Toward a Framework for IT Utilization in Organizations: A Literature Review from the Perspective of Organizational Theory

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Received Apr. 25, 2025, Revised May 28, 2025, Accepted Jun. 22, 2025
Published Jun. 30, 2025.

Management Review: An International Journal, 20(1): 27-62.
ISSN: 1975-8480 eISSN: 2714-1047
https://doi.org/10.55819/mrij.2025.20.1.27

ABSTRACT

This study presents a comprehensive literature review on the organizational use of information technology (IT) through the lens of organizational theory. This paper analyzes 45 peer-reviewed articles published in top-tier management journals from 2015 to 2024. The reviewed literature is categorized along three dimensions: the contexts in which IT tools are used (online vs. offline), the relationship between domain-specific and tool-specific knowledge, and broader discussions on IT's role in organizations and society. From this synthesis, the study proposes eight theoretical propositions that clarify the conditions under which IT utilization enhances organizational performance. Key findings emphasize the significance of transactive memory systems for

online knowledge sharing, the interplay of organizational design and IT-enabled efficiency, and the complementary nature of domain and tool knowledge in successful IT implementation.

Keywords: Digital Transformation, IT Utilization, Organizational Theory, Knowledge Management, Domain Knowledge

INTRODUCTION

In recent years, discussions surrounding digital transformation (DX) have gained considerable momentum. The question of how to effectively utilize information technology (IT) has long been a central theme in organizational studies. With the increasing application of AI and IoT in business contexts, these discussions have grown more intense and pressing. The topic of IT utilization is frequently addressed within the field of organizational theory. For instance, investments in systems for decision-making, ERP, email, and intranet technologies are viewed as enhancing an organization's information-processing capabilities (Numagami, 2004). Regarding the usefulness that IT tools can include, it was noted in Park (2020) that the use of digital technology may help overcome cultural divides. There are also technological limitations of the system, as evidenced by the fact that alternative systems are recommended for adoption (Joo & Lee, 2006), suggesting that IT tools need to be renewed periodically as technology evolves.

Furthermore, IT utilization is closely related to knowledge management. Grant (1996) and Nonaka and Takeuchi (1996) are known as representative studies of knowledge research in management studies. Related to knowledge studies is the concept

of exploration and exploitation (March, 1991). These concepts are interpreted as conflicting. Research on exploration has also examined the effects of boundary-spanning activities across organizational and technological domains (Kikuchi, 2021). Additionally, knowledge integration research explores how new knowledge is generated through processes of knowledge sharing, combination, and creation (Wang, 2022). Yan, Xiong, Gu, Lu, and Zhang (2023) review papers dealing with the relationship between knowledge management and digital technology. Other empirical studies examining digital technology and knowledge management have been conducted in recent years (Thomas, 2024; Zhou, Li, Ma & Zhou, 2025). The existence of such literature suggests that IT utilization in organizations remains prevalent and is closely linked to knowledge management.

As such, IT utilization constitutes a major theme in organizational theory and plays a significant role in knowledge management. IT tools serve to store accumulated knowledge in accessible forms, allowing it to be leveraged for value creation at any time. By drawing on the knowledge embedded in these IT tools, organizations can generate new value-adding activities.

Given the current momentum behind DX, this paper seeks to examine how the use of IT tools has evolved in recent years. Through a literature review of recent studies, this paper aims to identify major trends and extract future research directions.

LITERATURE REVIEW

The theme of utilizing IT tools—namely, information technology—within organizations has a long-standing body of accumulated research. For instance, studies by Kuwada (1995) and Takeda (2000, 2001) have addressed this topic. In Kuwada (1995), the discussion centers on how new information technologies influence organizational design. Meanwhile, Takeda (2000, 2001)

examines the impact of information technologies such as 3D CAD on organizational issues including communication, differentiation, and integration. These studies demonstrate that even at the point when IT technologies were becoming widespread, research had already begun to focus on information technology and its relationship with organizations.

In recent years, the concept of "digital technology" has come to be used as a keyword related to information technology, helping to organize research in this area. For example, Ancillai, Sabatini, Gatti and Perna (2023) conducted a review of studies related to digital technology, focusing on the relationship between digital technology and business model innovation (BMI). Their review revealed that research in this field can be categorized into four areas: (1) types of digital technology-driven BMI, (2) the impact of digital technology on BMI, (3) the process of digital technology-driven BMI, and (4) digital servitization. Additionally, Yan et al. (2023) reviewed literature exploring the relationship between digital technology and knowledge management. Through topic cluster analysis, they identified four main topics: (1) digital technology and customer knowledge management, (2) dilemmas and issues in the application of digital technology in knowledge management, (3) digital transformation of organizational knowledge management, and (4) the impact of digital technology on knowledge management.

