initiated by the German headquarters. Even pandemic-era technological adaptation — adoption of 3D glasses for virtual process verification — was initiated by the parent rather than local management. The Brazilian subsidiary is an effective and capable implementer, but not a co-creator of the TT process.

4.7 Cross-Case Synthesis: The Dual-Mode Technology Absorption Framework (DTAM)

The comparative analysis reveals a fundamental organisational distinction that cannot be adequately captured by existing absorptive capacity frameworks, which tend to treat the construct as a continuum from low to high. This study proposes instead that large enterprises engaged in TT may occupy one of two qualitatively distinct configurations – strategic absorption and operational absorption – defined by organisational conditions that interact systemically rather than additively (Fig. 1).

Source: Elaborated by the research team. Both firms scored High Maturity in ToTAP quantitative assessment.

Table 3
– Dual-Mode Technology Absorption Framework (DTAM): Comparative Dimensions

Dimension	Strategic Absorption (EMP306)	Operational Absorption (EMP32)
Cultural orientation	Adhocratic/transformational; active cultural management programme	Hierarchical/process-oriented; culture as compliance rather than strategy
Innovation governance	Dedicated innovation management unit; formal VP-level accountability	No local innovation structure; consolidated solutions from headquarters
R&D investment	~R\$3 billion annually; integrated with core processes	Zero local R&D; all research conducted at German parent
TT knowledge type	Disembodied + embedded; project and fabrication knowledge	Embodied; assembly and process training; tacit knowledge dependency
Strategic intentionality	Proactive; decarbonisation as strategic driver	Reactive; technology received on headquarters terms and timeline
Governance architecture	Dual-listed; Novo Mercado; SAP integration; independent audit	Subsidiary; operational financial autonomy; strategic decisions at parent
University/ecosystem links	Active partnerships; incubators; accelerators; startup acquisitions	Absent locally; some links maintained by German headquarters
Dominant lexical field	Innovation, strategy, transformation, decarbonisation, portfolio	Process, assembly, Germany, materials, flow, training
DTAM classification	Strategic Absorption	Operational Absorption

Source: Elaborated by the authors based on empirical data (2024).

The DTAM conceptualises the distinction between strategic and operational absorption not as a quality difference but as a configurational one – as summarised in Table 3 –: each mode is internally coherent and can achieve high scores on aggregate absorptive capacity measures – both firms scored as High

Maturity in the ToTAP assessment — while differing fundamentally in organisational architecture and capacity for self-directed technological development.

Strategic absorption, as exemplified by EMP306, is characterised by the co-presence of three enabling conditions: (a) a cultural orientation that prizes external scanning and knowledge integration; (b) a governance architecture creating formal accountability for innovation; and (c) a strategic intentionality connecting technology acquisition to competitive positioning. When mutually reinforcing, these conditions produce what might be termed a learning posture.

Operational absorption, as exemplified by EMP32, is not a deficit mode per se — it represents a functional adaptation to a subsidiary position in a global value chain. However, it carries significant strategic vulnerabilities: dependency on the headquarters' innovation agenda, limited local capacity for adapting technology to specific market conditions, and restricted capacity for the co-evolutionary knowledge development that Kogut and Zander (1992) identify as a source of sustainable competitive advantage.

4.8 Theoretical Contribution

This study contributes to absorptive capacity literature in three ways. First, it challenges the implicit assumption that absorptive capacity develops linearly according to firm size or resource availability. The evidence suggests that firms with comparable structural scale may enact fundamentally different organisational configurations for receiving and internalising external technology.

Second, the findings indicate that absorptive capacity may be better interpreted as a configurational organisational phenomenon rather than as a homogeneous maturity continuum. The contrast between strategic and operational absorption demonstrates that firms can display similar aggregate readiness indicators while relying on distinct governance, cultural and learning architectures.

Third, the study extends technology transfer research in emerging economies by demonstrating how organisational intentionality and innovation governance shape the transition from technology implementation toward autonomous capability development — a finding with direct implications for Brazilian industrial policy.

