**Review Article**

# An Integrated Framework for Addressing the Challenges and Strategies of Technology Adoption: A Systematic Review

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**Abstract**

While the rapid growth of information technology (IT) adoption has not lessened, insufficient attention has been directed towards the major themes and sub-themes of IT adoption challenges. Consequently, this study consists of a systematic literature review of the challenges of technology adoption based on a total of 235 peer-reviewed articles from the business and management literature between 2012-2022. Our longitudinal study provides an integrated framework for matching IT challenges to organizational strategies for transforming IT practices and processes. The results of the review broaden scholarly understanding of the importance of strategic IT agility, the need to keep pace with competitive information systems and IT environments. The findings enhance understanding of the pre-change and post-change processes of IT adoption, expanding knowledge on adoption success and organizational strategies for achieving IT strategic agility. Three key contributions include closing gaps not explored in comparative studies, adopting a unified approach with an integrated research model, and strategies to enhance an organization's absorptive IT capacity and agility.

## 1- Introduction

Hyper-competition, globalization, and the flow of information in contemporary organizations dictate organizational success in many of the world's leading economies [1, 2]. National economies, legislative and legal structures, infrastructure, and telecommunications services are becoming increasingly scalable [3]. This suggests that scalability is the ability of the organization's system to continue to function well when it is changed in size or volume to meet a user need [4]. Furthermore, the technological requirements of business are continually changing [5]. Information Technologies (ITs) have become a highly essential driving force for enterprises as a result of IT advancements, providing organizations with many alternatives to grow business performance [6, 7]. Interest in technology adoption has accelerated, moving from traditional systems to automated procedures and, more recently, to complicated and innovative systems [8]. Not only do IT systems help businesses shape their organizational structures, but they also increase an organization's return on assets in ways that lead to competitive advantage [7, 9, 10]. Generally, IT adoption is a process resulting in the implementation of new technology [11, 12]. New IT systems are tools for improving business performance that enable organizations to deal with competitive threats [13]. According to scholars, IT plays a critical role in the success of any business [3, 14–16]. For instance, Ghobakhloo et al. [17] and Mabad et al. [3] found that IT investments accelerate competitive advantage, improve integrity and productivity, and support inter-organizational

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networking with partners. All aspects of software and hardware deployment are included in IT adoption, from the decision-making cycle to technological use [18].

However, existing studies have found that many organizations are surprisingly reluctant to adopt IT, such that adoption is a challenge and a bridge too far [19–21]. Here, the authors wanted to test this statement by conducting a systematic literature review (SLR) of extant studies related to IT adoption. This review is accordingly designed to inform both scholars and practitioners related to the challenges of IT adoption and what to do about them. Information technology challenges appear to be related to the functional alignment of IT systems with the organizational, individual, technological, financial, and environmental dimensions that underpin IT adoption success [22–27]. The need to integrate and align IT adoption has thus become a top priority for IT experts, professionals, and researchers in recent times [21, 26–28]. Prior studies, for instance, have found that many problems exist pertaining to IT acceptance and operationalizing IT initiatives [29].

While studies note that organizational culture shapes the way organizations implement and achieve IT success [30], a more recent study found that technology user attitude, change attitude, and cultural agility strongly correlated to technology readiness and internal expertise [31, 32]. IT-related strategies should not only be about IT adoption but also the alignment of other organizational functions, such as culture-supportive IT functions. Although it is valuable to understand what is meant by cultural strategies within the context of IT adoption, categorizing a range of IT challenges within much broader contexts in prior studies has not been well defined, and scholars and practitioners are mostly no wiser about how to address these broader concerns. To address these significant gaps, the goal of this study is to conduct an SLR of the major challenges of IT adoption. While a goal-related opportunity was to expand intellectual insight into a comprehensive suite of literature related to IT challenges, a secondary goal was to identify which organizational strategies would better help facilitate IT adoption success. The SLR is underpinned by the main research question: *What are the main challenges to technology adoption based on extant research, and what strategies are required to solve them?* This review will also provide an integrated conceptual framework by which IT stakeholders can better facilitate successful IT adoption.

The study is structured as follows: Following Wohlin & Prikladniki [33] and Ali et al. [34], we first outline the SLR design and methodology. We next explain why we investigated prior extant research between 2012 and 2022, focusing on concerns linked to IT adoption challenges. Second, we discuss the results of our research and categorize IT challenges. Third, we explore a range of IT adoption strategies for managers and practitioners by advancing our scholarly contribution to both theory and practice in the discussion section. Finally, we discuss the research implications of the review and the directions for future research.

## 2- Theoretical Background

### 2-1- Contextualizing Prior Reviews

While SLRs focused on an IT perspective are not new, the current SLR encompasses a longitudinal research design over a much broader context of challenges that influence all organizations. Sharma et al. [35], for instance, found that cloud computing is being adopted at a different pace in developed countries and that cost and relative advantage were the most significant cloud adoption factors. In an SLR of health information technology, Kumar et al. [36] found that there was no unified understanding of health IT resistance, which should be intertwined with interactions involving people, practice, and technology. In a study of the technology acceptance model (TAM) in six digital libraries, Turner et al. [37] found that, as a means of predicting technology usage when TAM is first introduced, perceived usefulness plus perceived ease of use of TAM were worse predictors of TAM actual usage than behavioral intentions. Interestingly, Turner et al. [37] noted that it was important to measure the actual usage of TAM objectively rather than using subjective measures. In an SLR of cloud computing-enabled healthcare opportunities, Ali and Soar [38] found that there was a lack of theoretical orientation and longitudinal studies concerning the value of cloud services in the healthcare sector and that while research interest was increasing in this area, there was reduced interest in cloud applications.

Prior studies have tended to focus on a limited representation of technology, organization, and environmental factors within a certain context without situating these factors within a longitudinal systematic design [39, 40]. Moreover, although important, the current study findings move away from IT adoption issues mostly related to management issues [41–43], as well as technology, organization, and environmental (TOE) fit [1, 2, 31, 32]. This also includes context-specific IT-related issues [44–46]. More recently, Ali et al. [47] explored the challenges of embracing artificial intelligence in the education sector, highlighting that the sector was ill-prepared to facilitate AI-related strategies. Taken together, the current study represents a new approach to exploring the challenges of IT adoption. Based on an extensive SLR process, many new strategies for technology adoption are proposed. This comprehensive examination categorizes a spectrum of IT challenges within broader contexts, a dimension that has not been adequately defined in earlier research. While studies by Cordeiro et al. [48], Molinillo & Japutra [49], and Alexandro & Basrowi [50] focused on important organizational barriers, these studies did not provide comprehensive frameworks. Similarly, a review by Chouki et al. [51] did not focus on the strategic alignment of challenges with organizational strategies. Williams [52], moreover,

emphasized contextual challenges but did not explore cross-industry comparisons. In contrast, the studies by Aleström [53], Kumar & Ayedee [54], Maisiri et al. [55], and Nurqamarani et al. [56] proposed useful integrated frameworks. However, these studies were centered on specific aspects of IT adoption and did not represent a holistic view. The current review by comparison addresses these gaps by including a comprehensive framework of IT adoption challenges. This distinct contribution enhances our understanding of the challenges and strategies associated with IT adoption within organizational contexts.