As noted by Ancillai et al. (2023), digital technology alone does not inherently create value. They argue that its potential is only realized when it leads to BMI. Research dealing with how digital technology unleashes its potential and contributes to significant outcomes such as BMI falls under the theme of digital transformation (DT). Several recent studies have conducted literature reviews on DT. For instance, Hanelt, Bohnsack, Marz, and Antunes (2021) identify two thematic patterns: the shift

toward flexible organizations and transformation within digital business ecosystems. Based on these two patterns, they classify research focuses into four types: (1) technology impact-driven, (2) partial adaptation, (3) systemic transformation, and (4) holistic co-evolution. Plekhanov, Franke and Netland (2023) also conducted a literature review on DT, analyzing it based on a new framework that divides organizations into three layers: core activities, peripheral activities, and the external environment. Their analysis found that companies undergoing more advanced transformation tend to be integrated into platform ecosystems where business boundaries are ambiguous.

In summary, the long-established theme of utilizing information technology has given rise to extensive research, particularly in response to recent environmental changes such as DT. Systematic reviews of these studies have also been increasingly conducted. Among these, Yan et al. (2023) is noteworthy for addressing the relationship with knowledge management. However, their discussion remains abstract and does not incorporate a classification of knowledge. When utilizing IT tools, it is inevitable to consider whether the knowledge involved is tacit or explicit, and how tool-related knowledge is employed—an aspect that is missing from current discussions. This reveals a research gap. Therefore, the aim of this paper is to review recent studies and clarify what kind of systematic organization is possible from the perspective of organizational theory—particularly in terms of knowledge classification—and to identify where the research frontier lies.

METHODOLOGY

Method selection: systematic literature review

The specific procedure is shown in Figure 1. In this study, a literature review was conducted using the Web of Science database. The search targeted academic articles that included one or more of the following keywords in their topic fields: IT, digital transformation, or digital technology. The review was limited to articles published in the top five management journals between 2015 and 2024. Specifically, the search covered the Academy of Management Journal, Academy of Management Review, Administrative Science Quarterly, Strategic Management Journal, and Organization Science.

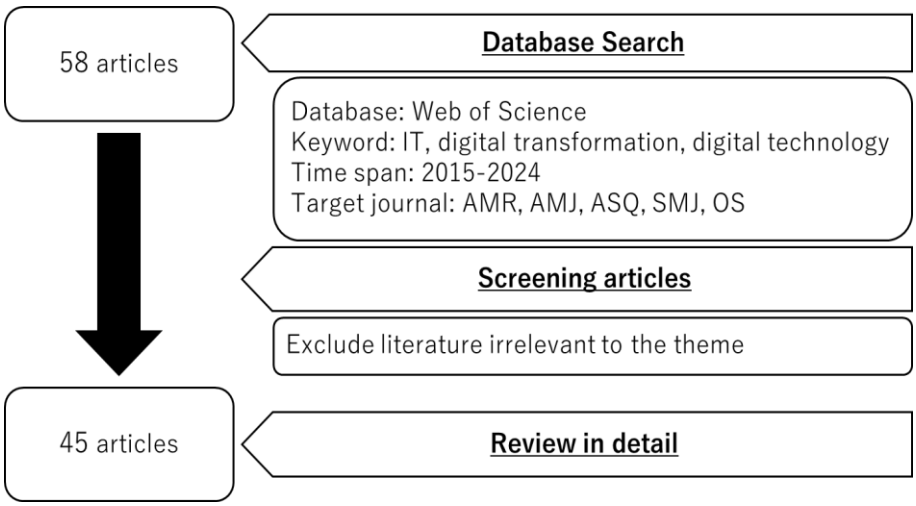

Figure 1. Procedure for identifying review targets

As a result, 58 articles were initially identified. Through further screening, articles that were deemed unrelated to the topic of IT utilization in organizations were excluded, resulting in a final sample of 45 articles for detailed review. The distribution of publication years for the selected literature is shown in Figure 2.

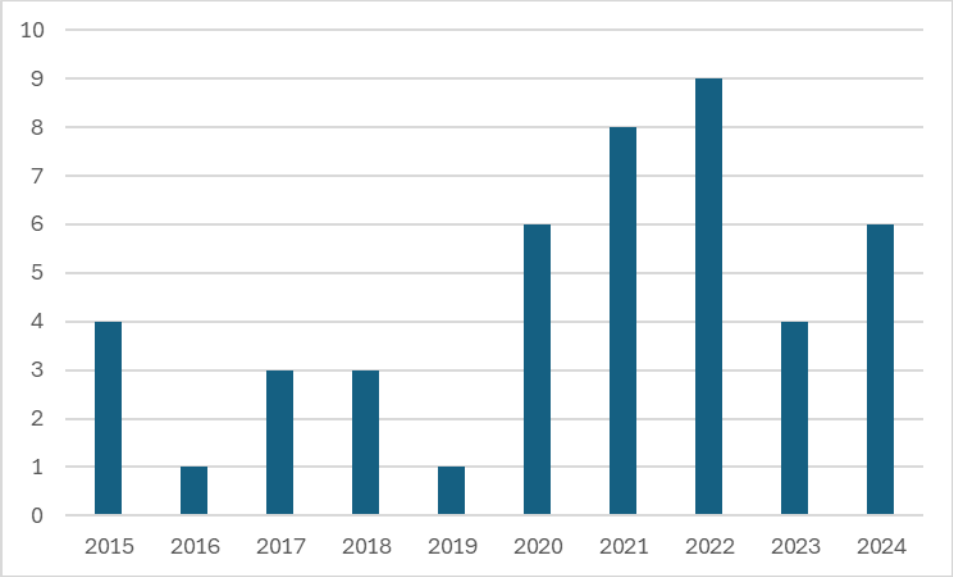

Figure 2. Trends in the number of IT-related publications in top five management journals

