

Knowledge Management Practices and Innovation Efficiency in Malaysian Telecommunications Organisations: A Comprehensive Review

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ABSTRACT

Knowledge management (KM) has emerged as a foundational strategic capability for organisations operating in knowledge-intensive industries, particularly within the fast-evolving telecommunications sector. This article presents a systematic literature review, reported in line with PRISMA principles, examining how KM practices — operationalised as knowledge sharing and knowledge collecting — influence innovation efficiency in Malaysian telecommunications organisations. Grounded in the Theory of Reasoned Action (TRA) and drawing on an integrative synthesis of 43 peer-reviewed empirical and theoretical studies identified through a transparent, multi-database search of Scopus, Web of Science, EBSCOhost Business Source Complete, and Google Scholar, this review critically evaluates the roles of four organisational influence factors: top management support, organisational rewards, information and communication technology (ICT) use, and organisational culture. Throughout the synthesis, evidence obtained directly from Malaysian telecommunications organisations is explicitly distinguished from evidence transferred from other national and sectoral contexts. The review finds that organisational culture and ICT infrastructure are the most consistently supported enablers of knowledge sharing, while organisational rewards demonstrate differentiated effects across sharing and collecting behaviours, and it proposes a conceptual mediation framework in which knowledge sharing and knowledge collecting mediate the relationship between the four influence factors and innovation efficiency. The paper further identifies research gaps concerning the underrepresentation of the Malaysian telecommunications context in KM scholarship, the need for longitudinal designs, and the limited theoretical differentiation of knowledge collecting from knowledge sharing. The proposed framework provides a rigorous evidential platform for future empirical investigation, via structural equation modelling, in this sector.

Keywords: knowledge management practices · knowledge sharing · knowledge collecting · innovation efficiency · telecommunications · Malaysia · Theory of Reasoned Action · organisational culture · ICT · top management support · systematic review · Prisma

INTRODUCTION

The global economy's rapid shift toward knowledge-intensive production has changed organisational goals. Organisations now compete on the strength of their intellectual capital — the expertise, insights, processes, and relational knowledge embedded in their human and structural resources. Knowledge management (KM), the systematic process of identifying, capturing, organising, distributing, and applying the knowledge and skills required for problem solving, strategic planning, and decision-making, has evolved from a peripheral administrative function into a core strategic competency.

In telecommunications, these dynamics are especially pronounced. The sector is characterised by rapid technological change, shortening product life cycles, increasingly sophisticated customers, and continual

regulatory change. Competing in this environment requires organisations to continuously generate, share, and apply knowledge in order to innovate products, services, operational processes, customer-engagement models, and organisational structures. Knowledge management provides the systemic underpinning for capturing, organising, and leveraging organisational knowledge in the pursuit of innovation efficiency.

The Malaysian telecommunications sector is a strategically important and analytically interesting setting for this review. Leading mobile network operators (MNOs) and network facilities providers (NFPs) serve more than sixteen million subscribers in an industry that generated USD 8.3 billion in revenue in 2021 and was projected to grow by over 2% annually through 2026 (GlobalData, 2022 — an industry market report cited here for contextual market sizing only; it is not part of the peer-reviewed evidence base synthesised in this review). Major operators such as TM Berhad and SACOFA Sdn Bhd have invested heavily in KM infrastructure over the past decade. Yet Wei et al. (2009) — in one of the few studies to examine Malaysian telecommunications organisations directly — found that gaps in managerial recognition of KM's value and in KM implementation maturity continued to constrain innovative performance.

Despite a growing global literature on KM and innovation, empirically grounded evidence on KM dynamics and their innovation consequences within the Malaysian telecommunications sector remains sparse and fragmented. Existing reviews tend either to examine KM in general organisational contexts without sector-specific nuance, or to examine telecommunications innovation without adequately theorising the underlying KM mechanisms.

This review addresses that gap by synthesising empirical evidence on four interconnected themes: (1) the conceptual and theoretical foundations of KM practices; (2) the roles of knowledge sharing and knowledge collecting as distinct KM behavioural mechanisms; (3) the organisational influence factors — top management support, organisational rewards, ICT use, and organisational culture — that shape these behaviours; and (4) the relationship between KM behaviours and innovation efficiency, including the mediating position that KM behaviours occupy within that relationship.

The Theory of Reasoned Action (TRA; Fishbein & Ajzen, 1975) supplies a psychologically grounded account of how organisational conditions shape KM behavioural intentions and actions. Building on this framework, the review maps the current state of KM-innovation scholarship relevant to telecommunications, identifies key gaps and inconsistencies in the literature, synthesises evidence on the differential roles of influence factors across KM behaviours, and establishes a theoretically coherent evidential foundation for future empirical research.

The remainder of this article is organised as follows. Section 2 sets out the review methodology, including the search strategy, screening process, and quality-appraisal criteria. Section 3 examines the conceptual roots of knowledge management and its application in telecommunications. Section 4 critically evaluates the knowledge-sharing literature. Section 5 conceptualises knowledge collecting as a distinct KM construct. Section 6 examines each organisational influence factor in turn. Section 7 defines innovation efficiency, synthesises the cross-construct evidence, and presents the proposed mediation framework. Section 8 identifies research gaps and future directions, and Section 9 concludes.

METHODOLOGY

This review combines the procedural rigour of a systematic literature review with the interpretive flexibility of narrative synthesis. It was conducted in five stages: (1) definition of the search strategy and search strings; (2) multi-database searching and de-duplication; (3) title/abstract and full-text screening against explicit inclusion and exclusion criteria; (4) quality appraisal of eligible studies; and (5) thematic data extraction, evidence-context coding, and critical narrative synthesis. The identification and screening stages are reported following PRISMA conventions (Figure 1) to make the review process transparent and reproducible.

Search Strategy

Four databases were searched: Scopus, Web of Science (WoS) Core Collection, EBSCOhost Business Source Complete, and Google Scholar (the first 200 results, ranked by relevance, were screened for the latter, consistent with recommended practice for grey-literature-prone platforms). Search strings combined the core constructs using Boolean operators and their principal synonyms:

("knowledge management" OR "KM practice*") AND ("knowledge sharing" OR "knowledge donat*") AND ("knowledge collect*" OR "knowledge acquisit*" OR "knowledge seeking") AND ("innovation efficiency" OR "innovat* perform*" OR "innovat* capab*") AND ("telecommunicat*" OR "telecom*") AND ("Malaysia*")

A second, broader string — omitting the "Malaysia*" and "telecommunicat*" filters — was run in each database to retrieve theoretically relevant studies from adjacent national and sectoral contexts for comparative and transferability purposes; these records were tagged at extraction as transferred evidence (see Section 2.5). Search fields were restricted to title, abstract, and keywords. Results were limited to the subject areas of management, information systems, organisational behaviour, and innovation studies. Publication-date filters prioritised 2005–2024 research, while foundational theoretical works published earlier (e.g., Polanyi, 1958; Fishbein & Ajzen, 1975; Nonaka & Takeuchi, 1995; Blau, 1964) were retained for theoretical grounding irrespective of date; these theoretical works were identified through citation tracking rather than the database search itself and are excluded from the empirical-study tally reported below. The final search was executed in [month/year — to be confirmed by the authors against their search log], and reference lists of all eligible full-text articles were hand-searched for additional relevant records (backward citation tracking).