### 2-2- Absorptive Capacity & Strategic Agility

*Absorptive capacity* (AC) is the ability of an organization to assimilate knowledge in ways that allow the knowledge learned to be imitated and shared [57, 58]. When organizations, however, are more comfortable with their existing absorptive capacity [59], then these beliefs might evolve into two possibilities. First, the organization might believe that it has assimilated all of the current IT knowledge that it wants and disregards and/or sees new knowledge related to IT adoption as a bridge too far [60]. On the other hand, some will see their existing AC as limiting their ability to solve existing or new operational problems, thus motivating the organization to search for new ways to update existing innovation knowledge [58], such as IT innovations in cloud computing [61]. That is, organizations might be able to exploit all the good things they have learned (operational agility) and may be slow or unresponsive to transforming existing knowledge [62]. The alternative situation by comparison describes those who can explore new ideas and new knowledge, including through skills, processes, and innovations [63]. Studies have shown a direct correlation between higher evidence of AC and innovation performance [64]. If operational agility is underpinned by assimilation and exploitation reflecting the state of an organization's current capabilities, then the basis of *strategic agility* is the acquisition and transformation [57, 60] of existing capabilities. Scholars suggest that increased agility enables an organization to adapt to volatile and unforeseen business scenarios through resource reconfiguration, *meaning* both the integration of internal and external capabilities [65]. While we acknowledge in this review that IT adoption is hard, successful IT adoptions are often similar to disruptive innovation, where organizations can rapidly reconfigure existing knowledge to adapt to an innovation process [66, 67]. Following the SLR process, we later tie the strategic aspects of AC and strategic agility with the review findings to gain a better appreciation of the IT adoption phenomenon.

## 3- Review Planning and Methodology

The primary goals of a systematic review (SR) relate to the identification, analysis, and interpretation of a relevant phenomenon [47], where research questions explore the accumulated extant knowledge [68]. An SLR summarizes the procedures involved in gathering, organizing, and evaluating the existing literature [69]. In the present study, the SLR closely aligns with the study objectives, highlights research gaps, and provides recommendations for future research [70–72]. Following Palmatier et al. [73], the current study identifies the emerging broad themes and categorizes them into associated sub-categories.

Systematic literature reviews are common as an initial reference point for formulating standards in management and Information Systems (IS) practices [74]. The current SLR is based on Watson [75], who proposed a structured procedure for planning, implementing, and reporting (Figure 1).
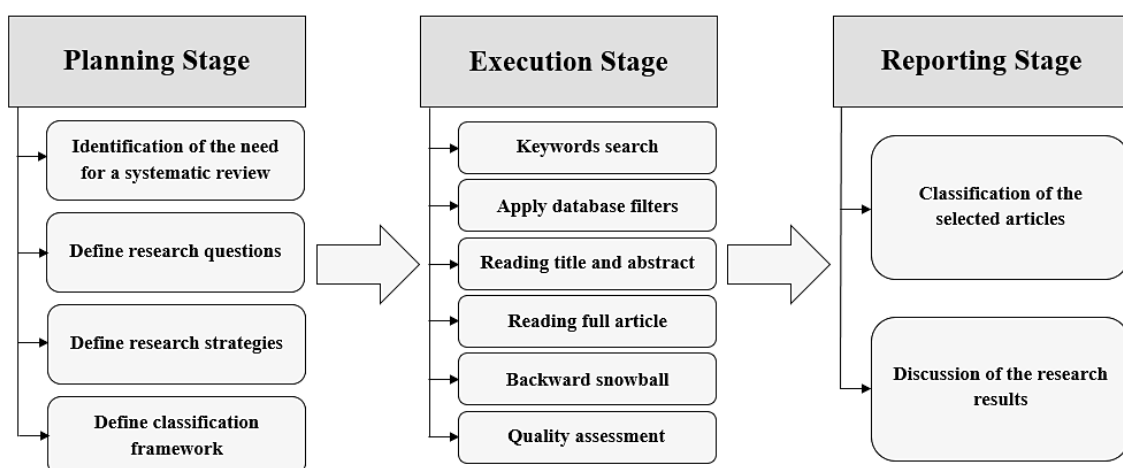


**Figure 1.** Systematic review stages

Boell & Cecez-Kecmanovic [76] suggest that the process is an efficient technique because it is based on a predetermined protocol and specific search process. Given the vast volume of continuously updated publications in management and Information Systems (IS), SLRs are increasingly valuable since scholars and practitioners need to identify the difference between evidence-based practice versus more theoretical based literature [77]. Next, we elaborate on each stage of the SLR process.

### 3-1- Planning Stage

Planning involved delineating the requirements of the SLR process. The process was divided into four sub-stages. The first of these justified the need for the SLR by exploring the available IT adoption literature, followed by a second substage to define the research questions [69]. The following research questions were developed for the SLR:

*Research Question 1: What are the outcomes of previous studies and their related themes?*

*Research Question 2: What are the main challenges of technology adoption?*

*Research Question 3: What IT adoption strategies are required for future managers and practitioners?*

The *third* substage involved defining the research strategies, where a comprehensive automated search of online resources occurred. Online databases selected included Science Direct, ACM Digital Library, Emerald Insight, Taylor & Francis Online, and Wiley Online Library. Filtering methods were applied to refine the study findings for each database [78].

A systematic manual review technique was applied. This involved initially reviewing the title and abstract of each research article [79] and a thorough examination of the full text by eliminating irrelevant articles [34, 80, 81]. A backward snowballing approach was employed to identify articles overlooked in the initial process by reviewing article reference lists [82]. Articles that did not align with the primary research criteria were removed. The selection criteria for relevant articles appear in Table 1.

**Table 1. Selection criteria**

| Criteria | Inclusion | Exclusion | Rationale |
|---|---|---|---|
| Publication Type | Scholarly articles | None: academic resources | To make sure that the research retrieves information from academic sources. |
| Peer-reviewed | Peer-reviewed | None: peer-reviewed | To ensure the quality of the used articles. |
| Year of publication | Articles published between 2012 to 2022 | Articles published before 2012 | To make sure about the validity of the content of any article that has been used in this review study. The challenges of adopting any type of technology have changed over time. So, 10 years is an appropriate period when the research authors can observe more solid trends. |
| Language | English language | Any other language than English language | English is the official language for research articles. |

The *fourth* substage adapted the Valeri et al. [83] comparative classification system applied to social science literature. The classification framework included headings related to the emerging challenges, associated categories, and sources. Six challenges emerged related to various categories, which are discussed below.

### 3-2- Execution Stage

The techniques outlined in the planning phase formed the basis of the execution stage as follows: *Identifying search keywords:* The continuous process of identifying keywords is initiated by employing distinctive search terms extracted from existing papers in the research field [69, 84]. The identified keywords included "information system" OR "information technology" OR "innovation" OR "advanced technologies" OR "cloud computing" OR "internet of things" OR "mobile technologies" OR "social media" AND "organizations" OR "businesses" OR "enterprises" OR "firms" AND "challenges" OR "issues" OR "barriers" OR "obstacles" AND "adoption" OR "implementation". *Filtering*: Filtering techniques were employed to enhance the precision of the research findings during the exploration of Internet databases. [74, 85]. Different parameters were used to encompass research fields, e.g., information systems and management, the publication year (2012–2022), document type (journal articles and conference papers), and language (English).

