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ICT-based Inter-organisational Knowledge Exchange: A Narrative Literature Review Approach

Yuzhen Zhu^{1[0000-0002-2971-2285]}, Efpraxia D. Zamani^{2[0000-0003-3110-7495]}, Jorge Tiago Martins^{3[0000-0003-3906-5904]} and Ana Cristina Vasconcelos^{4[0000-0002-8921-5256]}

^{1,2,4} Information School, The University of Sheffield

³ VTT Technical Research Centre of Finland Ltd.

¹ Yzhu74@sheffield.ac.uk

Abstract. Organisations are increasingly seeking collaborations across organisational boundaries, and the digitalisation of organisation can greatly accelerate people to exchange knowledge in such inter-organisational collaborations. Therefore, Information and Communication Technologies (ICTs) play a more significant role in organisations' inter-organisational knowledge exchange (IOKE) than ever before. However, current studies provide somewhat fragmented perspectives through which knowledge and technology may be interpreted. It is critical now for research and practice to understand how ICTs shape IOKE. This study accordingly explores how IOKE is conceptualised from different ICT perspectives and understand their limitations and implications. The paper contributes to understanding the dynamic nature of IOKE from ICT perspectives and calls for future research to conceptualise IOKE from a more integrative view.

Keywords: knowledge exchange, inter-organisational collaboration, narrative literature review, sociomateriality, socio-technical systems

1 Introduction

As the world of work continuously transforms, organisations seek collaborations outside their boundaries, forming inter-organisational collaborations [1]. The digitalisation of organisations has enabled people to work remotely [2], which has meant organisational members exchanging knowledge via Information and Communication Technologies (ICTs) [3]. The Covid-19 pandemic has further accelerated this, making even more apparent the impact of ICTs on inter-organisational work [4] and our reliance on them for business continuity [5].

To date, however, the discourse on the role of ICTs for inter-organisational knowledge exchange (IOKE) is somewhat fragmented as there are multiple perspectives through which both knowledge and technology may be interpreted. For example, the socio-technical perspective emphasises IOKE's interactive process shaped by social and technical subsystems [6], while the sociomaterial perspective focuses on IOKE's practices shaped by ICT and actions [7]. What is critical for research and practice today

is to explore how different perspectives of ICTs help shape IOKE; what are the similarities and differences across existing perspectives of ICTs in how they address, conceptualise and influence IOKE, and what are the implications and limitations of these different perspectives for an enhanced understanding and practice of IOKE.

To address the aforementioned questions, this study conducts a narrative literature review, drawing from the Information Systems and Knowledge Management literatures, with the aim to explore how IOKE is conceptualised from different ICT perspectives. The specific objectives are: to understand the dynamic nature of IOKE; to explore different perspectives of knowledge exchange; to explore the role of ICTs in knowledge exchange; and to delineate the limitations and implications for the investigation of IOKE practices. The narrative literature review approach is considered to be particularly useful for extracting a broader landscape of ICT studies for the IOKE field [8, 9].

This paper contributes to the understanding of IOKE from an ICT perspective. The intrinsic and dynamic nature of IOKE is clarified from different perspectives of ICT through which salient areas for future research and the need for conceptualising IOKE from a more integrative view are identified.

2 Inter-organisational Knowledge and Knowledge Exchange

As organisations increasingly seek opportunities from external resources [10], knowledge exchange in inter-organisational collaborations attracts the interest of organisational scholars [11]. However, and despite the increasing interest, there is not yet an agreed definition of the concept. For example, Fazey et al. [12] define knowledge exchange as “a process of generating, sharing, and/or using knowledge through various methods appropriate to the context, purpose, and participants involved” (p. 20). Davenport [13] defines it as a “dynamic process by which knowledge is transferred, shared and created within the core collaboration and with wider stakeholders” (p. 297), and emphasises its iterative and multi-directional characteristics that are supportive of collaboration. On the other hand, Davison et al. [14] conceptualise knowledge exchange as a constitution of “knowledge seeking and knowledge sharing”. While different, these conceptualisations suggest that knowledge exchange can be viewed as a broader concept, encapsulating the creation, sharing, storage and application of knowledge.

