Borrowed theory: applying exchange theories in information science research

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Abstract

This article discusses the applicability of "borrowing" theory originally developed in other disciplines to information science research, and, in particular, the analytical concepts and assumptions of social exchange theory as a framework for exploring motivational factors of knowledge sharing in large, distributed, information-intensive organizations. Social exchange theory relates to sociology, psychology, and anthropology, and the article indicates the extent to which knowledge has been regarded as an "exchange resource". This is followed by an analysis of previous work that has tied exchange theory to areas of interest to information scientists. An ongoing research project tests the analytical concepts and assumptions of social exchange theory in a knowledge market, and the potential for such work to generate further theory.

1   Introduction

It is not uncommon for researchers to explore the application of a theory derived from beyond their home domain to facets of their own research, or to use tools that have been developed in another discipline to support their projects. For example, in the field of psychology such

practice is crucial in areas such as behavioral science: studies on human decision making should draw on economics as well as on psychology and neuroscience (Levine, 2001). Other work reveals unexpected applications of methods from one discipline to another. For example, Harden (2000) shows how tools from literary criticism can be applied in nursing research by treating data collected from patients as autobiographies narrated to a listener, rather than as case histories reported to a health care professional.

In multi-disciplinary fields, such as information science, engagement with theory originally derived elsewhere, and the importing of tools from different domains, is important. Information scientists have used theories emanating from subject areas as diverse as linguistics and the natural sciences in their research work. This practice ventures beyond mere intellectual tourism. Indeed, that such practice might generate practical solutions to real problems serves as justification of the approach. To an extent it might be argued that "borrowed" theory is a tradition of information science. It is employed to systemize concepts and understandings into "new" theory, or a version of existing theory from an information science perspective.

This article discusses the applicability of "borrowing" a theory originally developed from a branch of economics - social exchange theory - to information science research. In particular, it considers how social exchange theory might provide a framework for exploring the mechanics of knowledge sharing in large, distributed organizations. The context for this discussion is set with a short summary of exchange theory, social exchange theory, and gift economies. Following discussion, earlier work that has relates exchange theories with knowledge sharing is analyzed. Examples of work in information science that can be allied with social exchange theory are then provided. The article concludes with comments on a research project that intends to test the applicability of the analytical concepts and assumptions of social exchange theory to knowledge markets, and the potential for such work to generate further theory[1].

2   Exchange theory and social exchange theory

Exchange theory, which derives from economics' rational choice theory and the study of relationships and "exchanges", argues that individuals evaluate alternative courses of action

so that they get best value at lowest cost from any transaction completed. There are various forms of exchange theory[2], but all have in common the same analytical concepts and assumptions (see Table 1).

Insert Table 1 here

Within a network, actors initiate exchanges with other actors who control resources that are valued. The dependent relationships that support these exchanges are known as exchange structures. Initiations that produce greater value increase in frequency. The reverse applies in low value interactions. Changes in the value of a formed relation effects change in the relationship. If the value falls to zero, for example because there are "free riders" in the system (Dyer & Nobeoka, 2000, p. 349; Weisband, Schneider, & Connolly, 1995, p. 194) the relationship ends (Molm, 1997, p. 20; Scott, n.d., para 20).

2.1 Contributions of economics, anthropology, sociology and psychology to social exchange theory

Molm (2001) explains that "the philosophical roots of social exchange begin with the assumptions of utilitarian economics, broaden to include the cultural and structural forces emphasized by classical anthropologists, and enter sociology after further input and modification from behavioral psychology" (p. 262). In spite of having antecedents in economics, there are several significant ways in which social exchange theory differs from classical microeconomic theories. First, it deviates from exchange theory of economics because social exchanges are connected to long-term social relationships that occur within communities, whereas "in the market or trading sphere of material life, exchanges are anonymous and socially disarticulated" (Gudeman, 1998, p. xii). Economic exchanges depend largely upon contractual obligations, rather than lasting bonds between individuals or groups of people. Second, the emphasis on social structure, as the specified framework in which exchanges operate and the resultant structural change created through exchange processes, distinguishes social exchange theory from other perspectives in psychology and economics (Molm, 1997, p. 12). It is also worth noting that from the outset social exchanges depend on trust and, in time, generate "a spiral of trust" (Blau, 1964, p. 71), not least because

the value of what is exchanged, and the return on the exchange, are not readily anticipated (Jarvenpaa & Staples, 2001, p. 153).

The various disciplines of sociology, microeconomics, behavioral psychology and anthropology (in particular, the branch of anthropology known as *economic* anthropology) have developed "flavors" of social exchange theory: their articulations of the theory differ. First, each makes assumptions about actor behavior in studies of exchange. To a greater or lesser degree the "rational actor model" (the assumption derived from microeconomics that actors cognitively weigh potential costs and benefits of alternative exchange partners and action) is followed. Similarly, a "learning model" derived from behavioral psychology may be adopted. In this case it is a given that, when making an exchange, operant actors reflect costs and benefits of past behavioral choices without consciously weighing the alternatives. Second, each of the noted disciplines shows a different degree of interest in the three specific exchange structures: (1) direct exchange where two actors are dependent on one another; (2) generalized exchange where there are more than two actors and reciprocal dependence is indirect; and (3) productive exchange where both actors must participate in order to benefit, for example in co-authoring a book (Molm, 2001, p.261).