*Reviewing:* A meticulous review of the papers was conducted to assess their relevance to the study objectives, with a particular focus on the title and abstract [86]. *Paper content*: The content of the papers that successfully passed the previous phase underwent a thorough analysis in alignment with the study objectives [87]. *Backward snowballing:* The backward snowball approach was employed to identify items that were not discovered through the automated research strategy [88]. *Quality evaluation*: To ascertain that all papers included in our review met the minimum quality standards, we applied specific quality evaluation criteria [84, 89]. To assess the eligibility of articles for inclusion, a checklist was formulated from [34, 80, 90]. The checklist items included: the research objectives discussion was satisfactory; the research questions and research problem were clear; the data used were well described and available; the adopted methodology was well presented and used; and the research results were well-presented and were designed to answer the research questions.

A quality score was employed to assess whether the findings of a selected article aligned with the study's quality criteria. The score was utilized to investigate whether any of the individual quality variables, such as sample size and validation technique, were associated with the primary research outcome. To mitigate bias and bolster the reliability of the SLR, we scrutinized the quality of the relevant articles post-selection. This meant that 235 articles were appraised

based on quality criteria. To ensure adherence to study principles and methodologies, we evaluated the selected studies in terms of scientific rigor, dependability, accuracy, and propriety. We examined whether the outcomes were focused, unique, relevant, and valuable to future scholars and practitioners.

### 3-3- Summarizing and Reporting Stage

The total number of articles selected for the current review research is presented in Table 2. Initially, 2176 articles were identified through the initial search process. Following the application of database filters, this number was reduced to 1094 articles. Subsequently, the researchers conducted a manual review to identify publications that were irrelevant to the study themes. This process led to the removal of 435 articles, leaving a total of 659 articles. In reading these articles, the researchers focused on specific criteria such as aims, research questions, description of data, methodology, and data analysis techniques. This thorough reading process resulted in the removal of an additional 433 irrelevant articles, reducing the count to 226. Next, the reverse snowball approach was employed, adding 18 articles for a total of 244 articles. Finally, after reviewing the quality evaluation criteria, 9 items were eliminated, bringing the total number of articles to 235.

**Table 2. Review search results**

| Databases | Automated Search | | Manual Search | | Backward Snowball | Final Results |
|---|---|---|---|---|---|---|
| | 1st Strategy Keywords Result | 2nd Strategy Apply Filters | 3rd Strategy Title and Abstract | 4th Strategy Reading Full Articles | 5th Strategy Backward Snowball | 6th Strategy Quality Assessment |
| Science Direct | 373 | 256 | 122 | 62 | 66 | 65 |
| ACM Digital | 469 | 287 | 116 | 38 | 41 | 39 |
| Emerald insight | 896 | 371 | 264 | 76 | 78 | 76 |
| Taylor & Francis | 167 | 84 | 76 | 23 | 27 | 24 |
| Wiley Library | 271 | 96 | 81 | 27 | 32 | 31 |
| **Total** | **2176** | **1094** | **659** | **226** | **244** | **235** |

### 3-4- Article Distribution by Publication Year

The data search period occurred between 2012 through June 2022 (Figure 2). The authors felt that this timeline represented more accurately the contemporary IT adoption literature, including the rapid pace of technological change. The highest number of articles (37) were published in 2018, while the lowest number (8) appeared in 2022. The majority of papers were distributed between 2015 and 2020, indicating the escalating relevance and significance of the IT adoption phenomenon.
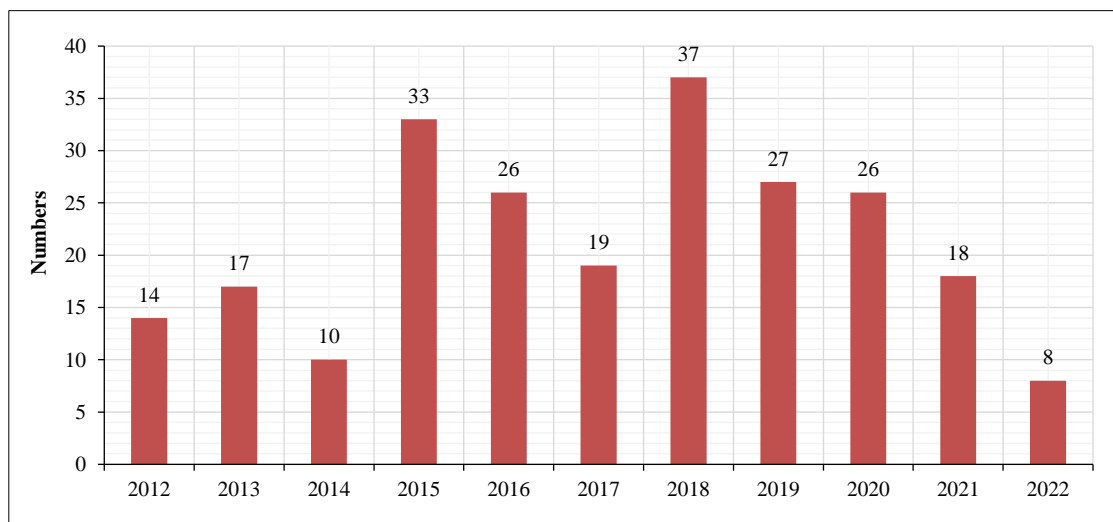


**Figure 2. Publications by year**

### 3-5- Distribution of Articles by Database

Figure 3 illustrates the databases selected, encompassing Science Direct, the ACM Digital Library, Emerald Insight, Taylor & Francis Online, and Wiley Online Library. The analysis revealed that the Emerald Insight database yielded the highest number of selected articles, totaling 76, followed by 65 articles from Science Direct. The ACM Digital Library contributed 39 articles, while the Wiley Online Library provided 31 articles. Taylor & Francis Online had the lowest count, with only 24 articles.
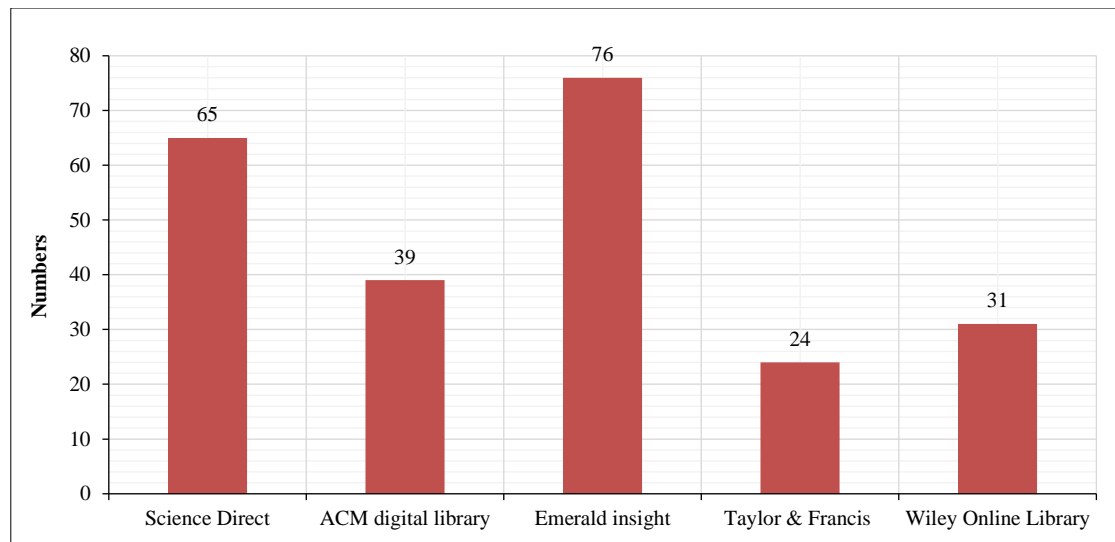
**Figure 3. Publications by database**

## 4- Research Results

We next outline the research results, which are classified and explained in Table 3. Research question 1 is now restated for the purpose of explaining the emerging themes.