5 FINAL CONSIDERATIONS

This article investigated how organisational culture, strategic orientation, R&D investment and leadership disposition shape the mode of absorptive capacity enacted during technology transfer in large Brazilian enterprises. Through a comparative case study of EMP306 and EMP32, four principal conclusions emerge.

First, firm size is confirmed as a moderating rather than deterministic variable in TT readiness. EMP306 and EMP32 are nominally comparable in size, yet diverge fundamentally along cultural, structural and strategic dimensions. This directly challenges the practitioner assumption that large firms are inherently

better prepared for TT, reinforcing Cohen and Levinthal's (1990) argument that absorptive capacity is a function of accumulated knowledge and strategic investment.

Second, organisational culture — and specifically the presence or absence of a formally institutionalised cultural transformation programme — emerges as a primary driver of the mode of absorption enacted. EMP306's dedicated Vice-Presidential unit for cultural transformation represents a strategic deployment of culture as a capability. EMP32's absence of equivalent cultural infrastructure produces a technically competent but strategically passive absorption profile unlikely to generate the combinative capabilities necessary for autonomous technological development.

Third, the distinction between embodied and disembodied TT acquires new empirical specificity through the case comparison. EMP306's strategic shift toward acquiring project and fabrication knowledge — rather than merely operational know-how — represents a qualitative transition in the type of absorption sought. EMP32's TT model remains anchored in embodied transfer, functional but insufficient for generating the tacit knowledge accumulation required for technological self-sufficiency.

Fourth, the DTAM framework advances absorptive capacity theory by introducing qualitative configurational categories that complement existing quantitative scaling approaches. The framework does not supersede the ToTAP quantitative instrument — it was generated from deeper investigation of cases that instrument identified — but extends it by providing interpretive depth that aggregate scores cannot supply.

The study is not without limitations. The comparative case study design does not permit statistical generalisation. Both cases are large enterprises, and dynamics in medium-sized or smaller firms may differ substantially. Future research should extend the qualitative investigation to contrasting size segments, other sectors and international comparative contexts. Longitudinal study designs, tracking the evolution of absorptive capacity following deliberate organisational interventions, would constitute the most theoretically consequential agenda — in particular, examining whether transitions between operational and strategic absorption can be deliberately engineered through governance and cultural intervention.

Declarations

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Competing interests

The authors have no relevant financial or non-financial interests to disclose.

Ethics approval

This study involved semi-structured interviews with consenting adult professionals in an organisational context. Participation was entirely voluntary. Under Brazilian Resolution CNS nº 510/2016 (<https://conselho.saude.gov.br/resolucoes/2016/Reso510.pdf>), which formally exempts research not involving vulnerable populations, sensitive personal data, health-related information or identifiable participants (Art. 1, §III; Art. 2), no ethics committee (CEP) registration was required or sought. All procedures were conducted in accordance with Resolution CNS 510/2016 and the Declaration of Helsinki.

Consent to participate

Written informed consent was obtained from all participants prior to each interview, including an explicit commitment not to disclose any information capable of identifying the participant or their organisation.

Consent to publish

Participants provided informed consent for the anonymised use of their data in academic publications. Company identities are anonymised as EMP306 and EMP32. No personally identifiable information is reported.

Data availability

The qualitative codebook, cross-case synthesis matrix, and radar chart diagnostic profiles for EMP306 and EMP32 are openly available via the anonymous OSF review link: https://osf.io/upbtv/?view_only=62a329cbcac048868bb4e1236c44ed4b (the project has been kept private during peer review and will be made fully public upon article acceptance).

The quantitative dataset underpinning case selection derives from the author's doctoral dissertation, approved in 2024 ([Author, 2024]) and from a companion quantitative article currently under review at Innovation and Green Development. Full cross-referencing and dataset integration will be provided upon acceptance of both articles.

Interview transcripts are not publicly available because participants spontaneously disclosed personally and organizationally identifiable information during the interviews and signed consent forms committing the research team to confidentiality. However, the transcripts may be made available to editors and reviewers upon direct request to the corresponding author, subject to the execution of a non-disclosure agreement (NDA).