Database-Wise Search Results

Table 1 reports the number of records retrieved from each database before de-duplication, in the format expected by readers and reviewers of a systematic review. The bracketed entries below are placeholders: they mark exactly where the authors' own search-log figures belong and must be filled in from the original database export files (with the search date recorded) before the manuscript is submitted.

Database	Search field(s)	Date range	Records retrieved (n)
Scopus	Title/Abstract/Keywords	2005–2024	[..]
Web of Science Core Collection	Topic	2005–2024	[..]
EBSCOhost Business Source Complete	Title/Abstract	2005–2024	[..]
Google Scholar (first 200 by relevance)	All fields	2005–2024	[..]
Backward citation tracking / hand search	Reference lists of eligible full texts	n/a	[..]
Total records identified	—	—	[TOTAL]

Table 1. Database-Wise Search Results Prior to De-Duplication

Screening, Exclusion, and Study Selection

Records retrieved from all sources were exported to a reference manager, and duplicates were removed using automated matching on DOI and title/author/year, followed by manual verification. Two reviewers independently screened titles and abstracts against the inclusion and exclusion criteria in Section 2.4; disagreements were resolved by discussion, with a third author consulted where consensus could not be reached. Studies surviving title/abstract screening proceeded to full-text assessment, at which point the same criteria were re-applied with particular attention to peer-review status, construct operationalisation, and contextual transferability. Figure 1 summarises this process and reports, for each exclusion decision point, the number of records removed and the principal reasons for exclusion. Forty-three studies met all inclusion criteria at full-text assessment and form the core peer-reviewed evidence base synthesised in this review; a further set of foundational theoretical works (see Section 2.1) was added for conceptual grounding only and is reported separately from this count.

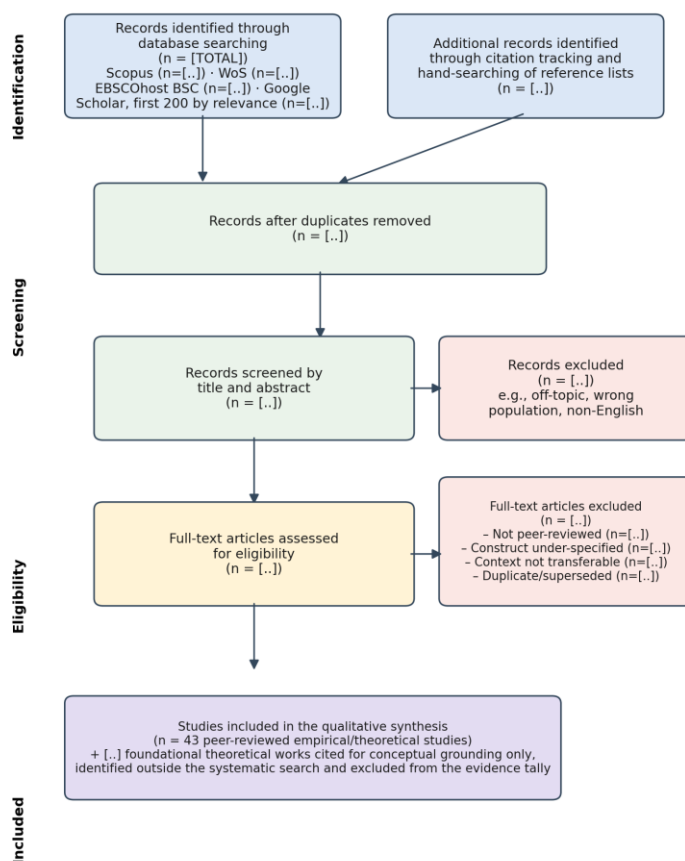


Figure 1. PRISMA-style flow diagram of study identification, screening, and inclusion (record counts to be confirmed against the authors' search log)

Inclusion and Exclusion Criteria

Inclusion criteria were applied consistently across all four databases and both search strings. A study was included if it: (a) examined at least one construct relevant to the review framework (KM practices, innovation efficiency, or one of the four organisational influence factors); (b) was published in a peer-reviewed journal indexed in Scopus or Web of Science, or was a peer-reviewed conference proceeding subsequently published in an indexed journal; (c) reported a quantitative, qualitative, or mixed-methods empirical design, or a theoretically rigorous conceptual contribution; and (d) was published in English.

Exclusion criteria were applied with equal consistency. Studies were excluded if they were: (a) non-peer-reviewed — including conference papers without subsequent journal publication, working papers, theses, industry white papers, and practitioner or trade-press commentary; (b) unable to operationalise KM constructs with sufficient specificity to permit construct-level extraction; (c) drawn from populations or contexts judged to lack theoretical transferability to the telecommunications sector (e.g., studies of purely technical knowledge-management systems with no organisational-behavioural component); or (d) duplicate or superseded publications reporting the same dataset. This peer-review criterion was enforced uniformly during editing: a single non-peer-reviewed practitioner source (a professional-networking-site commentary) that had been cited in an earlier draft for a claim about top management support has been removed and replaced with peer-reviewed evidence already within the corpus (see Section 6.1), so that no in-text claim in the KM evidence base now rests on a non-peer-reviewed source. The single remaining non-peer-reviewed citation in the manuscript (GlobalData, 2022) is used exclusively for background market statistics in Section 1 and is explicitly labelled as such; it is not treated as part of the reviewed evidence base and was not subject to the screening process described above.

Evidence-Context Coding: Direct Malaysian vs. Transferred Evidence

Because a central aim of this review is to assess how much of the KM–innovation evidence base was generated within Malaysian telecommunications organisations specifically, each included study was coded for its national and sectoral context at data extraction. Three categories were used: (i) direct evidence — studies conducted within Malaysian telecommunications organisations; (ii) proximate evidence — studies conducted either within Malaysian organisations outside telecommunications, or within telecommunications organisations outside Malaysia; and (iii) transferred evidence — studies conducted in neither the Malaysian nor the telecommunications context, included because they contribute theoretically generalisable findings about KM constructs or influence-factor mechanisms. This coding is reported explicitly alongside each major citation in Sections 3–7 and is summarised in the “Evidence Context” column of Table 2, so that readers can distinguish findings with direct contextual applicability to Malaysian telecommunications organisations from findings whose applicability to that context is, at this stage, an evidence-informed extrapolation rather than a direct empirical finding.