*Research Question 1: What are the outcomes of previous studies and their related themes?*

In relation to research question 1, the review found that there were five major emerging challenges, each with their own embedded associated categories and sources (Table 3). For instance, top management had four categories arising from 85 sources, end users four categories from 68 sources, technological issues two categories from 49 sources, organizational factors five categories from 57 sources, and external challenges three categories from 40 sources. The highest number of publications were related to studies focusing on top management challenges, followed by studies of end-user challenges. Interestingly, of the sub-categories for each emerging theme, the lack of commitment and engagement by top management attracted the greatest number of sources (33) followed by the lack of users' technical expertise (21) closely followed by users' resistance to change. Out of the technological emerging themes, technology infrastructure requirements had the greatest number of sources (28).

**Table 3. Classification framework**

| Emerging Challenges | Associated Categories | Sources |
|---|---|---|
| **Top Management** | Commitment and engagement | [11, 12; 19, 24; 91-118] |
| | Top management knowledge and expertise | [3, 21, 24, 26, 31, 93, 95, 119 -133] |
| | CEO's desire to invest in new technology | [2, 19, 24, 98, 108, 134-142] |
| | Perceived IT benefits | [21, 24-26, 42, 95, 121, 132, 138, 140, 143-151] |
| **End Users** | Users' resistance to change | [23, 56, 95, 93, 100, 114, 116, 152-167] |
| | Limited users' engagement | [156, 161, 168-176] |
| | Users' knowledge about IT benefits | [2, 11, 12, 24, 44-46, 54, 95, 108, 170, 171, 177-181] |
| | Limited users' technical expertise | [3, 11, 14, 21, 81, 92; 93, 156, 176, 178, 179, 182-191] |
| **Technological Issues** | Infrastructure | [1-3, 11, 51, 55, 92, 93, 95, 141, 171, 183, 190, 192-207] |
| | Security | [1-3, 201, 203, 206, 208-225] |
| **Organizational Factors** | Lack of IT strategy | [14, 16, 24, 45, 105, 152, 226- 231,180] |
| | Business Type | [3, 15, 18, 24, 44, 128, 130, 170, 181, 216, 227, 232] |
| | Financial Resources | [1-3, 18, 14, 21, 51, 92, 93, 102, 112, 190, 217, 233-237] |
| | Culture | [11, 12, 18, 32, 40, 42, 164, 165, 211, 238-246] |
| | Structure | [12, 32, 239, 247-253] |
| | Human Resources | [3, 11, 24, 42, 93, 105, 207, 254- 256] |
| **External Challenges** | Government support | [1-3, 21, 28, 36, 44, 105, 181, 190, 204, 206, 257- 260] |
| | Availability of external expertise | [1-3, 24, 105, 177, 261-265] |
| | Environmental pressure | [1-3, 21, 24, 39, 44, 51, 105, 266-271] |

**Research Question 2:** *What are the main challenges of technology adoption?*

We now discuss each of the challenges, their associated categories, and extant research related to article sources commencing with top management.

### 4-1- Top Management

#### Commitment and Engagement

Studies suggest that senior management's support and dedication to IT initiatives have a substantial impact on project success [11, 12, 91, 104, 105, 115]. Tarhini et al. [106], Aleström [53], and Varajão et al. [44] suggested that the success or failure of IT adoption depends on the dedication and commitment to IT projects. Since the CEO has the most significant influence on IT adoption, Ramayah et al. [272] argue that the CEO and other top managers should be involved in IT adoption decisions by facilitating positive attitudes towards IT innovation. Studies suggest that project execution is frequently negatively affected by poor management, which in turn highlights IT adoption failure [1, 2, 111]. Small and medium-sized firms rely more directly on top management support to make critical IT adoption decisions [109, 117], while some scholars suggest that a higher level of interest in IT initiatives occurs in small than large companies [19, 98, 102, 112]. Moreover, IT adoption success depends on the desire to invest in new technology, including allocating capital expenditure [23, 113, 114].

#### Perceived Benefits

Wisdom et al. [273] suggested that CEOs and other top managers are less likely to engage in IT adoption if they doubt the overall benefits. Hamdan et al. [21], for instance, found that the CEO's lack of awareness of IT advantages influences the CEO's trust in embracing IT adoption and is one of the main IT adoption obstacles [125-128, 130]. Scholars suggest that IT positive assessment behavior influences IT adoption success [93]. Likewise, the perceived usefulness of an IT system is one of the main challenges of IT adoption behavior [119, 120, 122, 123, 274]. In sum, the IT literature shows a strong link between top management's confidence and awareness of IT benefits and the organization's IT adoption or non-adoption [95, 121]. Yet, ironically, because of the growth of technological fraud and security breaches, CEOs are increasingly worried about the security issues of new technology [26, 95].

#### Limited top Management Knowledge and Expertise

Studies suggest that top management's digital capacity, competence, knowledge, and expertise are critical throughout the IT adoption process [135, 234]. For instance, the CEO's involvement includes obtaining the required management resources as well as fostering organizational development processes to support IT initiatives [1, 2, 138]. Some suggest that the CEO's personal abilities play a significant role in organizational success [137]. For example, Bondarouk et al. [139] note that the CEO's innovation resolve is an important quality that determines success or failure, similar to the overall organizational resilience discussed earlier [136, 140]. The compilation of studies therefore suggests that when CEOs and other top managers lack IT competence and desire to innovate, these behaviors thwart IT adoption success.

#### CEO's Desire to Invest in New Technology

A range of studies in Table 3 suggest that the value CEOs place on the importance of information is not linked to achieving business goals and objectives [145, 148, 149]. According to Rahayu & Day [146], Rahayu & Day [147], and Abdi et al. [275], the scarcity of available resources of funding, time, and expertise, inter alia will influence the quality of informed decisions, suggesting that CEOs perceptions of IT needs are limited. Studies suggest that an organization's ability to conceptualize an IT strategy and build IT adoption methods relates to less CEO desire for IT innovation [144], while linking IT innovation to organizational growth is more complicated than anticipated [140]. Scholars suggest that the success of IT adoption is also influenced by the CEO's level of education and experience [143]. CEOs with only primitive IT knowledge are unexcited about information and IT innovation and are often unwilling to accept the belief that IT-related change will increase organizational productivity [148].