Result

The 45 selected papers were classified from the perspective of organizational theory into the following categories: 1) Classification by situation in which IT tools are used, 2) classification of tool knowledge and domain knowledge, 3) other research on organizations, society and IT use in general. Classification by the situation in which IT tools are used is a classification based on whether it is an online or offline situation that is being addressed in the study. Here, online refers to activities related to information integration using IT tools between two points that are geographically and temporally different (information sharing through databases, information sharing and information exchange in online forums, etc.). On the other hand, offline refers

to the use of IT tools as an aid in the execution of work in the field (digitization of work instructions, decision support systems, etc.).

In addition to the above categories, in relation to knowledge research, there are some that focus on (specialized) knowledge about tools and discuss how domain knowledge (specialized knowledge about work) works. In order to introduce IT tools such as AI and IoT into business operations, knowledge of the tools themselves is of course necessary. However, knowledge of the tools alone is not necessarily enough to build a tool that fits the business needs. In order to build tools that meet business needs of the field, domain knowledge, which is knowledge about the business backed by years of experience is required. In addition, when using IT tools in the field, it is necessary to be familiar with the field operations to a certain extent in order to judge whether the output data is correct. Some research was conducted from the perspective of domain knowledge.

Furthermore, it was possible to divide the discussion of IT use into three categories: intra-organizational, inter-organizational, and social. Then, as a result of the use of the tools within and between organizations, there were cases where conflicts occurred and cases where cooperation progressed. The last category was divided into this and other more general discussions of the relationship between IT tools and society. These studies examine the drivers and results of IT tool adoption, and the process of adoption.

Classification by situation in which IT tools are used

Classification by IT tool use classified the literature according to whether the situation in which the IT tool was used was offline or online. In the following, we will organize the review literature in the order of studies that dealt with the online format and those that dealt with the offline format.

Studies dealing with the use of IT tools in online situations

Regarding the use of IT tools in online situations, studies have been conducted on online situations such as forums. Among these, the following studies include examples of use in companies. Haas, Criscuolo and George (2015) examines what problems knowledge providers, who answer questions, focus on in online discussion forums within global companies. Hwang, Singh and Argote (2015) reveals the trends in knowledge shared in online communities. It has been revealed that shared knowledge is biased based on geography and hierarchy, and that it is the accumulation of past experience and the visibility of the questioner that overcomes such bias. Gibson, Dunlop, Majchrzak and Chia (2022) describes knowledge management in globally geographically distributed teams. These teams use some IT technology (email, web conferencing, etc.). However, if the same usage is used for the same tool in every situation, inefficiencies are likely to occur in that team. Therefore, they examined how to use tools according to the situation. As a result, it was revealed that successful teams recognized signs of changes in activities and adjusted their use of technology accordingly (focus, meaning, document and share). Wu and Kane (2021) further develop the concept of transactive memory system and propose the concept of digital transactive memory system(DTMS) formed by expertise search tool. They also state that DTMS contributes to performance by improving access to knowledge, creating new connections and increasing diversity of information, especially for women and young people. The search tool for DTMS in this paper is called Expertise-Find, which is developed and operated within a certain information service company. This system creates an index of employees regarding "who has what knowledge", based on the interactions on the company's digital platform, making it possible to search for them.

The adoption of such a system has brought about the results described above.

There is also theory-building research through literature review rather than empirical analysis. Malhotra, Majchrzak and Lyytinen (2021) focuse on large-scale collaboration used in open source development, architectural design, medical research, etc. They argue that there are challenges in knowledge exchange, deliberation, discussion, and integration, and that these can be solved by IT. Alaimo and Kallinikos (2022) propose the concept of data objects and attempt to build a new model of how knowledge is generated from data. It is argued that the formation of new knowledge is promoted so that demand forecasting and failure prediction are possible through such data objects.

There are also several other papers that focus on online communities, but in a general context rather than within a company. For example, one paper sheds light on the role that online communities play in shaping product interpretations in the market (Seidel, Hannigan, & Phillips, 2020). Kane and Ransbotham (2016) shed light on how content consumers and contributors change over time in an open collaborative community (Wikipedia) since the creation of the content.

The above studies deal with cases of knowledge integration in online situations and theories related to it. The knowledge handled there was basically codified and easily transferable explicit knowledge. Liu and Ravichandran (2015) is one study that can be read as dealing with tacit knowledge in an online format. In this study, they examined the use of past alliance experience. They found that IT capabilities improve the effectiveness of using past knowledge. The alliance experience discussed in this study refers to past collaborations with other companies, but this experience is often not necessarily written down, and the study discusses how to make this experience available for use in future alliances. Hence,

this literature is considered to be dealing with tacit knowledge. The study argues that the use of IT can facilitate making this experience available online to other organizational members. This study is exceptional in that it deals with tacit knowledge in an online format.

Studies dealing with the use of IT tools in offline situations

The following studies deal with the application of IT tools to operations in offline situations. These studies deal with cases where new knowledge has been generated and this has led to improved efficiency and performance, or cases where this was aimed at but was not necessarily successful.