Over time social exchange theory has been modified and extended. For example, the early work by sociologists examined relations between two parties, whereas current work explores how the possibility of setting up exchange relations with a number of partners impacts power, coalition formation, and related processes in the context of larger network structures (Molm, 2001, p. 260). Molm (1997) points out that, "In contrast [to interest in reciprocal relations of classical exchange theorists], most contemporary theorists study exchanges that are negotiated through explicit bargaining" (p. 27).

Social exchange theorists and economic anthropologists have long been noted as sharing similar perspectives. In 1970, it was observed that "sociological exchange theory shades into economic anthropology in a rather imperceptible way" (Anderson, Berger, Zelditch & Cohen 1970, cited by Emerson, 1976, p. 337). Economic anthropologists discuss exchanges under the label of the "gift economy". They argue that gift giving supports the circulation of goods that are fundamentally different from those analyzed by economists, and that the associated

rituals of gift giving provide insight on group values and behaviors. Unlike economic exchanges, gift exchanges should not involve explicit bargaining, but they generate strong social obligations (Bergquist & Ljungberg, 2001, p. 313). Any gift exchanged represents more than the physical item per se because it is imbued with the knowledge that it is presented by someone with whom the receiver has an ongoing emotional relationship (Kollock, 1999, p. 221). The understanding of the significance of the "deal" may be quite different for each party (Galison, 1997, p. 803). The act of presenting a gift means much more than a simple transaction between actors. For example, it indicates levels of mutual regard and respect of the parties, and the power relationship that they share.

Malinowski (1922) set the theoretical underpinnings of the gift economy in the early 20th century through his description of the "kula". This complicated exchange economy supported tribes who traded precious objects in Papua New Guinea. Mauss subsequently developed a fuller systematic study of the custom of gift-giving in "primitive" in *Essai sur le don* (*The gift*) (Mauss, 1925, 1990 trans), which became classic in anthropology and continues to be held in high regard (Parry, 1998, p. 143). He argued that the traditions of gift giving are governed by specific rules that impact the relationships and inter-dependencies of social groupings. Table 2 presents key social exchange theorists, their domains and dominant themes.

Insert Table 2 here

2.2   Contemporary work with social exchange theory

Since the 1970s, the themes of power (including bargaining, reward, and punishment power) and explaining structural change through the examination of the structure of relations, including coalitions and seeking alternative partners, have become dominant in sociologists' interests in social exchange theory (Molm, 2001, pp. 260, 270). Much of this research (e.g. Janssen, 2000) refers back to Blau (1964). Some theorists have devised experiments to predict social exchange activity and its impact under a range of conditions (particularly with reference to power relationships). Others, e.g. Nooteboom, 1996, have used social exchange theory as a starting point for examining related areas such as commitment, trust, and affective

ties. Research on the link between leadership and empowerment in the workplace (Keller & Dansereau, 1995) or power over corporate governance (Westphal & Azajac, 1997) might also be cited as examples of work related to these dominant themes. Elements of exchange theory also emerge in guises which use different terms. For example, Watson (2000, pp. 25-28) discusses "strategic exchange" as a strategy for managers to shape the future of their organizations.

Contemporary anthropologists continue to study gift economies in non-capitalist societies referring back to the work of Mauss (e.g., Gregory, 1981; Maschio, 1998; Racine, 1994). These studies are not limited to the examination of "primitive" groups. Indeed, the impact of gift economy values on modern life are discussed in general (e.g., Harrison, 1993; Sjostrand, 2001), and with reference to particular contemporary issues (for example Cooper, 1995; Goddard, 1995; Werbner, 1990). Like their colleagues in sociology, contemporary economic anthropologists are also interested in power relationships (see, e.g., Middleton, 2001; Rumsey, 1999; Yang, 1989). The implications of what is understood from the study of gift economies now extend beyond the boundaries of economic anthropology. For example, the traditions of ceremonial exchange are of interest to archaeologists to explain the discovery of ancient artifacts distant from their point of manufacture (McNiven,1998).

Molm (2001, p. 268) has suggested that the long-neglected concerns of the classical social exchange theorists should be revisited. These include risk and uncertainty inherent in exchange (partially generalized exchange and reciprocal exchange); trust and commitment; the emergence of affective ties between exchange partners and their ability to transform the structure and form of exchange; and the relation between structure and agency.