### 4-2- End User Challenges

#### Users' Resistance to Change

IT effectiveness and implementation are highly dependent on the users' motivation and satisfaction in the workplace [157, 158, 166]. Most employees are resistant to IT change resulting from bad prior experiences with technologies due to fear of needing more time for IT management and implementation [100, 152, 154, 159, 160]. The review found that, for several scholars, user acceptance is one of the main factors in IT project success. Moreover, evidence of poor change strategies often determines IT adoption failure [56, 153, 155, 276]. While more than half of IT initiatives are underutilized, other studies in our review found that users accept that IT innovations will result in significant business improvement [116, 162]. To mitigate the resistance to change barriers, studies also note that top management and chief operating officers should better incorporate other business strengths, e.g., human resource know-how, to compensate for the change issues identified [23, 114].

### *Limited Users' Engagement*

Organizations with users that have the skills and capabilities to assess, engage, and utilize IT are more likely to embrace adoption processes [172, 173, 175, 277]. Raflesia et al. [171] and Raflesia et al. [278] found that user engagement in IT adoption initiatives is a key factor for success. To alleviate employees' concerns about the impact of IT on their job role and to secure employee involvement, studies note that senior management has a role to play in IT change initiatives by fostering the need for IT adoption and educating employees about potential increases in business efficiency [277]. Top management, moreover, can create increasing interest in new IT projects by defining deadlines for IT projects and placing the responsibility for IT success with the entire IT project team throughout the project life cycle [168, 169].

### *Users' Knowledge of IT Benefits*

The shortage of technological expertise is a significant barrier to IT adoption. Rather than seeing improvements in efficiency and production, users often see system complexity tied to existing job processes and the cost risks associated with having to employ large numbers of skilled IT personnel [44, 95, 170, 181]. Training represents a mitigating factor to improve users' IT expertise and increase user knowledge [171, 179, 278] while increasing users' understanding of IT advantages [178]. Scholars suggest that less effective IT implementation often relates to poor training and maintenance of IT systems [177, 180]. Users who adapt better to IT adoption are, however, more likely to accept new technology innovations since they relate innovation to company growth [11, 12].

### *Limited Users' Technical Expertise*

Employees are critical assets that have a significant impact on organizational performance [14]. Many studies in the current SLR point to the importance of improving user technical expertise [182, 187, 189]. However, El-Gohary [92] notes that organizational size can influence technical expertise, especially the establishment of an IS department or even a full-time IT manager with professional training. In many organizations, the IT director is frequently a low-level employee with no prior knowledge of computer technology and much less understanding of the technical expertise required. According to Hamdan et al. [21], 52.1 percent of businesses lack skilled informatics and IT management experts. Many CEOs see training as unnecessary because software is simple to use. Consequently, a significant obstacle to IT adoption exists because of too few skills related to IT knowledge sharing, training, and IT know-how [184].

## *4-3- Technological Issues*

### *Infrastructure*

Infrastructure is the organization's internal technological capability, which comprises the structural features that include the platform, organization system, or technological framework, such as the installed network technologies and enterprise systems, which can be replaced or substituted by newer technologies [1, 2, 171, 197]. It includes having sufficient resources and budget allocated to IT [198, 205] and the availability of IT infrastructure and organizational systems required for the new technology [199, 200].

An organization's technological/computing resources are a crucial priority that has an impact on the evaluation of its goods and services [207, 236]. According to several studies, the shortage of technological resources (hardware and software) can be a key challenge to IT adoption [39, 51, 95, 141, 183, 190, 203, 279]. Studies of both small and large firms' technological challenges, however, are different from one firm to the next. For instance, a study by Hameed et al. [11], Hameed et al. [12], found that infrastructure had a significant impact on IT adoption across nine out of twelve countries, particularly at the implementation stage, but mostly for large firms. The study found that 95 percent of firms showed a significant link between the importance of IT infrastructure and its implementation. Other studies of small firms found that running accounting software comprised the extent of infrastructure needs, and that computer and software resources were lacking across the manufacturing and marketing functions [183, 203, 204, 279]. Studies suggest that IT departmental size can influence IT adoption practices, with larger departments having greater adoption success [11, 12, 55, 203], quite possibly because of greater access to resources.

### *Security*

Security issues are critical for IT adoption [201]. Our SR process revealed many IT-related inter alia security issues: (1) challenges in securing data [213, 215, 218, 219, 223], (2) capability of legacy security mechanisms [3, 209], (3) managerial security awareness [208, 220, 221, 224], (4) security personnel skills [222], (5) employees' perception of the sensitivity of information assets [1, 2, 208, 216], (6) regulatory compliance [1, 2, 217, 222], and (7) reputation of IT vendors and environmental uncertainties [206, 209, 212, 214]. The compilation of security issues is a result of the large volume of data generated, including the realization that all organizations have significant yet common security problems. However, with the introduction of new technological trends such as cloud computing or big data and its diverse data-centric solutions, existing uncertainties relate to how data should be handled, where the data is stored, and how it will be secured [61, 201].

### 4-4- Organizational Factors

#### Lack of IT Strategy

The formalization of IT refers to a company's technical strategy. This involves organizational planning and preparedness [152], also known as IT strategy or Information Technology Planning (ITP) [231]. ITP relates to identifying and answering the how, why, and what advantages of IT. Here, organizations need to assess their computing needs by developing a long-term plan [230]. The formalization process is a critical component for ensuring organizational success and successful IT adoption [16, 228]. ITP enables firms to tailor their IT needs, in contrast to unplanned processes that require constant upgrades [180]. Studies have found that IT planning in small organizations is less strategic compared to larger organizations [226, 227, 231]. Rather than for any strategic purpose, organizations acquire IT just to keep up with the competition [14]. Poor IT strategy translates into a competitive advantage for more organized firms. Organizations with few IT strategies lead to IT project failure [24, 105] and little value-added outcomes from IT adoption processes.

#### Business Type

The type of business is a function of IT adoption processes [18, 128, 130, 227]. The 'type' of business and/or functional activities within a business, e.g., a purchasing department versus a technical department, has had a significant role in determining the structure and architecture of IT adoption [44, 181]. Organizations with comparable activities within an organization field, e.g., IT firms and banks, prefer to adopt similar IT requirements due to user attitudes, information requirements, and service intensity [130, 211]. As a result, the challenges to IT adoption in manufacturing firms differ from those in service firms [44, 170, 181]. Mabad et al. [3] found that industries with a high level of information intensity are more likely to adopt IT than industries with a lower level of information intensity. Similarly, studies suggest that IT has a greater impact on the marketing and sales sectors than on the manufacturing sector [44, 181].

#### Human Resources

The human resources function encompasses employees' capability, technical and management skills, internal and external knowledge and know-how, and planning and internal strategy and structure, including high-performance work [63]. The total human resource capital is the composite of individual plus organizational-level capital [280]. Therefore, IT adoption success depends on the functional capacity of human capital [105, 254, 281]. Internal IT knowledge and experience, for instance, are a reflection of human capital, where small businesses may be more vulnerable [24]. According to Mabad et al. [3] and Dastane [207], a positive relationship to the IT adoption process depends on the extent of internal expertise and capability. Extant research suggests that to achieve a high level of IT adoption success, organizations need to address the precise point at which human resource skills can match IT adoption needs [11, 255]. However, human resource needs should be integrated with other technological and infrastructure requirements so that a more supportive culture for IT adoption is encouraged.