Studies dealing with cases that are not necessarily successful are as follows.Pine and Mazmanian (2017) deal with the introduction of an IT tool, electronic health records(EHR) at a university hospital in the United States. In this case, while the aim was to improve work efficiency, it is argued that the introduction of the IT tool distorted the existing work practices. Until then, flexible task adjustments were made between doctors and nurses, with nurses understanding the doctor's orders and correcting and supplementing the contents of the orders. However, as a result of the introduction of electronic medical records and the strengthening of access rights for each profession, doctors had to correct the contents of the doctor's instructions themselves, which nurses were unable to do, resulting in a delay in work. In other words, it is suggested that, assuming that there is a discrepancy between on-site practices and formal business norms, the introduction of ICT must be designed with such discrepancies in mind.

Although seemingly successful, one study is not necessarily successful in another perspective. Pachidi, Berends and Faraj (2021) examine what factors promote the introduction of new

technology. The paper deals with the introduction of an algorithm to support the work of sales teams. In this case, it is revealed that symbolic conformity ultimately promotes the adoption of technology. The sales department pretended to follow the algorithm's predictions, but in reality they were conducting sales in the traditional way. This is symbolic conformity. As these actions continue, achievements are accumulated, which are recognized as the results of the algorithm. As these actions continue, achievements accumulate, but they are perceived as algorithmic results. By appealing to management with these results, the data scientist helped management recognize that algorithmic sales were effective, and the adoption of the technology proceeded. The above is an overview of Pachidi et al. (2021).This is a seemingly successful case study, as it depicts the results of the increasing adoption of IT tools. However, it is not necessarily true that algorithmic performance improvement was realized. Kim, Glaeser, Hillis, Kominers and Luca (2024) deals with the case of detecting noncompliant restaurants in a restaurant inspection department in a large US city. As a result of the analysis, the algorithm was able to detect noncompliant restaurants better than human judgment. However, inspectors did not inspect many restaurants detected by the algorithm, and it did not lead to improved decision-making. This suggests that the effectiveness of the algorithm is limited as long as on-site inspectors are given strong decision-making authority. This makes it clear that it is impossible to reflect the effect of introducing the algorithm in decision-making without considering organizational design such as authority, as well as improving the accuracy of the algorithm.

The following studies show that IT tools have improved performance. Furman and Teodoridis (2020) examine the application of automation technology to research work. This case study deals with the implementation of Microsoft Kinect. The

introduction of Microsoft Kinect improved the efficiency of researchers' data collection and productivity in idea generation. In particular, there was a noticeable change in the diversity and trajectory of research, especially from researchers in non-specialized fields. In addition, researchers within the specialty also experienced increased efficiency and diversification of research directions. Gardner Boyer and Ward (2017) revealed that in companies with a high level of IT adoption, the mindful use of technology improves performance. More specifically, using the concept of "time-sensitive," they clarified performance on time-sensitive tasks and performance on general tasks. The mindful use of technology and adherence to routine routines were used as explanatory variables. The sample covered U.S. hospitals and addressed the use of health care systems in hospitals.The sample is divided into two groups: organizations with advanced IT implementation and those without. The results showed a positive effect of mindful use of technology on both time and general performance in the group with advanced IT adoption, while adherence to specific routines had a positive effect only on general performance. On the other hand, in organizations with less advanced IT adoption, there was a positive effect of adherence to specific routines on both time performance and general performance, while mindful use of technology had no effect.

The following is a study that raises alarm bells regarding the use of IT tools. Bruns and Lingo (2024) point out that creative work is often accompanied by tedious tasks, criticizing that this has been overlooked in previous studies. They argue that digital technology makes these tedious tasks more noticeable. While digital technology offers endless possibilities, it also creates endless work, and tedious work is caused by the ability to focus on details. They argue that in order to ensure the performance of creative work, it is necessary to recognize the existence of such tedious tasks and

take measures against the risks. One thing that can be considered from this literature is that tedious tasks will arise infinitely and measures are necessary to deal with them, but on the other hand, if we look at it from a different perspective, digital technology creates a lot of tasks, including tasks that are not noticeable but have important meaning, and it can be interpreted that digital technology expands human work and requires further tacit knowledge.

Some literature is thought to have offline situations in mind, and some literature aims to build theory based on literature review rather than empirical evidence. Raisch and Krakowski (2021) classify the use of AI in organizations into automation and augmentation and derive theoretical propositions. Pursuing automation alone leads to cost reduction, but at the same time, it leads to deterioration of human resources' skills and stagnation of innovation, resulting in negative effects. Augmentation works to enhance human creativity, but using it alone, it faces the challenges of complexity, cost, and lack of reproducibility. Achieving a balance between automation and augmentation can produce a synergistic effect of increasing both efficiency and creativity. This can be seen as a discussion related to tacit knowledge in offline situations, as it replaces or assists the judgments humans make in their work.