Quality Appraisal

Studies meeting the inclusion criteria were further appraised for methodological quality before being weighted in the narrative synthesis. Rather than adopting a numerical scoring threshold that would imply a false precision for a heterogeneous mix of quantitative, qualitative, and conceptual studies, this review used the structured four-criterion appraisal shown in Table 3, applied narratively at the point of use throughout Sections 3–7 (for example, by explicitly flagging single-informant, cross-sectional designs where relevant to interpreting effect sizes).

Criterion	Guiding question
Theoretical grounding	Is the study explicit about the theoretical framework used to justify hypothesised or discussed relationships?
Construct validity and measurement	Are KM, influence-factor, and innovation constructs operationalised with named, previously validated measures or a clearly described qualitative protocol?
Methodological transparency	Are sampling frame, sample size, response rate (where applicable), and analytic technique reported in sufficient detail to assess rigour and to permit common-method-bias considerations?
Contextual relevance and transferability	Is the study's national, sectoral, and organisational context reported clearly enough to support the evidence-context coding in Section 2.5?

Table 3. Quality Appraisal Criteria Applied to Included Studies

Studies that satisfied all four criteria were treated as higher-confidence evidence in the synthesis; studies that satisfied fewer than four — for example, single-informant cross-sectional surveys with no named validated instrument — were retained (because they still met the inclusion criteria) but their limitations are flagged explicitly wherever their findings are discussed, particularly in the critical synthesis presented in Section 7.2.

Data Extraction and Synthesis

For each of the 43 included studies, the following were coded: study setting (country and sector), theoretical framework, constructs examined, sample characteristics, methodological design, key findings, and evidence-context classification (Section 2.5). Thematic synthesis then grouped findings under the review's four organising themes (Section 1). Consistent with best practice in narrative synthesis, contradictory or context-dependent findings were flagged explicitly rather than folded into an averaged consensus claim; these points of disagreement are discussed critically, with attention to differences in methodology, sample characteristics, and context, in Sections 7.2 and 8.

Definition and Organisational Importance of Knowledge

Tacit and Explicit Knowledge as Organisational Assets

Michael Polanyi's (1958, 1966) distinction between tacit and explicit knowledge underpins KM literature. Explicit knowledge — technical specifications, procedural manuals, databases, and regulatory documents — can be stored and communicated through organisational systems. As Polanyi observed, “we know more than we can tell,” capturing the idea that tacit knowledge — cognitive schemas, experiential insight, intuitive judgement, and interpersonal competence — cannot be fully codified. While information systems and documentation standards can manage explicit knowledge, tacit knowledge requires social interaction, mentoring, collaborative practice, and cultural conditions that enable voluntary externalisation and transfer.

Recognizing and managing both dimensions of organisational knowledge confers a competitive advantage. Carlucci et al. (2004) argued that managing an organisation's knowledge resources is the foundational step in building the capabilities that enable innovation and financial performance. Consistent with the resource-based view of the firm (Barney, 1991), Carmeli and Tishler (2004) found that intangible, knowledge-based resources are difficult to imitate and can therefore sustain competitive advantage.

Wang and Xie (2022) observed that employees may serendipitously discover and record knowledge without deliberately seeking it, underscoring the emergent, often informal character of organisational knowledge generation that formal KM systems must accommodate. This points to the need for cultural, institutional, and technological conditions that support knowledge capture through both formal channels and the informal conversations through which much organisational knowledge is actually produced and transmitted.

The Evolution and Definition of Knowledge Management

KM's formalisation as a management discipline in the early 1990s reflected a growing recognition that knowledge, rather than physical or financial capital alone, drove value creation in advanced economies. Choi and Lee's (2002) influential definition frames KM as an organisation's realisation, dissemination, use, and application of knowledge — a process view that positions KM as a dynamic organisational capability that creates, shares, and uses knowledge.

Dalkir (2005) proposed an integrated KM cycle comprising three interconnected stages: knowledge capture and creation, which generates and codifies new knowledge; knowledge sharing and dissemination, which distributes captured knowledge to those who need it; and knowledge application, which embeds shared knowledge in organisational processes and decisions. This cycle provides an analytical scaffold for understanding KM as a continuous organisational process rather than a one-off intervention.

Andreeva and Kianto (2012) described KM practices as a coordinated set of activities directed at managing knowledge resources productively, emphasising that knowledge governance requires deliberate organisational design rather than emerging spontaneously. Singh and Kant (2008) similarly characterised KM as the systematic coordination of an organisation's workforce, technology, business processes, and organisational structure to generate value through innovation and knowledge reuse — a definition that anchors this review's focus on the KM–innovation relationship.

Knowledge Management in the Telecommunications Sector

Telecommunications organisations face distinctive KM demands. Alongside large repositories of explicit technical knowledge — network specifications, regulatory-compliance documentation, customer data, and operational procedures — they must also manage the tacit expertise of engineers, project managers, customer-relationship specialists, and innovation teams. Because technical knowledge can become obsolete quickly in this sector, continuous learning and knowledge renewal are essential (Wei et al., 2009).

Wei et al. (2009) — direct evidence, Malaysian telecommunications sector — conducted the earliest systematic assessment of Malaysian telecommunications organisations' KM readiness. They found that, while managers valued KM in principle, the largest implementation-maturity gaps lay in knowledge auditing, leadership support, and the measurement and embedding of KM processes. This remains the empirical baseline for the Malaysian telecommunications context: organisations recognise KM's strategic value but continue to struggle with its operational implementation, a gap this review's proposed research agenda (Section 8) aims to help close.

Zayed et al. (2022) — transferred evidence, Nigerian telecommunications sector — examined how KM affects employee retention. Supervisory knowledge support, in particular, was associated with retention outcomes, indicating that effective KM generates organisational value beyond innovation performance alone; the extent to which this retention-related benefit replicates in the Malaysian context, however, has not been directly tested.

Jyoti et al. (2011) — transferred evidence, Indian telecommunications sector — surveyed 1,190 telecommunications employees and found that the full KM cycle — knowledge gathering, organising, sharing, and application — was associated with stronger innovative capability, and that organisations with more mature KM practices reported better innovation performance. The large sample size strengthens confidence in the statistical association reported, although the single-country, single-sector design means the finding requires independent replication before it can be assumed to generalise to Malaysian telecommunications organisations.