#### Financial Resources

Financially related resources are a major challenge to IT adoption [1–3, 93, 233]. Spending and investment commitments need to be signed off by the CEO or chief operating officer [14, 102, 112, 237], and this is difficult when IT staff do not advocate the strategic benefits convincingly. Poorly resourced IT departments or quasi-departments suggest that many business owners will need to invest their personal capital in IT-related expenditures, adding yet another layer of complexity to the financial resource problem [18, 236].

#### Culture

Corporate culture influences IT adoption success [282]. Different cultural artifacts influence the extent to which organizations can achieve absorptive capacity and new innovations [283], such as new innovation beliefs. For instance, Riduan [244] argues that organizations with less adaptable cultures are more vulnerable and much less inclined to embrace IT adoption. Culture and change should be considered jointly [18, 238], with evidence that more flexible and supportive cultures result in more successful technological uptake [32, 240]. Organizations can become trapped between too little capacity to reorient and explore new innovations versus exploiting and adjusting their existing routines [284, 285]. More ambidextrous outcomes are created when a firm can simultaneously explore new knowledge by regularly updating existing knowledge [245]. Our review suggests that this process is particularly required for IT adoption since poor cultural adaptation to IT needs will not result in new IT innovations [61]. Scholars note that ambidextrous capability is a cultural trait, more likely to be achieved when appropriate technological assets help to leverage the processes of knowledge exploration and exploitation [242]. For instance, cloud computing supports knowledge exploration by producing a knowledge system that can extract new information from structured and unstructured digital sources [241].

*Structure*

The organizational structure functions as an organizing framework that connects and coordinates all of the organization's departments [249, 251]. A more efficient structure connects every employee to their duties and roles. Consequently, better structural outcomes significantly influence technology adoption [247]. Rajan and Baral [250] suggest that the introduction of technological systems requires changes to existing structures, altering employee responsibilities, and requiring top management support, as discussed earlier. More adaptable organizational structures are more likely to support new innovations in technology and help to speed up the flow of information [248, 286]. When small organizations have centralized decision-making with just the CEO making all project decisions, including IT initiatives, centralization has a negative relationship with IT adoption, but a better relationship with IT implementation [11, 252].

### 4-5- External Challenges

*Government Support*

Extant studies have explored government policies and support for IT adoption practices, finding that little government assistance presents significant challenges [28, 257, 259, 260]. Due to firm size and lack of resources, smaller organizations rely on government assistance to a greater extent than larger firms since government assistance encourages and facilitates information sharing and transfer [105]. Managing the external environment is considered a significant challenge for IT adoption, particularly when infrastructure assistance is not supported [21]. This is particularly the case when IT-associated laws change too slowly to keep up with the rapid pace of IT development [44, 181].

*Availability of External Expertise*

Scholars note that IT consultants and suppliers often balance IT expertise between different business requirements by assessing and responding to business demands and by offering suitable hardware and software equipment options [105]. Similarly, external experts encourage IT users to embrace change and overcome anxieties by re-educating users to better manage implementation requirements [24]. Firms that hire external consultants have a higher rate of effective IT adoption, integration, and user satisfaction [287]. However, engaging IT consultants and suppliers can also have negative consequences for user satisfaction, which may lead to certain challenges for IT adoption [24, 105]. These challenges can be summarized as: (1) conflicts between consultants and IT users; (2) disregarding the needs of the organization; and (3) communication limitations due to contracts. When external consultants face limited internal knowledge expertise, this leaves organizations in a dilemma to either reject the consultants' recommendations and/or accept them on the basis that experts have power over knowledge.

*Environmental Pressure*

Given the numerous benefits that IT provides, Chouki et al. [51] suggest that the role of external forces through competition is an important requirement for IT adoption. Adopting a competitive stance suggests that organizations absorb new IT adoption to differentiate themselves from their competitors. That is, IT decision-makers consider not just internal motives for IT adoption, but also the information demands of suppliers and customers [44, 91]. Customer and supplier pressure are among the most critical external factors influencing the success of IT adoption efforts [267]. Meeting customer expectations means being able to stay in business and compete [271]. Moreover, organizations with a low rate of innovation and a high level of competitive pressure are less likely to embrace new IT innovations [269], perhaps reflecting less capacity for adaptation. Scholars note that barriers to IT adoption and implementation reflect an inability mindset of driving to survive, to develop new innovations, and to stay competitive [105].

Following the discussions thus far, we now restate research question 2. Earlier, we asked: *What are the main challenges to technology adoption?* Taken together, the challenges have been discussed at length and are illustrated in Table 3. The compilation of challenges helps to inform scholars and practitioners as to which strategies are required for better IT adoption results. We now turn to the findings for research question 3. Here, our focus is less on challenges and more related to the strategies required for future managers and practitioners. The discussion is focused only on the broad emerging themes arising out of Table 3.

**Research Question 3**: *What IT adoption strategies are required for future managers and practitioners?*

### 4-6- IT Adoption Strategies for Future Managers and Practitioners

*Top Management Strategies*

In integrating insights from extant research, top management challenges can be overcome by an increasing commitment from IT managers or information managers by building technology support communities [288] and presenting alternative evidence of the benefits of IT [289]. There is an increasing need to build suitable IT solutions that

target these needs [290], including providing professional training [291], by enhancing knowledge sharing information [207]. Poor management desire can be solved by demonstrating the benefits of individual technologies [292] and by information officers illustrating how new technologies speed up existing legacy systems and solve legacy problems [293]. Since top managers have a propensity for performance-linked outcomes [284, 294], IT and information managers should tie IT innovation to profit-seeking goals [295, 296].

### End User Strategies

Applying successful industry change strategies is one way to encourage and better equip employees to learn new technologies [297, 298]. Enhancing IT training methods will ensure that users feel part of the adoption process [299, 300]. Building a knowledge-sharing system will enhance digital technological use and increase IT skills, resulting in increased opportunities to share knowledge and create new IT innovations [3, 61, 191]. For instance, Saratchandra et al. [61] found that increased digital technologies related to cloud computing skills significantly enhanced user knowledge, such that over 12 months, user know-how and know-why knowledge increased, resulting in greater user participation and the fostering of new innovative ideas. New policies and procedures will be required to support the adoption of new technology. Likewise, a cultural shift toward learning new technology is required to overcome various end-user challenges [298, 301].

### Technology Strategies

Technology strategies should begin with an integrated IT adoption plan, following earlier discussions. New technology requirements should be matched to legacy technology functions [302]. Increasing use could be made of cloud computing, which not only helps to solve security issues but also enables the more efficient delegation of IT tasks [1, 2, 61, 303]. Legacy security mechanisms should be reassessed and better aligned with new regulatory compliance [201, 304], since security remains the number one concern for new technology adoption. Taken together, each organization requires a security risk management plan [305], along with the need to consider security in the very early stages of IT adoption [201].