Author contributions

Author 1: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Visualization, Writing – original draft, Writing – review and editing. Author 2: Conceptualization, Supervision, Writing – review and editing. Author 3: Supervision, Validation, Writing – review and editing.

Use of artificial intelligence

Artificial intelligence tools were used exclusively for language refinement and readability improvement of author-written text. All intellectual content, analysis and conclusions are the sole work of the authors.

References

1. AUDRETSCH DB, BELITSKI M (2022) The knowledge spillover of innovation. *Industrial Corp Change* v 31(6):1243–1268
2. BARDIN L (2016) *Análise de conteúdo*, 4 edn. Edições 70, Lisboa
3. BOZEMAN B (2000) Technology transfer and public policy: a review of research and theory. *Res Policy* 29:4–5
4. BRUUN P, BENNETT D (2002) Transfer of technology to China. *Eur Manage J* v 20(1):98–106
5. CAMERON KS, QUINN RE (2006) *Diagnosing and changing organizational culture*, 3 edn. Jossey-Bass, San Francisco
6. CHESBROUGH HW (2003) *Open innovation*. Harvard Business School Press, Boston
7. COHEN WM, LEVINTHAL DA (1990) Absorptive capacity: a new perspective on learning and innovation. *Administrative Sci Q* v 35(1):128–152
8. [Author] (2024) [Title withheld for blind review]. Doctoral thesis (Graduate Programme in Technological and Environmental Processes) – Universidade de Sorocaba (UNISO), Sorocaba, SP, Brazil
9. [Authors] (2022) [Title withheld for blind review]. *Int J Dev Res* v 12(11):60456–60460
10. FLATTEN TC et al (2011) A measure of absorptive capacity. *Eur Manag J* 29(2):98–116
11. GARCIA R et al (2024) Unveiling the role of local absorptive capacity in FDI spillovers in Brazil. *Res Policy* v 53 n. 8:104–120
12. GLASER BG, STRAUSS A (1967) *L. The discovery of grounded theory*. Aldine, Chicago
13. HOGAN SJ, COOTE LV (2014) Organizational culture, innovation, and performance. *J Bus Res* v 67:1609–1621
14. KOGUT B, ZANDER U (1992) Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, v. 3, n. 3, pp. 383–397
15. LASSERRE P (1982) Training: key to technological transfer. *Long Range Planning*, v. 15, n. 3, p. 51–60
16. LINCOLN YS, GUBA EG (1985) *Naturalistic inquiry*. Sage, Beverly Hills
17. MERRIAM SB, TISDELL EJ (2016) *Qualitative research*, 4 edn. Jossey-Bass, San Francisco
18. QUINN RE, ROHRBAUGH J (1983) A spatial model of effectiveness criteria. *Manage Sci* 29(3):363–377
19. REBENTISCH ES, FERRETTI M (1995) A knowledge asset-based view of technology transfer. *J Eng Technol Manage* v 12:1–2

20. SCALIZA JAA et al (2022) Relationships among organizational culture, open innovation and performance. *J Bus Res* v 140:264–279
21. STAKE RE (1995) *The art of case study research*. Sage, Thousand Oaks
22. TEECE DJ, PISANO G, SHUEN A (1997) Dynamic capabilities and strategic management. *Strateg Manag J* 18:509–533
23. TSAI W (2001) Knowledge transfer in intraorganizational networks. *Academy of Management Journal*, v. 44, n. 5, p. 996–1004
24. UNCTAD (2021) *Technology and innovation report 2021*. UNCTAD, Geneva
25. VILLANI E, RASMUSSEN E, GRIMALDI R (2017) How intermediary organizations facilitate university-industry technology transfer. *Technological Forecast Social Change* v 114:86–102
26. WINKLEBACH A, WALTER A (2015) Complex technological knowledge and value creation in science-to-industry TT. *Industrial Mark Manage* v 47:98–108
27. YIN RK (2018) *Case study research and applications*, 6 edn. Sage, Thousand Oaks
28. ZAHRA SA, GEORGE G (2002) Absorptive capacity: a review, reconceptualization, and extension. *Acad Manage Rev* v 27(2):185–203