Conceptualising Knowledge Sharing

Definition and Organisational Function

Knowledge sharing — the intentional exchange of information, experience, ideas, and expertise within an organisation — is the outward-facing, donative side of KM behaviour. Fayyaz et al. (2021) frame knowledge sharing as behaviour employees engage in because they wish to disseminate their intellectual experience and expertise, a motivation-centred definition that positions sharing as a discretionary act employees choose to perform or withhold depending on their attitudes, intentions, and organisational circumstances.

Knowledge sharing supports several organizational functions. Sharing solutions with colleagues facing similar problems avoids duplicated problem-solving effort. Cross-functional knowledge integration exposes technical specialists to commercial perspectives and vice versa, enabling the heterogeneous knowledge combinations associated with radical innovation (Majchrzak et al., 2004). It is also the primary mechanism through which tacit knowledge is socialised and externalised — the central dynamic in Nonaka and Takeuchi's (1995) SECI model of organisational knowledge creation.

By building trust, reciprocity, and mutual obligation among colleagues, knowledge sharing also builds organisational social capital. This relational dimension is especially relevant to complex telecommunications projects, which typically require coordinated input from engineering, commercial, regulatory, and operations functions; effective cross-functional knowledge sharing may therefore be a precondition for integrating the diverse expertise that telecommunications innovation demands.

Evidence on Knowledge Sharing and Innovation

Across the reviewed literature, knowledge sharing and innovation are consistently, though not uniformly strongly, associated. Darroch (2005) — transferred evidence, multi-industry — found in a large multi-industry study that firms with more effective information-exchange systems reported higher product, process, and administrative innovation, but that this relationship was itself moderated by organisational responsiveness: firms that actively used shared knowledge to inform decisions and adapt practices were the most innovative, implying that knowledge sharing alone is insufficient without a complementary capacity to act on shared knowledge.

Nguyen et al. (2020) — transferred evidence, Vietnamese telecommunications sector — used a mixed-methods design combining manager and employee data and found positive associations between both knowledge donating and knowledge collecting and employees' innovative work behaviour. As a telecommunications-sector study, this evidence is geographically distant from Malaysia but shares important organisational and regulatory features with the Malaysian telecommunications context, strengthening its relevance relative to studies from unrelated sectors.

Fayyaz et al. (2021) — transferred evidence, Pakistani multi-sector sample — found that top management support, organisational rewards, and ICT use jointly shape knowledge-sharing behaviour and, in turn, innovation efficiency, with standardised path coefficients indicating meaningful effect sizes. This study is methodologically important for the present review because it operationalised knowledge sharing and knowledge collecting as parallel, theoretically distinguished mediating mechanisms — the conceptual approach adopted throughout this review (see Section 5.1) — rather than treating KM as a single undifferentiated construct.

Alzghoul et al. (2018) — transferred evidence, Jordanian telecommunications sector — examined authentic leadership, workplace climate, knowledge management, and performance, finding that leadership authenticity was associated with increased creativity, knowledge sharing, and performance. This adds leadership authenticity as a candidate moderating or antecedent factor to the top-management-support literature reviewed in Section 6.1, although its role has not yet been tested directly alongside the four influence factors examined in this review.

Conceptualising Knowledge Collecting

Knowledge Collecting as a Construct Distinct from Knowledge Sharing

Although knowledge sharing and knowledge collecting are sometimes treated interchangeably in the applied KM literature, the two constructs are conceptually distinct and are treated separately throughout this review. Knowledge sharing is an outward-facing, donative behaviour enacted by the knowledge holder, who chooses whether to externalise what they know. Knowledge collecting, sometimes termed knowledge donation's counterpart or knowledge acquisition, is an inward-facing, acquisitive behaviour enacted by the knowledge seeker, who must recognise a knowledge gap, identify a plausible source, and expend effort to obtain knowledge already held by others (Fayyaz et al., 2021).

Van den Hooff and de Ridder (2004) were among the first to formalise this donating/collecting distinction empirically, showing that knowledge donating and knowledge collecting are predicted by different combinations of organisational commitment and communication climate rather than by a single common antecedent. Kuvaas et al. (2015) extended this reasoning by showing that donating and collecting are

differentially related to employees' social- and economic-exchange relationships with their immediate supervisor: employees in stronger social-exchange relationships were comparatively more inclined toward donating, while the association with collecting followed a different pattern.

Taken together, these studies imply that the two behaviours cannot safely be treated as interchangeable or as proxies for one another in empirical models: an organisational intervention that increases sharing (for example, recognition-based rewards) will not necessarily increase collecting, and vice versa. This review therefore treats knowledge sharing and knowledge collecting as parallel but non-equivalent mediating mechanisms throughout — consistent with Fayyaz et al.'s (2021) empirical operationalisation of the two constructs as distinct, correlated latent variables within a single structural model, rather than as a single aggregated KM-behaviour factor.

Knowledge collection is the receptive, inward-facing side of KM behaviour: it involves locating, evaluating, and obtaining knowledge and expertise from internal and external sources. Because knowledge sharing and knowledge collecting are functionally complementary — one person's sharing is, from the counterparty's perspective, an act of collecting — KM system design must attend to both sides of the exchange. An organisational knowledge ecosystem depends on both employees' willingness and ability to share knowledge and employees' willingness and ability to actively seek and acquire it; a system that cultivates sharing without a reciprocal culture of active collecting risks accumulating knowledge that is never actually drawn upon, depleting the practical value of the knowledge commons over time.

Organisational Knowledge Collecting in Telecommunications

In telecommunications organisations, knowledge collection takes several forms: consulting subject-matter experts on technical or regulatory questions, reviewing documentation repositories, project reports, and organisational-memory systems; participating in communities of practice or professional learning networks; attending training events or knowledge-sharing sessions; and informal peer consultation to resolve operational problems. The breadth of this behavioural repertoire suggests that effective knowledge collection depends jointly on technological infrastructure, social relationships, organisational norms, and the personal motivational orientation that leads individuals to actively seek knowledge rather than attempt to solve problems independently.

Ibidunni (2019) transferred evidence, cross-sector — found that systematic knowledge collection strengthens organisations' capacity to adapt to technological and market change. This is consistent with dynamic-capabilities theory (Teece et al., 1997), under which an organisation's ability to identify, seize, and reconfigure knowledge resources is a key source of competitive performance in fast-changing industries such as telecommunications.