2.1 Inter-organisational Knowledge Exchange Process

Knowledge exchange is a social process where various perspectives, contextual conditions, entities, and technologies are involved and interact in a systematic way [15, 16]. The process is iterative and interactive, and involves the multi-directional mobilisation of knowledge [13]. In the context of inter-organisational collaboration, such knowledge mobilisation reflects a dynamic knowledge exchange taking place across organisational boundaries, i.e., IOKE [17-19]. We thus posit that IOKE is *a dynamic, multi-directional and iterative process by which knowledge is created, shared, stored and applied in inter-organisational collaborations, which achieve an inter-organisational exchange of knowledge*. By reviewing and synthesising current IOKE literature, we argue that

inter-organisational knowledge exchange involves five distinct sub-processes as knowledge is created, shared, stored and applied in IOKE. These are discussed next.

Knowledge Exploration reflects the process through which new knowledge is sought. This means that new knowledge is explored and refined regularly and evolves continuously [20]. Davison et al. [14] argue that knowledge is shared when sought. This indicates that the new knowledge exploration process plays a significant role in knowledge exchange and expands the knowledge domain as the IOKE process develops.

Extant Knowledge Exploitation refers to the synthesis and reuse of *existing* knowledge. Knowledge exploitation activities, such as locating knowledge and classifying knowledge, help understand relevant knowledge in the present [20, 21]. Therefore, extant knowledge exploitation is vital for the knowledge exchange process.

Context Construction shows the shifting context of knowledge exchange. Macro contextual factors, such as the economic context, exemplify the external context of knowledge exchange [22]. Micro contextual factors such as organisational structure, culture and leadership influence knowledge exchange practices [23]. These contextual factors shape and are shaped by knowledge exchange practices as the IOKE process evolves [24].

Intervention relates to the knowledge exchange activities. During knowledge exchange, individuals develop knowledge by sharing their own knowledge, creating and tailoring new knowledge, discussing and negotiating their ideas, which mediate their knowledge exchange patterns [22, 26]. Intervention thus refers to how knowledge exchange patterns evolve as knowledge sharing, creation, storage and application processes interact in IOKE.

Knowledge Utilisation refers to the shifting use of knowledge in the practice. Rather than focusing on the shifting of knowledge itself to promote IOKE in interventions, knowledge utilisation focuses on shifting the knowledge use in actions. This is associated with different types of knowledge use, such as conceptual and procedural use of knowledge and various relevant actions such as monitoring and evaluating the use of knowledge [25]. Organisations need to develop capabilities in mobilising their knowledge into action, which is the purpose of knowledge management and core for developing organisational competitive advantage [26]. In this respect, knowledge utilisation entails evaluating how effective the knowledge exchange process is and how useful the knowledge exchanged is [22]. As a result, knowledge utilisation is an essential phase in the knowledge exchange process and it reflects that knowledge exchange is a "know-do" process.

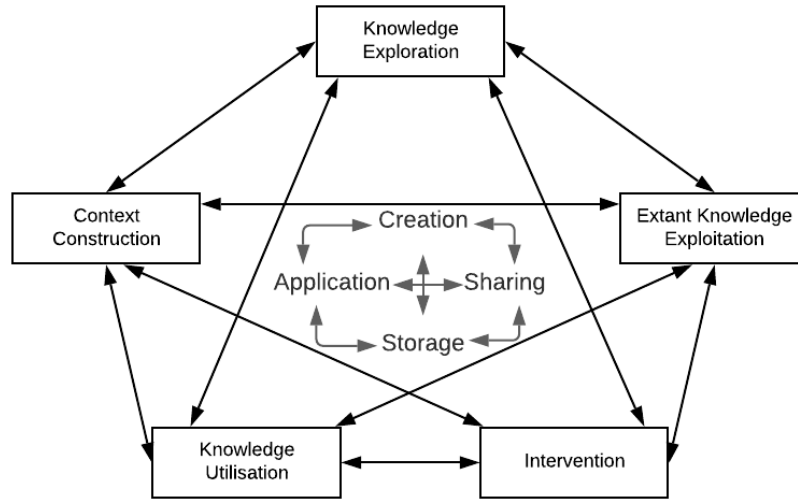


Fig. 1. Inter-organisational Knowledge Exchange Process.