Studies in offline situations, such as the above case study, deal with cases where IT tools are introduced into the field to improve operational efficiency and performance. There, IT tools replaced implicit work execution and coordination procedures in the field. This is not explicitly stated, it is tacit knowledge, and basically studies dealing with offline situations are dealing with tacit knowledge studies. We also foresaw a situation in which the introduction of IT tools cannot be said to simply replace human capabilities. In other words, the introduction of IT tools has

brought about a situation that requires new tacit knowledge on the part of humans. It also suggests that even if IT tools are effective, they do not necessarily lead to improved performance.

Tool knowledge and domain knowledge

Research on tool knowledge

The second axis of classification is based on domain knowledge and tool knowledge. First, in order to apply IT tools to an organization, knowledge of the tool to be introduced is naturally required. There are studies that deal with such tool knowledge. In such studies, points such as how to acquire knowledge about tools and what impact the amount of such knowledge has on the organization are discussed.

Kellogg, Myers, Gainer and Singer (2021) investigates how members of a community of practice learn new tools and technologies when existing expertise is impaired due to changes in the environment. Two explanatory variables that received particular attention were an illiegitimate learning hierarchy and status mobility. When introducing new technology, simply appointing inexperienced illiegitimate learning hierarchies to act as trainers will create resistance, especially from veterans, and learning will not progress. On the other hand, learning was promoted by not only promoting such illiegitimate learning hierarchies but also combining status mobility to rotate in the role of trainer. In addition, Beane and Anthony (2024) note that when new technology is introduced, superiors do not necessarily have knowledge of it, and discrepancies can arise between status and the amount of expertise. Several approaches to dealing with this issue were considered, and all of them were able to maintain the superiors' positions. On the other hand, there was a significant difference in the level of knowledge acquired, and in some cases, the results showed that junior employees had fewer opportunities

to learn. Regarding the acquisition of knowledge about tools, there are studies such as Nagle (2018). Regarding the use of crowdsource (open source software, OSS), this study reveals why people assign development staff to use it when packaged software should suffice. In conclusion, it is argued that learning by contributing (contributing code to OSS) is more effective, and feedback from the OSS community is accumulated as in-house knowledge, which can improve productivity.

Research on domain knowledge

As mentioned above, tool knowledge has been discussed as an important factor, but on the other hand, the discussion of how knowledge of the business field (called domain knowledge in this paper) affects the introduction and use of IT tools also has importance. In these studies, the use of IT tools in relation to domain knowledge, or the role of domain knowledge in creating knowledge, are discussed.

Alaimo and Kallinikos (2022), which I introduced earlier, discuss the use of IT tools called digital objects and the creation of knowledge, and predict that as knowledge creation by digital objects progresses, the reliance on domain knowledge will decrease. In the discussion by Allen and Choudhury (2022), the influence of domain knowledge on algorithm-assisted operations is examined. In the analysis, the focus is on ability and aversion. The model assumes that as domain knowledge accumulates, the ability to judge the accuracy of solutions generated by algorithms is formed, while aversion to the use of algorithms also increases. These two effects combine to produce an inverted U-shaped effect of domain knowledge on performance, suggesting that there is an optimal level of domain knowledge.

Thus, while some studies argue that domain knowledge is important for the use of IT tools, others argue that reliance on domain knowledge is less important.

Other research on IT tools and organizations and society

The third category broadly includes other studies that deal with the relationship of IT tools to society and organizations. It is further classified according to whether the situation in which the IT tool is used is intra-organizational, inter-organizational, or deals with the broader society. For the studies that dealt with inter-organizational and intra-organizational use, they were further categorized into whether the use resulted in increased intra-organizational conflicts or promoted cooperation.

Intra-organizational use of IT tools

First, we present studies that deal with situations within organizations. Among them, Kellogg (2022) deal with cases of successful intra-organizational coordination. Kellogg (2022) deals with issues such as labor intensification for workers in weaker positions, which occurs simultaneously with the introduction of digital technology.It examines how the introduction of digital technology (electronic medical record systems) can proceed without worsening the working conditions of these vulnerable workers. Through case studies, they found that when technology was introduced under the initiative of the doctor, it led to an intensification of the work of the vulnerable assistants, but when the manager repeatedly renegotiated the situation by involving the doctor and the assistants, a win-win reconfiguration of roles was possible.

On the other hand, a study that includes the results of conflicts within organizations is Obloj and Sengul (2020). This study found that when organizations aimed at multiple

performance indicators, organizational performance was lower in these situations to begin with, but the use of ICT was found to increase these negative effects. In addition, Beane and Anthony (2024) and Pine and Mazmanian (2017), which we have already seen, also found friction between superiors and junior staff and hindrance to task coordination between doctors and nurses, respectively.

Inter-organizational use of IT tools

In addition, there are a certain number of studies that deal with situations in which organizations use IT tools to make adjustments or form alliances. Here too, they are divided into those that facilitated inter-organizational relationships and those that showed a certain degree of friction, adjustment failure, and conflict.