Singh et al. (2011) — transferred evidence, telecommunications sector — found that KM, including knowledge-collection behaviours, was associated with improved employee wellbeing and organisational learning, suggesting that knowledge collection generates value at the individual level (learning and skill development), the team level (collective capability), and the organisational level (innovation performance) simultaneously.

Organisational Influences on Knowledge Management Behaviour

The literature repeatedly identifies four factors — top management support, organisational rewards, ICT use, and organisational culture — as shaping employees' knowledge-sharing and knowledge-collecting behaviour. Each factor's theoretical rationale and empirical evidence base is reviewed below through the lens of the Theory of Reasoned Action (TRA), used as this review's organising behavioural framework.

TRA (Fishbein & Ajzen, 1975) holds that behavioural intentions, and the actual behaviours that follow from them, are jointly determined by an individual's attitude toward the behaviour — shaped by beliefs about its

likely outcomes — and the subjective norm perceived in their social environment. In this review's application of TRA, organisational influence factors are understood to shape the attitudinal dimension (what outcomes employees expect from sharing or collecting knowledge) and the subjective-norm dimension (what knowledge behaviours the organisational community is perceived to expect and endorse).

Top Management Support

Top management support (TMS) refers to the range of behaviours through which senior organisational leaders demonstrate commitment to KM and create the conditions that support it. Fayyaz et al. (2021) define TMS as managers building information-sharing networks, allocating resources, articulating KM priorities, modelling knowledge exchange themselves, and integrating KM objectives into organisational strategy.

TMS is theorized to influence KM behaviour through both TRA pathways. On the attitudinal dimension, TMS signals that knowledge sharing and collecting will be recognised and rewarded, raising employees' expectations of positive KM outcomes. On the subjective-norm dimension, leaders who visibly practise knowledge sharing establish it as a norm endorsed by the organisation's most powerful members; in high-power-distance organisational contexts such as much of Malaysian corporate culture, senior leaders' own behaviour may carry particularly strong normative weight.

Zayed et al. (2022) — transferred evidence, Nigerian telecommunications sector — found that supervisory knowledge support predicted employee KM engagement and retention, linking TMS to multiple organisational-health indicators beyond innovation alone. Singh et al. (2011) — transferred evidence, telecommunications sector — found positive associations between top-management KM engagement and organisational-learning outcomes. Al-Hakim and Hassan (2013) — transferred evidence, Iraqi mobile telecommunications sector — found that leadership-driven strategic alignment of KM — securing resource commitment and embedding KM objectives within formal strategy, rather than relying on symbolic modelling alone — significantly predicted both innovation and organisational performance, underscoring that TMS operates as much through concrete resource allocation as through visible leadership example.

The literature also reveals important nuances in how TMS operates. Fayyaz et al. (2021) found that organisational reward structures moderated the effect of TMS on knowledge sharing, suggesting TMS is most effective when paired with complementary structural incentives rather than acting alone. This implies that telecommunications organisations should design TMS and organisational rewards as mutually reinforcing elements of an integrated KM-enablement system, rather than as independent levers.

Organizational Rewards

Organisational rewards — including financial compensation, promotion opportunities, and recognition mechanisms tied to KM behaviour — signal how much an organisation values knowledge sharing and collecting. The theoretical case for a positive reward–KM relationship draws on economic exchange theory (Blau, 1964), under which individuals weigh the anticipated returns of a behaviour against its costs: when organisations link rewards to KM behaviours, employees weigh the time and cognitive effort invested in sharing or collecting knowledge against the rewards they expect to receive.

Bock et al. (2005) — transferred evidence, multi-sector — provided an early empirical test of this relationship, finding that expected organisational rewards significantly influence knowledge-sharing attitudes and intentions, while also identifying an important qualification: extrinsic rewards are most effective when perceived as fair, reliably distributed, and genuinely contingent on KM behaviour rather than disconnected from actual performance. Ho (2009) similarly argued that organisational rewards function as incentives for KM effort only to the extent that they are perceived as adequate to justify the investment required — a moderating condition rather than a guaranteed effect.

Lee and Ahn (2007) offered a theoretical analysis of reward-system design for intra-organisational knowledge sharing, arguing that both individual- and group-level rewards are needed to address the

collective-action problem inherent in sharing: individuals may rationally withhold contributions if they bear the full cost of sharing while the benefits are distributed across all colleagues. Well-designed reward structures that create clear individual incentives to share can help overcome this barrier by aligning individual and organisational interests.

Abbasi et al. (2020) — transferred evidence, Pakistani public-sector banking — found that psychological empowerment and organisational identification, constructs related to but distinct from formal rewards, also contributed significantly to knowledge-sharing behaviour. This suggests intrinsic motivation may complement, or in some organisational contexts partially substitute for, extrinsic rewards in sustaining knowledge sharing — a possibility not yet tested directly within a Malaysian telecommunications sample.

ICT Use

Information and communication technology (ICT) is the infrastructural backbone of modern organisational KM systems, supplying the platforms through which knowledge is captured, indexed, made searchable, and distributed at scale. Huysman and Wulf (2006) characterised ICT as playing both an enabling role (making KM activities possible at scale) and a mediating role (shaping the specific modalities through which sharing and collecting occur). In telecommunications organisations — where employees are typically technology-proficient and technologically mediated communication is standard operational practice — ICT use represents a particularly potent and contextually well-fitted KM enabler.

Kucharska and Erickson (2019), transferred evidence, multi-industry — found that ICT competency, as distinct from mere ICT availability, significantly predicted knowledge-sharing behaviour, implying that technology investment must be paired with adequate training if it is to realise its KM-enabling potential. This is particularly relevant for telecommunications organisations, where the pace of technological change may outstrip employees' capacity to master new KM platforms.

Naeem (2019), transferred evidence, cross-sectors applied an innovation-diffusion framework and found that perceived compatibility between ICT tools and employees' existing work practices was a stronger predictor of KM-technology adoption than perceived usefulness alone, implying that ICT tool selection should prioritise workflow integration over raw functional capability. The same study found that informal digital-communication channels, including social media and cross-platform collaborative applications, complement formal KM systems by enabling rapid, peer-to-peer sharing of tacit knowledge — a finding with direct relevance to telecommunications organisations, where employees routinely rely on digital communication platforms for day-to-day operational purposes.

Organizational Culture

Organisational culture — the shared values, beliefs, behavioural norms, and assumptions that characterise an organisation — exerts a pervasive influence on KM behaviour. Rai (2011) argued that culture is central to knowledge production and KM because it shapes, at a deep motivational level, how employees learn, acquire, and share information. Unlike structural levers such as reward systems or ICT platforms, culture operates largely through taken-for-granted assumptions and informal social norms, making it both more pervasive and more resistant to deliberate managerial intervention.

