



Knowledge dilemmas within organizations: Resolutions from game theory

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ABSTRACT

The knowledge management literature suggests that an organization's knowledge ecosystem is comprised of strategic situations in which the individual behaviors of its knowledge workers show potential conflicts with what would be optimal for the organization. This paper aims to explore how such behaviors in terms of knowledge flows may be modeled and analyzed using a game theoretic approach. While prior research has investigated some use of game theory in knowledge management, a comprehensive understanding of the organizational eco-system remains unexplored. Hence, a qualitative inductive approach was adopted in order to pursue the exploratory nature of the research question. Critical reviews of key literature in both knowledge management and organization theory identified four organizational knowledge dilemmas – “silos of knowledge”, “tragedy of the knowledge commons”, “knowledge friction” and “knowledge toxicity”. These dilemmas were used in various combinations to generate five commonly occurring scenarios in organizations. A game theoretic analysis of these scenarios using the PARTS framework provided a useful understanding of knowledge flows within organizational eco-systems. More specifically, the analysis led to key insights and prescriptive guiding principles in formulating knowledge strategies and policies to combat the major knowledge dilemmas that inhibit effective knowledge flows within organizations.

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1. Introduction

In today's complex and globalised market economy, organizations view knowledge as one of the most valuable and strategic resource and strive to manage it in order to derive competitive advantage [91,46,32,68,89,10,84]. Knowledge sharing thus becomes a key differentiator of success. As Boer et al. [9] state: “It is a key process in creating new products and services, in leveraging organizational knowledge assets and in achieving collective outcomes.”

Hence, over the last two decades, knowledge management (KM) has drawn considerable interest as a discipline of study in the academic arena and practice in organizations. Despite the successful inroad of KM into leading organizations, numerous scholars have noted the various challenges associated with effective knowledge exploitation (c.f. [4,5,8,18,24,26,35,41,42,47,61–63,68,72,79,91,92,95]). There is also considerable agreement in the literature that while organizations make significant investments on technology and tools to promote knowledge sharing, this is neither necessary nor sufficient as behavioral, cultural and structural aspects are the primary determinants of success. Indeed the findings of a major study of 431 US and European organizations conducted by a consulting firm (and cited by Ruggles [78]), reveal that the most

challenging task of KM is to change behaviors relating to knowledge creation and consumption. As some have argued, knowledge sharing is often held as “unnatural” [23]. More specifically, a review of the KM literature suggests that the organizational knowledge transactions are ridden with tensions between the perceived self-interest of an individual and the cooperative gain for the group or community [60,14,20]. Organizations that ignore such tensions in knowledge flows would be ineffective in achieving their KM objectives [100].

Knowledge flows refer to the links between creation and consumption and occur at two levels – the intra-organizational flows confined to the boundaries of the organization and inter-organizational knowledge flows that extend beyond the enterprise and involve external entities such as suppliers, alliances, business partners, competitors and industry regulators. The nature of relationships, strategic motivations, situations of usage in inter-organizational and intra organizational knowledge flows are distinct and therefore, study of these two knowledge ecosystems entails different considerations. In order to manage the scope of paper, this study is limited to the intra-organizational flows and future research with an inter-organizational knowledge flow perspective is highly recommended.

In this paper, we address the issue of tensions in knowledge flows within organizations. Specifically, we identify some typical knowledge dilemmas and attempt to resolve them using the analytic lens of game theory. The next section introduces the notion of knowledge flows in organizations and a description of four

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major knowledge dilemmas. Section Three is a background review of game theory and its application to KM. In Section Four, five typical organizational scenarios, made up of a combination of dilemmas, are introduced and resolved using game theory. The paper concludes with the key findings and implications of the study in prescribing some design rules for organizational knowledge management strategy in Section Five.

2. Knowledge flows in organizations

The dictionary meaning of “dilemma” (Websters, n.d.) suggests a situation necessitating a choice among apparently undesirable alternatives. The organizational knowledge ecosystem comprises situations where agents, as creators and consumers of knowledge, make strategic choices to derive the best possible outcomes for the organization. Mutual dependence of such choices might result in outcomes with undesirable utilities for some or all the stakeholders. In order to capture and articulate the essence of such complexity of decision making in knowledge situations, this paper introduces the notion of dilemmas in the knowledge ecosystem. These dilemmas affect the outcome of organizational knowledge initiatives to a great extent. Therefore, in an organizational context, a specification of the dilemmas is necessary in order to combat them effectively.