As studies that make claims of smoother coordination, Schilling (2015) analyzes the causes of the sudden increase in the number of alliances that occurred in the early 1990s. Among them, technology shocks, such as the commercialization of the Internet and the appearance of web browsers, are cited as the cause of the sudden increase in alliances. It is explained that this sudden increase occurred because technology shocks simultaneously created uncertainty and opportunities, and companies responded through alliances. Cepa and Schildt (2023) conducted a case study of inter-company relationships between five Nordic companies and examined the changes in inter-company collaboration brought about by digital technology. As a result of the analysis, each company established a digital unit and promoted collaboration by putting this department in charge. In these departments, a data-driven mindset and data-driven interactions were formed, and data-based rationality was permeated. As a result, tensions between the companies were temporarily neutralized within the department, and a unified space was formed. This phenomenon

has led to situations such as focusing on common goals, rapid problem solving, and maximizing short-term collaborative results. Lumineau, Wang and Schilke (2021) examine the impact of blockchain technology on inter-organizational relationships. In this paper, they clarify how blockchain promotes cooperation and coordination. Blockchain realizes the adherence to agreements through technology that is different from previous contractual and relational governance. The automatic execution and immutability realized by blockchain promote cooperation, and the real-time information sharing and formation of common understanding promote coordination. Malhotra et al. (2021) also state that the support of technology such as IT tools is essential for large-scale collaboration, which enables knowledge exchange, deliberation, discussion, and integration. These literatures have relatively revealed that inter-company relationships and alliances are promoted by IT tools.

On the other hand, some studies have revealed conflicts in inter-company relationships through IT tools. Wang and Miller (2020) examine the dilemma of value creation and value capture in digital platforms, analyzing publishers' product strategies for the Kindle. Their analysis reveals that small publishers tend to offer products with high demand and profitability, while large publishers refrain from offering products with high profitability. They speculate that this is to avoid dependency on digital platforms. Khanagha, Ansari, Proutis and Oviedo (2022) deals with the case of Cisco, which successfully built a new platform in the presence of a dominant digital platform. In it, rather than conflicts between the companies, it reveals how they finally segregated their services in a competitive relationship. Tae, Pang and Greenwood (2020) examined how a failure in one company's IT system can have repercussions beyond that company.

Relationship between IT and society

The last category is papers that examine the broad relationship between IT and society. This category includes research on a very wide range of interests.

Research on the relationship with society includes a study examining the relationship between ICT use and entrepreneurship among rural women in India (Venkatesh, Shaw, Sykes, Wamba & Macharia, 2017), the spread of the British-originated mobile money service MPS in Kenya (Oborn, Barrett, Orlikowski & Kim, 2019), the unintended chain reactions caused by emerging technologies (e.g., changes in labor structure) (Bailey, Faraj Hinds, Leonardi & von Krogh, 2022), and the process of moral formation in the digital market (Gray, Briscoe & Ferraro, 2023).

Other themes addressed were the emergence of social media and changes in who organizations are accountable to (Karunakaran, Orlikowski & Scott, 2022), and the relationship between the adoption of machine learning for organizations and human resource mobility (Chen, Balasubramanian & Forman, 2024).

DISCUSSION: PROPOSITIONS AND FUTURE ISSUES

Existing research can be classified as above. The purpose of this section is to organize the above studies and derive new propositions. The propositions derived from the review of multiple studies can induce subsequent empirical research and become future research topics. In this section, we develop a discussion that expands the possibilities for such future research. In particular, we will focus on two studies: 1) Classification based on the situation in which the IT tool is used and 2) tool knowledge and domain knowledge, which will be analyzed in more detail and propositions will be derived.

Classification based on the situation in which the IT tool is used

Organizing Research

As already mentioned, we first categorized and reviewed studies that dealt with online and offline situations according to the classification by the situation in which IT tools are used.

Table 1. Classification Matrix for Knowledge Integration Research

Situation	Nature of knowledge	
	Explicit knowledge	Tacit knowledge
Online	Haas et al. (2015) Hwang et al. (2015) Kane and Ransbotham (2016) Malhotra et al. (2021) Wu and Kane (2021) Alaimo and Kallinikos (2022) Gibson et al. (2022) Seidel et al. (2020)	Liu and Ravichandran (2015)
Offline	N/A	Pine and Mazmanian (2017) Pachidi et al. (2021) Furman and Teodoridis (2020) Gardner et al. (2017) Raisch and Krakowski (2021) Bruns and Lingo (2024)

We also attempted to classify the nature of the knowledge handled in such studies from the standpoint of tacit knowledge and

explicit knowledge. If we form a 2x2 matrix with these two axes and classify the type of research included in each cell, we get the Table 1.

As mentioned above, the cases dealing with online situations mainly focus on explicit knowledge, while the cases dealing with offline situations mainly focus on tacit knowledge. Liu and Ravichandran (2015) is the only online/tacit knowledge literature that could be classified, but there was no corresponding research that dealt with explicit knowledge in offline situations.

Online/explicit knowledge research

When looking at online/explicit knowledge, there are many studies that focus on factors that affect online knowledge sharing (Gibson et al., 2022; Haas et al., 2015; Hwang et al., 2015; Kane & Ransbotham, 2016; Wu & Kane, 2021). It has been suggested that when sharing knowledge online, biases occur and are eliminated by the experience of the knowledge provider and the visibility of the questioner (Hwang et al., 2015), that online search tools form transactive memory system and accelerate knowledge sharing (Wu & Kane, 2021). It was also suggested that there are several phases to the sharing of information, and that prior to sharing, there are uses that promote information accumulation and uses that aid in meaning making and understanding (Gibson et al., 2022).