Liu et al. (2019) — transferred evidence, Chinese organisations — found that institutional context, national culture, and organisational culture collectively shape KM adoption and effectiveness, and that this relationship varies across cultural dimensions: more collectivist organisations exhibited higher informal knowledge sharing but lower formal knowledge documentation, while more individualist organisations showed the reverse pattern.

These findings are potentially relevant to the Malaysian context, where organisational culture is shaped by an interplay of Malay, Chinese, and Indian cultural values alongside contemporary corporate and digital-

culture influences — though, being drawn from a Chinese sample, the finding should be read as a hypothesis for the Malaysian context rather than as direct evidence of it.

Jasimuddin and Zhang (2013) transferred evidence, multi-sector — examined organisational culture and KM-strategy adoption in telecommunications-adjacent contexts and found that organisations with protective cultural orientations — emphasising competitive advantage through knowledge exclusivity — can simultaneously support internal knowledge sharing while suppressing external sharing with partners and competitors. This cultural paradox is potentially relevant to Malaysian telecommunications organisations operating within a concentrated market structure, where competitive pressure may create incentives to restrict knowledge sharing beyond organisational boundaries even as internal KM practices are actively encouraged.

Onday (2016) traced the development of organisational-culture theory from Schein's foundational model through more recent appreciative-inquiry approaches. Applied to the telecommunications KM context, this theoretical lineage suggests that culture's influence on KM behaviour operates simultaneously at multiple levels: the surface level of observable KM artefacts and practices, the mid-level of espoused values and KM policy, and the deep level of taken-for-granted assumptions about whether knowledge is a collective organisational resource or a competitive individual asset.

Innovation Efficiency and the Proposed Mediation Framework

Innovation Efficiency: Conceptual Foundations

Innovation efficiency is conceptualised in this review as an organisation's capacity to transfer and integrate the knowledge held by its human resources in order to generate new knowledge that produces new products, services, or processes, using an optimal deployment of organisational resources (Ben Zaied et al., 2015). This definition distinguishes innovation efficiency from raw innovation output by adding a resource-utilisation dimension: an organisation that achieves the same innovation output with less resource expenditure, or a greater output with the same resource investment, exhibits superior innovation efficiency.

An important conceptual distinction separates innovation from creativity. Noruzy et al. (2013) argued that creativity concerns the generation of novel ideas without regard to practical implementation, whereas innovation refers specifically to how such ideas are translated into practice within organisational and market contexts. Fagerberg (2005) similarly described innovation as an effort to put an idea into practice — a framing that highlights the translation challenge separating creative ideation from realised innovation. For KM purposes, this distinction implies that effective knowledge sharing and collecting must support not only idea generation but also the practical knowledge transfer required to convert ideas into implemented innovations.

Baregheh et al. (2009) offered a multidisciplinary definition of innovation as the multi-stage process by which organisations transform ideas into new or improved products, services, or processes in order to advance, compete, and differentiate themselves. This process orientation aligns naturally with a KM perspective: if innovation is a multi-stage process, KM practices can be understood as enabling each stage — supplying the knowledge inputs for ideation, the cross-functional exchange required for development, and the organisational learning that improves future innovation processes.

Evidence Synthesis: KM Behaviours and Innovation

The evidence synthesised across the reviewed studies reveals a broadly consistent pattern of positive

association between KM behaviours — particularly knowledge sharing and knowledge collecting — and organisational innovation outcomes, alongside important nuances of context, methodology, and construct operationalisation. Table 2 provides a structured synthesis of the key empirical studies reviewed, including the evidence-context classification described in Section 2.5.

Author(s) & Year	Context	Evidence Class.	Methodology	Key Findings	Relevance
Fayyaz et al. (2021)	Pakistan, multi- sector	Transferred	SEM / survey	TM support, rewards & ICT shape KS → innovation efficiency; KC mediates outcomes	Core influence- factor & mediation model
Nguyen et al. (2020)	Vietnam, telecoms	Transferred	Mixed methods	Knowledge donation & collection positively predict innovative work behaviour	Dual KM- behaviour mechanism in telecoms
Alzghoul et al. (2018)	Jordan, telecoms	Transferred	SEM / survey	Authentic leadership positively shapes KM sharing; KM drives creativity & performance	Leadership quality as KM moderator
Al-Hakim & Hassan (2013)	Iraq, mobile telecoms	Transferred	SEM / survey	KM strategies significantly and positively affect innovation and org. performance	Sector-specific KM–innovation evidence
Jyoti et al. (2011)	India, telecoms	Transferred	Survey, n=1,190	KM processes (capture, organise, share, apply) collectively build innovative capability	Full KM-cycle → innovation in telecoms
Zayed et al. (2022)	Nigeria, telecoms	Transferred	Survey / PLS- SEM	KM dimensions (incl. supervisory support) predict employee retention & engagement	Broader organisational KM benefits
Wei et al. (2009)	Malaysia, telecoms	Direct	Survey + interviews	Significant KM implementation gap in Malaysian telecoms; leadership gaps dominant	Malaysian context baseline
Alrubaiee et al. (2015)	Jordan, IT sector	Transferred	SEM / survey	Organisational innovation mediates the relationship between KM processes and performance	Innovation as KM–performance mediator
Darroch (2005)	Multi- industry	Transferred	Survey, large- n	Firms with sophisticated KM exhibit higher product, process & admin. innovation	Foundational KM–innovation relationship
Liu et al. (2019)	China	Transferred	Multi-level survey	Institutional & organisational culture independently influence KM practices	Culture's multi- level KM effects

Bock et al. (2005)	Multi-sector	Transferred	Survey / SEM	Expected rewards, reciprocity & org. climate shape knowledge-sharing intentions	Foundational KS-intention model
Patwary et al. (2023)	Malaysia, hotel industry	Proximate	SEM / survey	KM practices → employee performance through org. commitment & capacity building	Malaysian evidence, non-telecoms sector

Table 2. Synthesis of Key Empirical Studies on Knowledge Management Practices and Innovation, with Evidence-Context Classification (Direct = Malaysian telecommunications; Proximate = Malaysian non-telecoms or non-Malaysian telecoms; Transferred = neither Malaysian nor telecommunications)

This classification makes explicit what the narrative discussion above already signals: of the twelve studies summarised in Table 2, only Wei et al. (2009) constitutes direct evidence from Malaysian telecommunications organisations, one further study (Patwary et al., 2023) offers proximate evidence from a different Malaysian sector, and the remaining ten studies are transferred evidence from other national or sectoral contexts. This pattern — which recurs across the full 43-study corpus, not only the studies tabulated here — is itself among the review's central findings and is developed further as Gap 1 in Section 8.1: the Malaysian telecommunications KM–innovation relationship is, at present, substantially an extrapolation from evidence generated elsewhere, rather than a directly and repeatedly tested empirical relationship.