These processes are interrelated and interact with each other. For example, knowledge sharing mechanisms such as the use of ICT can readily display explicit knowledge through codification, i.e., the categorisation of knowledge enabling it to be embedded, stored and retrieved [27]. Stored knowledge can be further transformed into new explicit knowledge via sharing practices, which facilitates knowledge creation in inter-organisational collaboration [17, 28]. These shape the core interaction among internal processes of IOKE (Central Cycle in Figure 1). As these processes interact, new processes or phases emerge in IOKE (Outer Cycle in Figure 1) and mutually reinforce each other. For example, as knowledge is being explored or exploited, the structure of inter-organisational network [29], inter-organisational trust [30], and culture [31] are being (re)built and developed, which facilitate the contextual construction of IOKE. These interactive processes mutually shape the dynamic nature of IOKE.

3 The Role of ICTs for Inter-organisational Knowledge Exchange

ICTs are crucial for the dynamic nature of IOKE, as they strengthen the efficiency of IOKE practices [32]. To date, ICTs have been studied through different perspectives, as for example, the discrete entity, the ensemble, the structure, sociomaterial and the socio-technical perspective, among others. Orlikowski & Iacono [33] argue that these perspectives are the more prominent ICT-based ones for the study of organisational practices, such as IOKE. Over the years, these still remain the more influential ones among organisation studies. For example, Sarker et al. [34] argue for the relevance of the socio-technical perspective for studying organisations as being the “axis of cohesion in IS” (p. 700). Similarly, Hultin [35] argues for the sociomaterial approach and there

is a multitude of empirical studies leveraging it for studying organisations and organising [36, 37]. However, each of these perspectives emphasises different aspects of the IOKE process, influencing how the process itself and the role of ICTs are understood and interpreted. Through a narrative literature review approach, we pay attention on both historical and more recent studies that discuss IOKE from these ICT perspectives. In what follows, we discuss these perspectives in more detail (see Table 1 for an overview).

3.1 Discrete Entity Perspective

The Discrete Entity perspective treats ICTs as a discrete entity or object [38] that can stand apart from the IOKE process. ICTs can be classified by types (e.g., communication or computing technologies), and by applications (e.g., content management systems) [39]. ICTs constitute a distinct entity that is additional and affiliated to IOKE and interacts with various aspects of IOKE practices. The focus is on how ICTs, as solely an artefact with distinct characteristics, affect IOKE. For example, social media, being almost spatiotemporally agnostic, provide a digital platform for interaction and knowledge exchange across boundaries [40–42]. Email’s rapid communication and turnaround capabilities enable faster inter-organisational learning [43, 44]. Therefore, through the discrete entity perspective, ICTs are seen as independent tools, which actors in the social world (e.g., people, organisations, knowledge, relations) interact with within the IOKE process. In other words, ICTs in an IOKE context are seen as affecting IOKE practices by facilitating or inhibiting them, without any other influence on the practice itself. Under this perspective, the IOKE process can be conceptualised as being ICT-enabled, with ICTs being an add-on to the process.

3.2 Mutually Dependent Ensemble Perspective

The mutually dependent ensemble perspective conceptualises ICTs as “part of the complex process through which organising is accomplished” [38]. Studies normally emphasise the interplay between ICTs and organisations, e.g., how technology and organisations mutually depend on each other on the basis of their interactions [38, 45].

Work can be seen as an evolving process of shifting objects from one state to another, reflecting an iterative problem-solving practice where practical knowing is embedded in moving objects from their start state to their end state [46]. The flexibility of inter-organisational collaboration is a dynamic characteristic that changes over time, influencing individuals’ understanding regarding technology and affecting changes on the context of the collaboration [47]. In this light, ICTs are considered immersed and embedded in organisational practices, whereby ICTs, organisations, and humans are interdependent and associated with each other, shaping the IOKE process [45, 48]. In an IOKE context, the role of ICT is to interact with organisation and then together influence and shape the IOKE practices, where the emphasis is on the interaction between organisations and ICTs, such as how ICT affords or constrains user interaction for knowledge exchange [49]. Therefore, the mutually dependent ensemble perspective

views IOKE as an ICT-embedded process in which people and technology shape mutually dependent dynamic interactions that evolve practical knowing over time.