In general, it has been revealed that the effectiveness of knowledge sharing depends on the perception of the person using it. Wu and Kane (2021) emphasize transactive memory system, but Hwang et al. (2015) argue that when sharing knowledge online, it is experience and the visibility of the questioner (knowing their identity) that eliminate bias, which can also be interpreted broadly as a type of transactive memory system. In order to remove bias and fully spread knowledge, the identities of the questioner and knowledge provider need to be visible; this can be broadly

summarized as transactive memory system. Therefore, the following proposition can be derived:

> Proposition 1: To promote knowledge sharing in online situations, transactive memory system needs to be formed.

Offline/tacit knowledge research

When looking at research on offline/tacit knowledge, it can be seen that there are two directions: efficiency, represented by automation, and expansion, which complements human capabilities to achieve higher performance. Furman and Teodoridis (2020), on the other hand, argue that IT tools are replacing data taking in research work, a task that requires knowledge, including tacit knowledge, and increasing the productivity of ideas. Raisch and Krakowski (2021) also divide the use of AI into automation and augmentation from a literature review, but in order to enjoy the benefits of both, it is necessary to balance the two uses. Finally, Bruns and Lingo (2024) state that while the introduction of IT tools increases what people can do, it also creates a lot of tedious work. This occurred because it allows for an attention to detail that would not be possible without IT tools. It was also suggested that using these tools required a different kind of tacit knowledge than was previously available. This could be considered a study in augmentation.

With respect to efficiency gains through substitution, there are cases where efficiency has failed (Pine & Mazmanian, 2017; Pachidi et al., 2021; Kim et al., 2024) and cases where work requiring tacit knowledge has been replaced (Furman & Teodoridis, 2020). Comparing these two cases, the successful case was a replacement for a task that could be completed by an individual, such as a part of research work, while the unsuccessful case was for a task that could be performed by multiple members, such as

the coordination of work. In reviewing the other studies, there are sections where IT tools were effective in situations where the execution of work was completed by a specific individual. For example, Kim et al. (2024) stated that the algorithm accurately detected offending restaurants, although this was not reflected in the algorithm results.

What can be said from this is that when it comes to substituting operations using IT tools, there is tacit knowledge that can be substituted and tacit knowledge that cannot. Tacit knowledge of cognition and skills similar to craftsmanship required in work completed by individuals can be substituted by algorithms relatively effectively. On the other hand, tacit knowledge based on the common understanding of multiple individuals, as seen in the communication between nurses and physicians, would be difficult to replace with IT tools.Thus, the following propositions can be derived.

> Proposition 2a: Tacit knowledge required for tasks completed by individuals is relatively easy to be replaced successfully by IT tools.

> Proposition 2b: Tacit knowledge required for coordination among members is relatively difficult to be replaced by IT tools.

On the other hand, the use of IT tools to complement human capabilities is addressed in Raisch and Krakowski (2021) and Bruns and Lingo (2024). Bruns and Lingo (2024) deals with a case in which the use of IT tools has expanded human creativity. The study's assertion is distinct from the commonly held impact of AI, which is that the use of AI will replace the performance of human tasks. In their research, IT tools are not supposed to replace human work, but rather to expand the scope of creativity while leaving the

work that humans are responsible for intact. At the same time, there is an endless amount of tedious work involved in this process, and he is sounding the alarm bells in this regard. However, it can also be interpreted that there is new work needed and new tacit knowledge will be required.Thus, the following propositions can be derived.

> Proposition 3: The use of IT tools in a way that complements human capabilities creates the need to acquire new tacit knowledge.

Tool knowledge and domain knowledge

The next axis for classifying research is the classification of tool knowledge and domain knowledge. In the discussion of domain knowledge, there are studies such as Alaimo and Kallinikos (2022) who argue that the dependency on domain knowledge decreases as the use of tools increases. On the other hand, there is Allen and Choudhury (2022) who argues that domain knowledge determines the degree to which tools are trusted. This literature suggests that domain knowledge is necessary for the use of IT tools.

Regarding tool knowledge, there are studies that mainly assume organizations that do not possess such knowledge and discuss how to acquire and implement such knowledge into organizations. Nagle (2018) clarifies that learning by contributing, which not only uses OSS but also provides code, enables internal knowledge accumulation. Kellogg et al. (2021) clarifies how to appoint a trainer for that knowledge to promote adoption. Beane and Anthony (2024) revealed that the degree of learning of juniors depends on how the organization responds when their superiors do not have the knowledge during implementation.

For tool knowledge, the phases of acquiring and introducing tool knowledge and the phase of using the tool after its introduction

are discussed. There are two positions on domain knowledge: necessary (Allen & Choudhury, 2022, point out that domain knowledge provides the ability to distinguish the results of algorithms) and unnecessary (Alaimo & Kallinikos, 2022, expect that the dependency on domain knowledge will decrease as the use of tools increases). Then, it is possible to organize it into the following matrix of Table 2.

The upper and lower cells on the right side mention whether domain knowledge is necessary or not, while the studies classified on the left side do not mention domain knowledge. This means that there is currently not enough research related to the introduction of IT tools that incorporates the perspective of domain knowledge.