An extensive review of the KM literature provides a vantage point to some of the organizational dilemmas related to the knowledge ecosystem. These dilemmas may be specified through multiple perspectives and levels such as strategic, implementation, cultural, economic, and political. This section of the article identifies some key knowledge dilemmas that characterize conflict of interest situations among agents of the organization. Using such a criterion, four key dilemmas of organizational knowledge ecosystems, summarized in Table 1, are identified and described below.

2.1. Silos of knowledge

Knowledge flows in organizations depend heavily on creation of new knowledge through voluntary contribution and transfer of such knowledge through sharing throughout the organizational to be utilized as needed. However, possession of knowledge is associated with a sense of holding power that knowledge agents may not be willing to share such assets. Instead they make choices on investing limited time and efforts in exchanging knowledge, based upon perceived self-interests [24]. Accordingly, knowledge sharing situations reflect conflict of interests, where individuals make strategic choices on whether to contribute or hoard their knowledge depending on the perceived benefits from the exchanges.

Asymmetry of information in knowledge exchanges can also propagate inefficiency in the knowledge ecosystem [24,94,47]. Such asymmetry of information affects the perceived value of knowledge by the recipient and consequently the effectiveness of the knowledge flow. Lin confirmed such asymmetric information structures as a dimension of relationship between the agents of knowledge flows [58].

Knowledge exchanges often take place with incomplete information between the two parties; that is, the knowledge seeker and the knowledge provider [24]. There are operational inefficiencies in knowledge transfer as the nature of knowledge and its value is uncertain in the sharing stage. The three problem areas, taken together, contribute to a dilemma that affects the process of knowledge creation and sharing in the organization; producing pockets of disjointed knowledge. Such a dilemma is hence considered “silos of knowledge”.

2.2. Tragedy of the knowledge commons

Organization knowledge, with its non-excludable and non-rival characteristics, is best considered a “public good” or “commons”. As with any other public good, is susceptible to underinvestment. Since the consumption of knowledge can be enjoyed without any corresponding contribution, the benefit maximizing strategy for any agent in the organization is to “free ride”. This individual rationality leads to a sub-optimal outcome for the organizational knowledge ecosystem and poses a social dilemma [14]. Such a social dilemma in turn leads to a paradoxical situation where individual rationality towards maximizing self-interest leads to collective irrationality in over-exploiting common resources like public goods, producing a sub-optimal outcome for the organization as a whole [53]. This is identical to the “tragedy of the commons” situation for shared public goods, described by Hardin [48] and later popularized by Lessig [55]. Borrowing the concept, such an organization dilemma may be labeled as the “tragedy of the knowledge commons”.

2.3. Knowledge friction

Several scholars have observed that knowledge resides in organizational agents and their tools, tasks, and networks. Transfer of such contextual knowledge is difficult (cf. [5,86,21,90]). Intra-organizational knowledge flows are impaired by the formal hierarchical structure of the organizations [93]. Knowledge initiatives that focus on transfer and adoption of organizational assets and practices fundamentally encapsulate change management agendas. As with the case of most change management programs, organizations have replication and adoptions issues across business units and with their partners [90,69]. Motivational dispositions like the

Table 1
Four key knowledge dilemmas.

Dilemma	Related challenges within knowledge ecosystem
1 Silos of knowledge	A concept of power being associated with possession of knowledge, the dominant individual rationality is to retain monopoly of knowledge through hoarding [20]. In multi-unit organizations, asymmetry of knowledge repositories, authorities, structural and cultural dispositions among the units, can result in poor knowledge flows [93,45]. Additionally, asymmetry of information in knowledge exchanges impairs knowledge flow in organizations [24]
2 Tragedy of the commons	Knowledge is considered to be a public good with its “non-excludable” and “non-rival” characteristics. Individual rationality of enjoying the benefits of knowledge without any contribution makes it susceptible to underinvestment and free-riding [48,14]. Such free-riding results in a sub-optimal outcome for the knowledge ecosystem as a whole
3 Knowledge friction	While organizations pursue benchmarking their knowledge and replication of their superior practices within their boundaries, such transfer of knowledge may be inhibited by contingency factors such as similarity of context, motivational dispositions, strength of relationships and absorptive capacity [90,69,5,73]
4 Toxicity of knowledge	Possession of knowledge can generate biases in the organizations that prohibit learning from contradictions or past failures and replenishing their old knowledge stock. Such biases severely impair organizational performance [10,31,63,17]. Moreover, knowledge may be used in organizations may pursuing self-serving and political agendas that endanger organizational reputation and stability [4,13]

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