3.3 Structure Perspective

The perspective of ICTs as structure conceptualises technologies as embodied in social structures, such as rules and resources [50, 51]. Structuration theory [50] argues that social structures are constructed into technology by artefact designers and they are then appropriated by users as the latter interact with the technology [52]. Similar to the ensemble view, this perspective focuses on the interplay between technology and people that mutually shape the IOKE process. For example, Rosenbaum & Shachaf [24] argue that as people adapt various ICTs while interacting with online Q&A sites, their identity formation and maintenance is (re-)created through which the structure of the online community and participants' identity are co-constituted. However, this perspective emphasises the human-technology interactive nature of the IOKE process and how it is influenced by contextual structures, such as rules and routines, contrary to the ensemble perspective that emphasises objects, such as knowledge, interests and artefacts. For example, inter-organisational practices are viewed as recursive actions of the structural properties of the network where network agents, enabled or inhibited by rules, make sense of the situated context and convert meaning of ongoing actions to others [53]. According to this perspective, in an IOKE environment, organisations appropriate ICTs are appropriated and (re)produce social structures in IOKE practices. In short, IOKE is conceptualised as an ICT-embodied process in which people situated in the context appropriate social structures embodied in ICT artefacts through IOKE practices.

3.4 Sociomaterial Perspective

This perspective conceptualises ICTs with a materiality shaped by social practices [38]. ICTs are mutually related to other sociomaterial elements of the organisations and are materially constituted with actions in emergent practices of the IOKE. Therefore, all materiality should be considered as social, since it is created, interpreted and used in social processes [54]. Sociomateriality indicates an enactment of activities that blend materiality within social contexts [55] and thus, technologies are constituted through the imbrication of social and material agencies in practice (i.e., sociomaterial practice) [56, 57]. For example, the sociomaterial perspective conceptualises coordination as performed through the imbrication of diverse coordination technologies, inter-organisational knowledge transfer routines, and diversity of situations [7]. Learning is conceptualised as a matter of enactment of different knowledge resources, values, objects, and relations [58]. Sociomateriality, thus, challenges the separated ontological reality where ICTs are viewed separately from organisations and posits that all practices appear as the imbrication of technologies, humans and contexts [59]. In the IOKE context, the role of ICT is to intra-act with organisations within IOKE practices, and the focus is how sociomaterial facets (knowledge, ICT artefacts, inter-organisational relations, or-

ganisations) emerge, shape and are shaped by IOKE practices. Therefore, IOKE is conceptualised as an ICT-entangled process where sociomaterial facets are imbricated and entangled in the shaping of IOKE.

3.5 Socio-technical Perspective

This perspective sees ICTs as a system that combines both technical and social subsystems [54]. The technical subsystem refers to ICTs with materiality (i.e., the technological artefact), or sociomaterial practices. The social subsystem refers to the unfolding social constructions in relation to institutions such as social roles, power relations and hierarchies [54]. This perspective acknowledges the significance of sociomateriality but places the focus on the macro-level where the social subsystem exists. As such, studies adopting the socio-technical perspective focus on how the properties of a social subsystem (e.g., norms, rules, etc.) are reinforced through the imbrication of material and social agencies within the technical subsystem (i.e., ICTs) towards a 'joint optimisation' [54, 60]. For example, Silver & Markus [61] argue that an IT artefact's technical and social characteristics are equally important and together will shape its impacts. Geels [62] conceptualises dynamic patterns in socio-technical systems and examines innovation ecosystems where actors (people and artefacts) combine social resources and capabilities and interact within a network to create and deliver value [6].

In these studies, ICTs are conceptualised by considering the interactions between the technical and the social world, linking both the technical and social components that jointly shape the socio-technical system used in IOKE practices. In turn, IOKE can be seen as an ecosystem where technical and social subsystems of actors (human/organisation, knowledge, ICT artefacts) interact and mutually shape the IOKE process. Under this perspective, IOKE is conceptualised as an ICT-optimised process through which IOKE practices are shaped by the interrelated and joint optimisation of technical and social subsystems.