The discussion of whether domain knowledge is necessary or not is important in the introduction of IT tools. This is because it is related to the discussion of what kind of person will be the main person in charge of introduction when introducing IT tools within an organization. If domain knowledge is necessary, then the main person in charge of acquisition and introduction should be someone in the field. If domain knowledge is not necessary, then it would be acceptable for someone in the IT department who does not fully understand the actual situation on the ground to be the main person in charge of introduction. This perspective of who should be the main person in charge of introduction is not explicitly discussed in the literature review, and is a clear research gap.

However, it would be unrealistic for IT tools to be introduced in a single functional department (e.g., the IT department, operational organization). In this case, a cross-functional team is basically formed to implement the project to introduce IT tools. If we refine the above research gap from this perspective, the fact that the roles of those with domain knowledge and those with IT

Table 2. Classification Matrix for Domain Knowledge and Tool Knowledge

<table>
<tr><td colspan="2" rowspan="2">Categories</td><td colspan="2">Tool knowledge</td></tr>
<tr><td>The phases of acquiring and introducing</td><td>The phase of using the tool</td></tr>
<tr><td rowspan="2">Domain Knowledge</td><td>Necessary</td><td rowspan="2">Nagle (2018), Beane and Anthony (2024): Both discuss acquisition and implementation, but there is no mention of domain knowledge. Therefore, it is impossible to classify into upper left and lower left.</td><td>Allen and Choudhury (2022): Domain knowledge is necessary to judge the results of algorithms. Also, this is about the implementation stage of using tools.</td></tr>
<tr><td>Not Necessary</td><td>Alaimo and Kallinikos (2022): Introducing tools reduces the reliance on domain knowledge for creating information.</td></tr>
</table>

tool knowledge are not adequately discussed in the IT tool implementation process is an RG that needs to be addressed.

The hypothesis based on interviews with practitioners is that "IT tools are more likely to be successful if people with domain knowledge take the lead in introducing them." This is because it is impossible to build tools that are actually useful in practice without a full knowledge of the actual situation in the field. And it often takes a long time, in the order of 10 years, to acquire sufficient domain knowledge. In that sense, since domain knowledge is necessary, people who are actually working in the field need to take the lead in introducing IT. From this, the following proposition can be derived.

> Proposition 4: When introducing IT tools, it is more likely to be successful if members with domain knowledge take the leadership.

On the other hand, it is also possible for the IT department to enter the field and learn about the actual work before building the IT tools. However, as mentioned above, it takes a long time, in the order of 10 years, to become familiar with the actual work in the field. It is difficult to acquire a sense of the field even if you are in the field for less than a year under a system such as an in-house study abroad program, and it is not realistic for IT department personnel to build effective tools. However, it is highly possible to acquire something like literacy regarding the way of working in the field and a basic understanding of how to proceed with basic work even if you study abroad in the field for a few months. Having a common understanding of the procedures of works in the field is likely to promote collaboration with people in the field. In this regard, the hypothesis that "when IT department personnel go on an in-house study abroad program to the field, basic understanding

and literacy of the work in the field are built, enabling smooth collaboration with people in the field, and contributing to building effective IT tools in a team" seems to be valid. Also, since members with domain knowledge are people in the field, they do not necessarily have knowledge of IT tools. In that case, it will be necessary for people with knowledge of IT tools to support members with domain knowledge. Therefore, the following proposition can be derived.

> Proposition 5a: When introducing IT tools, it is more likely to be successful if members with domain knowledge and members with knowledge of IT tools form a cross-functional team.

> Proposition 5b: When introducing IT tools, it is more likely to be successful if IT department members with tool knowledge support members with domain knowledge.

> Proposition 5c: When introducing IT tools, it is more likely to be successful if IT department members with tool knowledge have experience in in-house study abroad at the site.

Above, we have derived eight propositions. This is a theory-building paper based on a review, and these propositions are derived theoretically. Therefore, we need to await further empirical evidence to see whether these match reality.

CONCLUSION

In this paper, we conducted a literature review on the use of IT tools in organizations in recent years, organized the results, and constructed a theory. The top five journals in management had

more than 40 articles published, even though they dealt with general management topics that were not specific to the subject of information technology. Furthermore, it was revealed that these papers were divided into online and offline, and each category contained a certain number of papers. It is assumed that events that triggered the online situation, such as the COVID-19 pandemic, boosted the number of such references, but at the same time, globalization and DX trends are probably also reflected in the number of such references. In fact, some literature was found to reflect the background described above.

When these literatures were organized, it was also revealed that the sharing of knowledge online is influenced by human consciousness such as bias, leading to the sharing of biased knowledge. This paper proposed that further research on TMS as a means of promoting the sharing of such knowledge is awaited. It was also foreseen that the use of IT tools in offline situations can be divided into substitution and extension, and that the situation that occurs with respect to tacit knowledge is different for each. Furthermore, research into knowledge of IT tools and domain knowledge has yet to be empirically demonstrated to determine how they affect the introduction of the tools. And this is also a question of what knowledgeable people to team up with. Such research will be required in modern society, where the use of IT tools, especially AI and IoT, will undoubtedly continue to progress. The propositions in this paper will be the beginning of research that could have a major impact.

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