Figures

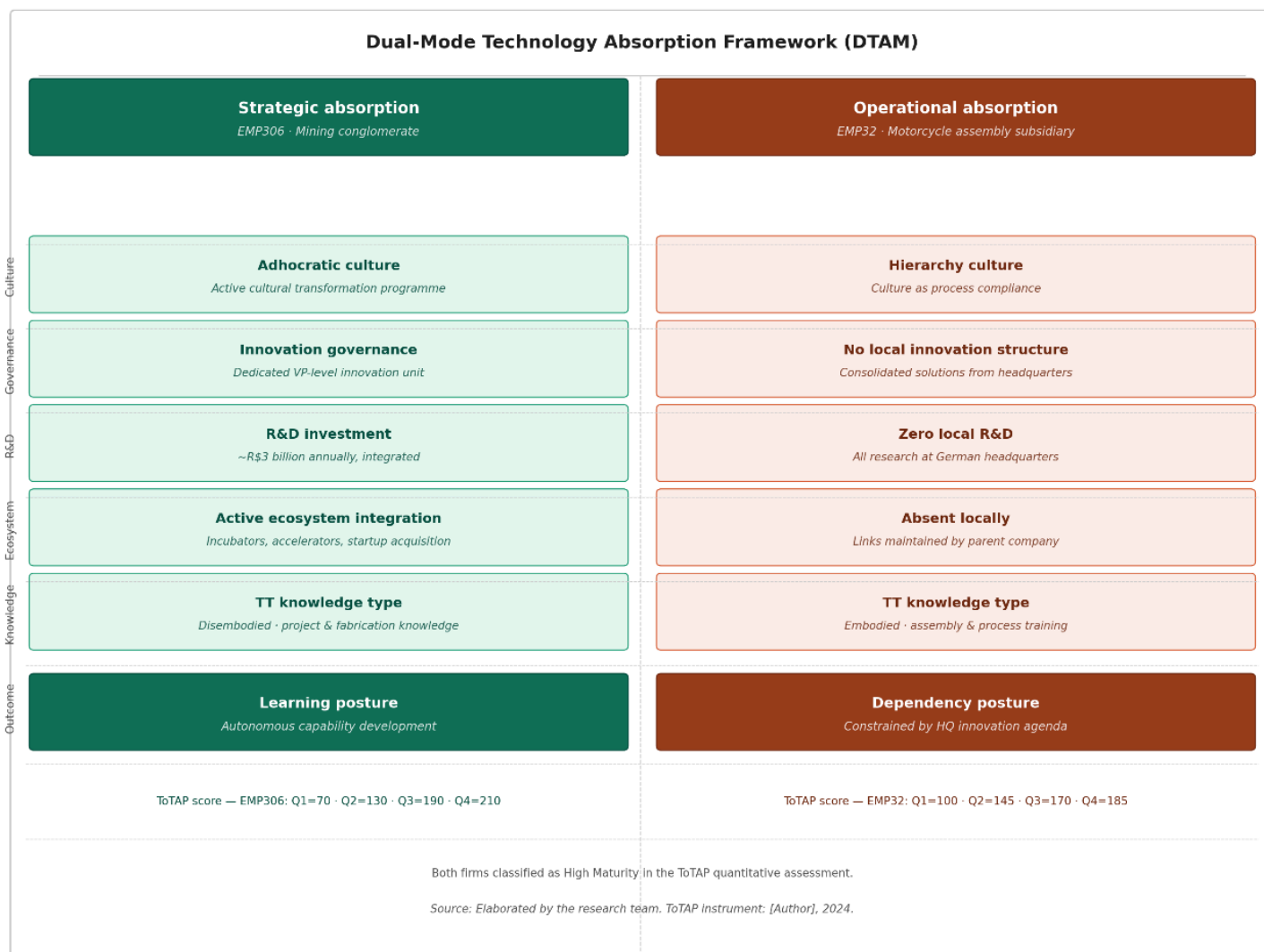


Figure 1

Dual-Mode Technology Absorption Framework (DTAM)

Source: Elaborated by the research team. Both firms scored High Maturity in ToTAP quantitative assessment