### Organizational Strategies

Studies suggest that IT officers and managers should adapt and change their IT strategy to match the information intensity of competitive actions [306-308]. Organizations will need to constantly reassess their IT needs by upgrading various methods, processes, systems, and infrastructure requirements [308]. Internal HR policies that support training will help to encourage employees to learn the new technology [31, 32]. The types of different technology requirements across different departments should be integrated with the quality of skill-equipping and relevant training methods [309, 310]. Complexity in existing organizational structures requires strategies to simplify the IT system, which places increasing pressure on the chief operating and technical officers to simplify structures and processes [310]. Murray [281] suggests that the total human capital resource is a function of both individual and organizational-level skills. Therefore, to solve problems related to isolated IT initiatives, IT and information managers need to link individual-level IT skills with organizational-level goals and strategies. Isolated islands of IT needs and functions are less likely to succeed in a strategic sense of matching IT needs to business-level goal-seeking.

### External Challenges

The availability of government assistance programs such as mentors and government-registered trainers within the IT area is more likely for small than large organizations [1, 2, 105]. When internal IT skills are low, making use of external IT expertise is a viable option to increase user hardware and software knowledge. Access to external training is a means to improve IT adoption effectiveness [24, 287] when those resources are not available internally. Here, organizations are encouraged to explore which consultants offer the most effective and flexible contracts to avoid conflicts between internal and external requirements [105]. IT strategies focused on improving the absorptive capacity of firms—acquiring knowledge and sharing it [63]—see acquiring new technology as an opportunity to expand knowledge and better exploit their existing IT skills and know-how [61]. Accordingly, organizations should embrace an ambidextrous mindset that matches their internal resources through exploitation and reorientation with their external IT needs through exploration and acquisition by developing the technical and innovation skills required to respond to external needs [61, 283].

Taken together and in answering research question 3, Figure 4 illustrates the discussions of the emerging themes, associated categories, and strategies for technology adoption. The discussions reflect which IT adoption strategies are required for future managers and practitioners to best counter the challenges identified earlier. This is the first integrated IT adoption framework to our knowledge that encapsulates the key findings of the SLR with the strategies required for future technology adoption success.
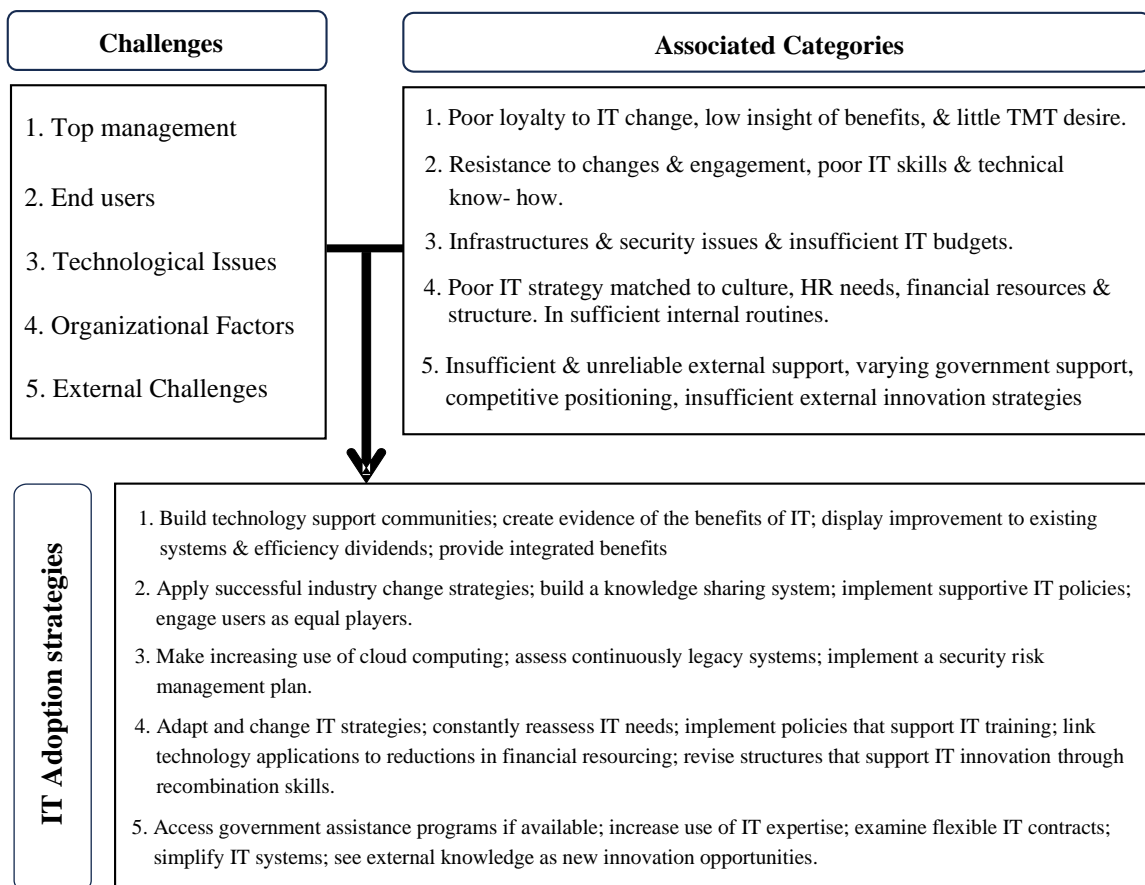
| Challenges | Associated Categories |
|---|---|
| 1. Top management | 1. Poor loyalty to IT change, low insight of benefits, & little TMT desire. |
| 2. End users | 2. Resistance to changes & engagement, poor IT skills & technical know- how. |
| 3. Technological Issues | 3. Infrastructures & security issues & insufficient IT budgets. |
| 4. Organizational Factors | 4. Poor IT strategy matched to culture, HR needs, financial resources & structure. In sufficient internal routines. |
| 5. External Challenges | 5. Insufficient & unreliable external support, varying government support, competitive positioning, insufficient external innovation strategies |

**IT Adoption strategies**

1. Build technology support communities; create evidence of the benefits of IT; display improvement to existing systems & efficiency dividends; provide integrated benefits

2. Apply successful industry change strategies; build a knowledge sharing system; implement supportive IT policies; engage users as equal players.

3. Make increasing use of cloud computing; assess continuously legacy systems; implement a security risk management plan.

4. Adapt and change IT strategies; constantly reassess IT needs; implement policies that support IT training; link technology applications to reductions in financial resourcing; revise structures that support IT innovation through recombination skills.

5. Access government assistance programs if available; increase use of IT expertise; examine flexible IT contracts; simplify IT systems; see external knowledge as new innovation opportunities.

**Figure 4. An Integrated Framework for Information Technology Adoption**

## 5- Discussions

The goal of this study was to conduct a systematic literature review (SLR) of the major challenges of IT adoption. Identifying which organizational strategies will better help facilitate IT adoption success was a secondary goal. The study asked three research questions to inform study findings with respect to exploring the outcomes of previous studies and their related themes, to determine the main adoption challenges, and to identify the adoption strategies required. We noted earlier how the findings of prior studies had not addressed comprehensively the IT adoption problem even while scholars had made significant strides in new technology implementation [31]. Given that there has been a significant need to integrate and align the many IT adoption challenges with strategies that provide the means to solve them, this is the first SLR to our knowledge that tackles these concerns.