Beyond this contextual pattern, the synthesis reveals several further patterns worth noting critically rather than descriptively. First, positive KM–innovation relationships are reported across diverse national and sectoral contexts, which strengthens confidence in the theoretical generalisability of the underlying relationship even as it underscores the need for context-specific empirical investigation within Malaysian telecommunications organisations specifically. Second, the KM–innovation relationship in the reviewed literature is predominantly indirect: KM practices appear to generate innovation-efficiency gains through intermediate mechanisms — organisational learning capability, knowledge-integration quality, and employee innovative work behaviour — rather than through a direct path. Alrubaiee et al. (2015) demonstrated this explicitly, finding that organisational innovation mediates the relationship between KM processes and organisational performance, with the mediated effect exceeding the direct KM–performance relationship.

This apparent consistency, however, partly reflects methodological homogeneity rather than convergent validity, and this should temper how much confidence is placed in the cross-study pattern. The large majority of the studies reviewed (e.g., Fayyaz et al., 2021; Alzghoul et al., 2018; Al-Hakim & Hassan, 2013; Zayed et al., 2022) rely on single-informant, cross-sectional survey data analysed through SEM or PLS-SEM. This design is prone to common-method variance, cannot establish the temporal precedence implied by a mediation model, and tends to be over-represented among published KM studies relative to longitudinal or multi-informant designs — a publication-related bias that this review cannot fully correct for but flags explicitly. Sample sizes also vary substantially, from Jyoti et al.'s (2011) 1,190 telecommunications employees to considerably smaller samples in several single-organisation studies, limiting how confidently effect sizes can be compared across studies. Findings are also not uniformly consistent on the question of what, precisely, mediates the KM–performance relationship: Fayyaz et al. (2021) reported that knowledge sharing and knowledge collecting fully mediated the relationship between organisational influence factors and innovation efficiency, whereas Alrubaiee et al. (2015) found that innovation itself, rather than KM behaviour per se, was the stronger mediating mechanism between KM processes and organisational performance. The precise causal ordering of KM behaviours, innovation, and performance outcomes therefore remains empirically unsettled, and may plausibly be sector- or context-dependent rather than

universal — a further reason the proposed framework below should be tested directly within the Malaysian telecommunications sector rather than assumed from transferred evidence.

Third, heterogeneity in reported effect sizes across studies suggests that context moderates the KM–innovation relationship. Studies conducted in more collectivist cultural contexts, in more hierarchical organisational structures, and in more technologically intensive industries tend to report somewhat stronger KM–innovation associations — a pattern that may reflect differential fit between organisational context and KM practice rather than a universal effect size. The Malaysian telecommunications sector, characterised by a blend of collectivist cultural values and high technological intensity, may represent a comparatively favourable context for KM-driven innovation, but this remains an inference from transferred evidence pending direct empirical verification.

A Conceptual Mediation Framework

Building on the evidence synthesised above, this review proposes a conceptual mediation framework in which knowledge sharing and knowledge collecting function as parallel, partially distinct mediating mechanisms linking the four organisational influence factors — top management support, organisational rewards, ICT use, and organisational culture — to innovation efficiency (Figure 2). Under this framework, influence factors are theorised to generate innovation-efficiency gains not through direct effects on innovation, but through their capacity to shape employees' attitudes and subjective norms toward KM behaviour, in line with TRA's theoretical logic; these attitudes and norms shape behavioural intentions, which in turn translate into the actual knowledge-sharing and knowledge-collecting behaviours that collectively build organisational innovation capability.

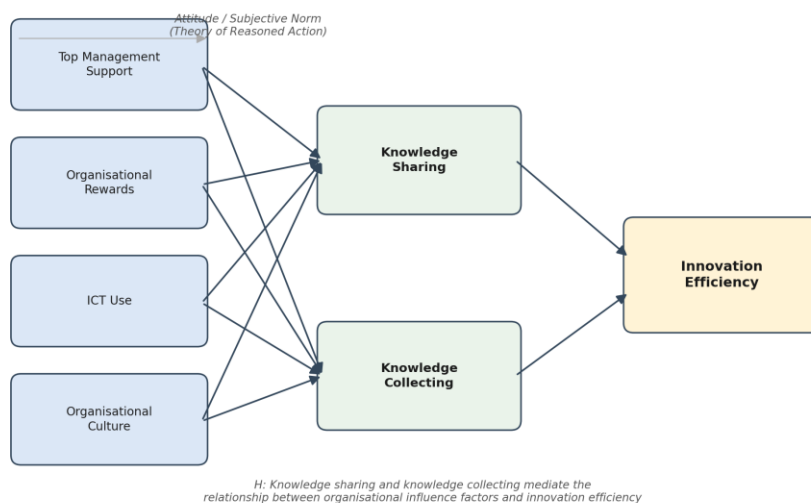


Figure 2. Proposed conceptual mediation framework linking organisational influence factors, knowledge sharing, knowledge collecting, and innovation efficiency

Fayyaz et al. (2021) provided the most direct empirical test of a structurally similar mediation model, demonstrating through path analysis that knowledge sharing and knowledge collecting fully mediated the relationship between organisational influence factors and innovation efficiency within their sample. That test, however, was conducted in a Pakistani multi-sector sample rather than in Malaysian telecommunications organisations; the framework in Figure 2 is accordingly presented here as a conceptual proposition to be tested empirically — as set out in Section 8.2 — rather than as an established finding within the review's target context.

The framework deliberately separates knowledge sharing and knowledge collecting as distinct mediators, consistent with the conceptual differentiation established in Section 5.1. The two behaviours have partially

independent antecedent structures — as evidenced by Fayyaz et al.'s (2021) finding that organisational rewards had differential effects on sharing versus collecting — and may generate innovation-efficiency gains through distinct pathways. Knowledge sharing is theorised to contribute primarily through the diffusion and democratisation of organisational knowledge, enabling broad participation in knowledge-based innovation activity. Knowledge collecting is theorised to contribute primarily through the enrichment of individual and team knowledge bases, enabling more informed, evidence-based innovation decisions. An effective KM system aimed at innovation efficiency must, on this logic, stimulate both behaviours simultaneously rather than treating either as a sufficient KM strategy on its own.

RESEARCH GAPS AND FUTURE DIRECTIONS

Identified Gaps in the Literature

This systematic review reveals several gaps that limit current understanding of KM practices and innovation efficiency in the Malaysian telecommunications context and beyond.