Table 1 Summary of the examined perspectives of ICTs

Perspective	How ICTs are defined	The role ICTs play	Implications for ICT-based IOKE
Discrete Entity	ICTs are a distinct entity that is an add-on and connected to the IOKE process.	The focus is on how ICTs as solely an artefact affect the IOKE.	IOKE is conceptualised as an ICT-augmented process, where ICTs are independent but facilitate or inhibit inter-organisational collaboration relationships or activities.
Mutually Dependent Ensemble	ICTs are a collection of additional resources that individuals are associated with, and highly embedded in practices.	The focus is on how ICTs and individuals interact, mutually evolve and change IOKE practices.	IOKE is conceptualised as an ICT-embedded process in which people and technology shape dynamic interactions that are mutually dependent and evolve practices over time.

Structure	ICTs are technologies embodied in social structures, e.g., rules and resources [50, 51].	The focus is on how ICTs and people interact to evolve the context of IOKE practices.	IOKE is conceptualised as an ICT-embodied process in which people appropriate the ICT-embodied social structures through IOKE practices.
Sociomaterial	ICTs are technologies with a materiality, shaped by social practices [38].	The focus is on how ICTs and actions are materially constituted and intrinsic to IOKE practices.	IOKE is conceptualised as an ICT-entangled process in which socio-material facets are mutually imbricated and entangled. Different sociomaterial facets (subjects, objects, inter-organisational relations, partners) of equal significance afford understanding of the IOKE.
Socio-technical System	ICTs as a socio-technical system that combines both technical and social subsystems [54].	The focus is on how ICTs link the technical world and the social world by affording a socio-technical system in which people, artefacts and social aspects interact to develop both social and technical aspects of IOKE practices.	IOKE is conceptualised as an ICT-optimised process where technical and social subsystems of actors (human/organisation, knowledge, ICT artefacts) interact and mutually shape the IOKE process. IOKE practices here are shaped by the interrelated and joint optimisation of technical and social subsystems.

4 Implications for Understanding Inter-Organisational Knowledge Exchange

While the previous discussion cannot be considered as an exhaustive presentation of the multitude of perspectives of ICTs within the context of IOKE, it offers a categorisation of the diversity of the field, through the analysis of how different ICT perspectives conceptualise ICTs, their role, and the IOKE process. It also shows that typically the focus is placed on the interaction among artefacts, people, knowledge, and relations in a certain context within a certain process. This suggests that adopting one of these perspectives may lead to disregarding that IOKE is the encapsulation and interaction of several processes, i.e., knowledge creation, sharing, storage, and application. These processes are not simply assembled together, but they interact with each other in order to inform knowledge exchange. This means that IOKE depends not only on the interaction of facets (e.g., entities, actors, ICTs), but on the interaction of the aforementioned processes. To the extent that ICTs play a role within each of these processes (e.g., for knowledge sharing), there will be an accumulated impact from all these processes on IOKE, forming and shaping it, but also shaping the way individuals and organisations participate in this process. Most crucially, depending on the adopted perspective for

investigating IOKE, scholars will be applying their own set of assumptions and interests shedding light on certain processes and obscuring or disregarding others, whereas the way ICTs are enmeshed within knowledge creation, sharing, storage, and application, individually and collectively, is focal for IOKE.

5 Conclusion

ICTs are increasingly used for inter-organisational collaborations, and thereby it is necessary to understand their role in IOKE from a more comprehensive perspective. This paper focused on exploring how some of the more influential perspectives of ICTs are typically applied within IOKE contexts to identify current limitations and challenges for a holistic understanding. While current perspectives of ICTs are diverse, each tends to focus on facets of the knowledge exchange process; hence an integrative view that addresses the role of ICTs and encapsulates the multiple interactive processes that shape the dynamic nature of IOKE is missing. We posit that this is something that warrants further future research. Exploring how ICTs shape and are shaped by the interactive processes of IOKE, particularly across dimensions such as the temporal one, is of interest, especially now as we move faster towards increasingly digitised societies and organisational practices as a result of intense digitalisation.

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