This study broadens the existing knowledge related to IT adoption in at least three ways. *First*, existing SLRs have focused on specific aspects of technology mostly within a well-defined context. These were discussed at length earlier in the paper. The current longitudinal study in contrast pays more attention to the holistic insights concerning the SLR process, the replication of a research process for future researchers, and an integrated framework for IT adoption. *Second*, the review findings indicate that there is no unified approach to IT adoption. Consequently, a more unified understanding of IT adoption is required when the various challenges identified are approached within an integrated whole (Figure 4). Here, we described the strategies available for solving IT challenges across different categories and sub-challenges.

Third, the findings highlight the importance of strategic IT agility. We discussed how organizations require an ambidextrous approach between the acquisition and transformation of new knowledge and between the assimilation and exploitation of existing knowledge. Transformation represents within an IT adoption perspective, the ability of an organization to recombine new and existing knowledge by developing appropriate IT capabilities [57, 60]. In thus integrating insights from the existing literature, our review broadens the IT adoption literature by adding additional insight into IT adoption know-how. That is, increasing the strategic agility of organizations is related to increasing their absorptive capacity through the acquisition and transformation of new IT adoption knowledge. In broadening the IT adoption literature, therefore, organizations need to go further than developing a cultural mindset towards IT adoption. If anything, they require the strategic agility to think big through the acquisition of new innovations [311], as well as the ability to reorganize their operational systems to support the assimilation and exploitation of IT adoption practices [312]. Specific behavioral routines will need to be developed to enable an organization to achieve an accepted level of absorptive capacity. Given that our review has noted the importance of training existing staff as well as moving the culture towards accepting an integrated IT adoption system, IT officers will need to work closely with human resource experts to update the skills of existing staff.

There is a difference, however, between the new routines required for acquisition versus transformation. While the former routines suggest employees will need to update their innovation and exploration skills, including better skills related to interpreting the environment [63], transformation skills will require more adaptive and recombination behaviors [57], such that employees from top management down can change and update their behaviors to reflect an integrated IT adoption approach for accepting new technology innovations [61]. Taken together, we believe that three contributions to intellectual insight concerning IT adoption practices help to broaden and extend the current adoption literature. Figure 5 illustrates the discussions pertaining to the third contribution. Integrative insights in Figure 5 build on Figure 4. In Figure 4, IT strategies consist of both internal and external strategies. The strategic insights in Figure 4 will only occur with a greater effort to align both internal and external capabilities to create increased strategic agility with respect to IT adoption practices.
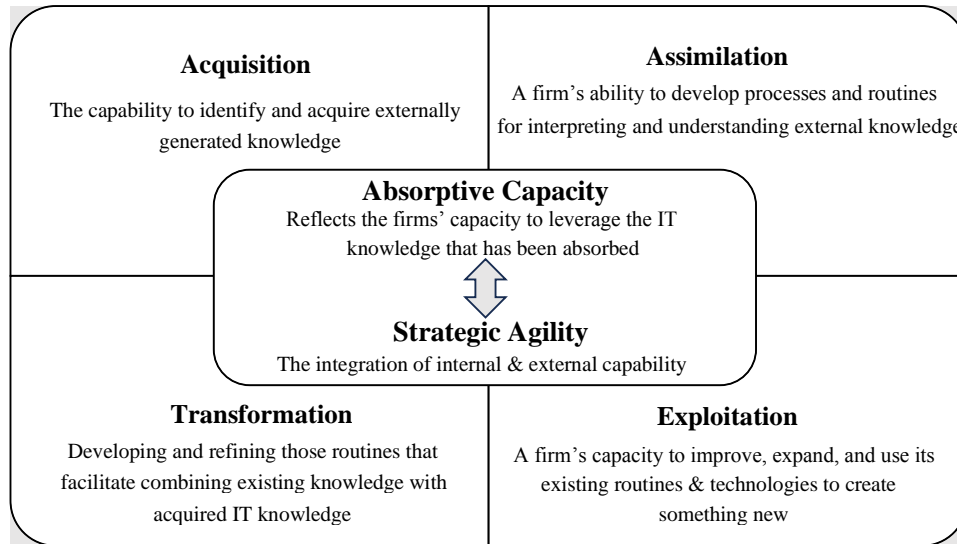


**Figure 5. Absorptive Capacity and Strategic Agility of IT Adoption**

# 6- Conclusion

This study involved an SLR and longitudinal approach to studies related to IT adoption between 2012 and 2022. Our SLR enabled the researchers to explore several important gaps in existing research related to several research questions. In exploring the research gaps, scholars and practitioners should be more cognizant about the range of challenges of IT adoption and what supportive strategies are required to solve them. We discussed how IT adoption strategies are related to organizational operational and strategic agility as a means to update existing culture and strategy. To this extent, this study helps to categorize a range of contemporary IT challenges within much broader contexts, which in prior studies have not been well defined. Also, within the IT adoption literature, scholars and practitioners have been mostly no wiser about how to address these broader concerns, even though, as outlined in this review, scholars have made substantial contributions to advancing the IT field of research. Our findings also provide greater insight into the pre-change and post-change processes of IT adoption, as illustrated in Figures 5 and 6 by broadening the existing knowledge related to adoption success by expanding on the gray areas of adoption, including organizational strategies to achieve IT strategic agility. Here, we noted that the main three contributions to broadening theory related to 1) the lack of comparative studies systematically exploring IT adoption challenges except within specific contexts, 2) the unified approach adopted in this research, including an integrated research model, and 3) the importance of increasing an organization's absorptive IT capacity by building strategic IT agility.

## 6-1- Directions for Future Research

Future research should examine in more detail the three research contributions. For instance, global technology standards might place increasing pressure on organizations to modify their culture, structure, and systems. Research might explore what these standards are and how they can be applied. Future research might examine whether standardized techniques of measuring organizational technology adoption are viable and helpful, while a range of tools, indices, and measuring methods may yield other IT adoption results. An additional approach might be for future scholars to propose a checklist for IT adoption that can be customized to different contexts by providing an overview of the organization's current IT state, thus mobilizing a more resilient, flexible, and adaptive organization. Similarly, future research might increase the focus of IT adoption with respect to increased digitalization and automation, artificial intelligence (AI), data translation, and fast information availability to users, influencing individual job motivation and performance, including organizational culture. While the current research has identified many of the broader challenges that all organizations face in relation to IT adoption, the current study is limited by the research design adopted.

## 7- Declarations

### 7-1- Author Contributions

Conceptualization, O.A., P.M., and A.A.; methodology, O.A.; software, A.A.; validation, O.A. and P.M.; formal analysis, O.A., P.M., A.A., and L.T.; investigation, O.A., P.M., A.A., and L.T.; resources, O.A., P.M., A.A., and L.T.; data curation, O.A., P.M., and A.A; writing—original draft preparation, O.A., P.M., A.A., and L.T; writing—review and editing, O.A., P.M., A.A., and L.T; visualization, A.A.; supervision, O.A.; project administration, O.A.; funding acquisition, L.T. All authors have read and agreed to the published version of the manuscript.

### 7-2- Data Availability Statement

Data sharing is not applicable to this article.

### 7-3- Funding

### 7-4- Institutional Review Board Statement

Not applicable.

### 7-5- Informed Consent Statement

Not applicable.

### 7-6- Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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