Gap 1 — Underrepresentation of the Malaysian telecommunications context. As Table 2 and Section 7.2 make explicit, of the 43 studies included in this review, only a small minority constitute direct evidence from Malaysian telecommunications organisations; Wei et al. (2009) remains the clearest example, with Patwary et al. (2023) offering proximate but sector-adjacent Malaysian evidence. The large majority of the KM-innovation evidence base synthesised in this review is transferred from other national or sectoral contexts. More recent, sector-specific, and methodologically rigorous empirical investigations conducted directly within Malaysian telecommunications organisations are needed to establish a current, context-specific evidence base.

Gap 2 — Limited theoretical differentiation of knowledge sharing and knowledge collecting. Although Section 5.1 shows that the conceptual case for differentiating these constructs is well established (Van den Hooff & de Ridder, 2004; Kuvaas et al., 2015), many empirical studies in this corpus still treat KM as a unidimensional construct or focus exclusively on knowledge sharing. Fayyaz et al. (2021) is a notable exception, but the field still lacks a comprehensive empirical framework that simultaneously examines both behaviours and their differential relationships with organisational influence factors and innovation outcomes — particularly within Malaysian telecommunications organisations.

Gap 3 — Predominance of cross-sectional designs. As discussed critically in Section 7.2, the overwhelming majority of the reviewed empirical studies use cross-sectional survey designs, which preclude causal inference and limit understanding of the temporal dynamics through which KM practices generate innovation-efficiency gains. Longitudinal studies capable of tracking KM-behaviour change and its lagged effects on innovation outcomes are notably absent from the telecommunications KM literature.

Gap 4 — Limited attention to Malaysian cultural specificity. While organisational culture is recognised as a critical KM enabler, existing literature rarely examines how the specific cultural characteristics of Malaysian organisations — including the interplay of Malay, Chinese, and Indian cultural values alongside Islamic organisational ethics and colonial institutional legacies — shape KM behaviours and innovation outcomes. This gap is particularly significant given Liu et al.'s (2019) demonstration, in a Chinese sample, that national and institutional culture meaningfully moderate KM-performance relationships; whether a comparable moderation pattern holds in Malaysia remains untested.

Gap 5 — Absence of multi-level analysis. Most existing KM studies examine relationships at a single level of analysis — typically the individual or the organisation — without examining how individual-level KM behaviours aggregate into organisational-level innovation outcomes, or how organisational-level KM climate shapes individual-level behavioural intentions. Multi-level research designs are needed to bridge this micro-macro gap.

Directions for Future Research

These gaps generate a clear agenda for future research. Priorities include: (1) an empirical test of the full mediation framework proposed in Figure 2 — influence factors → knowledge sharing/collecting → innovation efficiency — conducted specifically within Malaysian telecommunications organisations, using PLS-SEM or an equivalent structural equation modelling approach capable of estimating measurement and structural relationships simultaneously; (2) development and validation of knowledge-collecting measures that are theoretically differentiated from knowledge-sharing measures and appropriate to the Malaysian telecommunications context; (3) longitudinal designs that track KM behavioural change and innovation-efficiency outcomes over time, establishing temporal precedence for the relationships proposed in Figure 2; (4) multi-level studies combining individual-level KM behavioural data with organisational-level KM climate, policy, and innovation-performance data; and (5) qualitative or mixed-methods investigations of cultural dynamics within Malaysian telecommunications organisations, examining how multicultural organisational contexts shape knowledge-sharing norms, barriers, and enabling conditions.

CONCLUSION

This review has presented a systematic, critical, and integrative synthesis of scholarship on knowledge management practices and their relationship to innovation efficiency, with particular attention to the telecommunications sector and the Malaysian organisational context. Drawing on 43 peer-reviewed empirical and theoretical studies identified through a transparent, PRISMA-informed search and screening process (Section 2), the review establishes several key conclusions.

First, KM practices — conceptualised around the two theoretically distinct behavioural mechanisms of knowledge sharing and knowledge collecting (Section 5.1) — are consistently and positively associated with organisational innovation efficiency across diverse national and sectoral contexts. The strength and consistency of this association across methodologically varied studies supports the proposition that effective KM is a foundational enabler of organisational innovation performance, although, as Section 7.2 makes clear, this consistency partly reflects a shared reliance on cross-sectional survey methodology and should be interpreted with corresponding caution.

Second, four organizational influence factors — top management support, organisational rewards, ICT use, and organisational culture — emerge as the primary determinants of employees' KM behavioural intentions and actions, operating through the attitudinal and subjective-norm mechanisms specified by TRA. The evidence suggests organisational culture and ICT use are the most consistently supported enablers of knowledge sharing, while organisational rewards show more differentiated effects across sharing and collecting behaviours.

Third, the review proposes a conceptual mediation framework (Figure 2) in which influence factors generate innovation-efficiency gains primarily by stimulating KM behaviours, rather than through a direct path to innovation outcomes. This implies that organisational leaders seeking to improve innovation performance must invest not only in the enabling conditions for KM — management support, rewards, technology, culture — but in understanding and tracking the KM behaviours these conditions are intended to produce.

Fourth, and most centrally for the Malaysian telecommunications sector, this review's evidence-context classification (Table 2) shows that the KM–innovation relationship in this specific context remains substantially under-tested: the overwhelming majority of the evidence synthesised here is transferred from other national or sectoral contexts, with direct Malaysian telecommunications evidence largely confined to Wei et al. (2009). Addressing this gap, alongside the limited theoretical differentiation of knowledge sharing and knowledge collecting, the predominance of cross-sectional designs, and the absence of multi-level analysis (Section 8.1), through carefully designed future research will substantially advance both theoretical understanding and practical guidance for knowledge management in telecommunications organisations.

As Malaysian telecommunications organizations navigate a rapidly digitalising economy, intensifying competition, and accelerating technological change, the strategic management of organisational knowledge represents a critical and, on the evidence reviewed here, insufficiently tested source of innovation advantage.

The conceptual framework and evidential foundation established in this review are intended to guide the empirical study proposed in Section 8.2: a direct test of the full mediation model among Malaysian telecommunications organisations using structural equation modelling.

Author Contributions

T.S.M.T.S.A. — conceptualisation, literature search, writing (original draft), writing (review & editing).
A.M.Y. — supervision, conceptualisation, validation, writing (review & editing). All authors have read and approved the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

Data Availability Statement

No primary data were collected for this literature review. All reviewed data are available in the cited published sources. The search log underlying Table 1 and Figure 1 is available from the corresponding author on request.

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