3 Exchange theories and knowledge sharing: previous studies

3.1 Studies of knowledge sharing without acknowledgement of social exchange theory

A number of studies, some of which are described below, have adopted the ideas of social exchange theory and linked them to the processes of knowledge sharing. Many do so *without acknowledgement of social exchange theory*, yet they discuss knowledge sharing employing the vocabulary of exchange and/or social exchange. Numerous examples exist in discussions of communities of practice. For example, Huberman and Hogg (1994, pp. 2, 3) present a "detailed model of collaborative performance enhancement and examine its dynamical consequences for the community as a whole" with direct reference to informal networks supported by incentive schemes as facilitators of learning and problem solving "enhanced by exchanging information". This approach is also illustrated in several papers presented at a recent conference *(Proceedings of the Third European Conference on Organizational Knowledge, Learning and Capabilities,* 2002*)*, for example work presented on inter-organizational communities of practice (Huang, Newell, & Galliers, 2002)*.* Similarly knowledge sharing as "exchange" is described in the context of studies of collaborative software development (e.g., Lerner, 2001; Scott & Kaindl, 2000, p. 119); economic self-interest in electronic discussion groups (Gray & Meister, 2001); intranets as tools for knowledge transfer (e.g., Hendriks, 1999; Newell, Scarbrough, & Swan 2001); the creation of models of knowledge transactions in computer-mediated networks of practice from a social capital perspective (Faraj & Wasko, c2001); and the development of a knowledge sharing typology based on empirical research with management consultancy firms in Denmark (Jacoby Petersen, & Poulfelt, 2002). A study of decision support systems in health care administration in the U.S. set against the context of distributed knowledge management acknowledges the concepts of exchange (Pedersen & Larsen, 2001).

3.2 Studies that employ social exchange theory with limited discussion of knowledge exchange

Some studies that employ social exchange theory as a framework provide *limited* discussion of exchanges of *information and knowledge*. Examples identified include work that treats knowledge as an exchange resource (e.g., Wayne, Shore & Liden, 1997); recognizes knowledge as a contributor to the innovation process (e.g., Janssen, 2000); explicitly ties shared social capital with management performance, where social links are considered "a conduit for rich information exchange" (Galunic & Moran, 2000, p. 3); employs social exchange theory to analyze processes that encourage and inhibit word-of-mouth information flows (e.g., Frenzen & Nakamoto, 1993); examines the role of knowledge exchange as a success factor in outsourcing relationships (e.g., Kern & Willcocks, 2000); and considers the philosophical underpinnings of the gift economy to discuss classroom interactions between pupils and pupils and teachers in pedagogic research (Jardine, Clifford, & Friesen, 2000).

3.3 Studies of knowledge sharing that employ social exchange theory

As will be illustrated below, some writers, most notably from the disciplines of management and organizational studies, and information systems, have also started to look more closely at knowledge sharing with *explicit* reference to social exchange theory. Chapter 2 of the business text *Working knowledge* (Davenport & Prusak, 1998) provides an overview of the main themes. It relates social exchange theory with knowledge sharing in a knowledge market populated by a network of actors trading resources supported by adequate infrastructure (Davenport & Prusak, 1998, pp. 25-52). It is also worth noting that, by 2001, the relevance of social exchange theory to knowledge management had reached the professional knowledge management press, albeit in diluted form (e.g., Tiwana & Bush, 2001). Individual *research* papers that treat knowledge sharing as a primary interest (rather than an incidental as is the case of the examples in 3.2 above) are outlined here.

Writing from an organizational studies perspective, Nahapiet & Ghoshal (1998) argue that exchange is one of two processes that result in the creation of all new resources. The other is

combination, for which exchange is a pre-requisite (Nahapiet & Ghoshal, 1998, paragraph 32). Nahapiet & Ghosal (1998) discuss certain conditions that need to be satisfied for exchange and combination to take place, namely that: (1) "the opportunity exists to make the combination or exchange" (para 37); (2) "those parties must expect such deployment to create value" (para 38); and (3) "those involved must feel that their engagement in the knowledge exchange and combination will be worth their while" (para 39). This matches the analytical concepts and assumptions described in Table 1 where condition (1) relates to *exchange processes* and conditions (2) and (3) relate to *exchange resources*. They also discuss the concept of the "knowledge market" where knowledge sellers calculate whether it is worth sharing their knowledge with a knowledge buyer, and knowledge buyers work out whether they are able to offer something in exchange such as help in the future. In this knowledge market exchanges make social capital as well as intellectual capital: "social capital is created and sustained through exchange … social capital facilitates exchange" (para 41).

Staff at the IBM Institute for Knowledge-based Organizations are also interested in the creation and benefits of social capital. Using an initial framework partially informed by social exchange theory research, they have carried out research under the auspices of the "Social capital: networks" project. This work concludes that the whole network's ability to create and share knowledge is dependant on individuals' meta-knowledge of network members' expertise; ready access to such expertise; the willingness of members to actively engage in problem solving and the ease with which safe relationships can be formed (Cross, Parker, & Prusak, 2000). In a similar way, earlier research on knowledge transfer and social exchange theory has formed a platform for the examination of features of knowledge embeddedness (e.g. absorptive capacity, network capabilities and collaborative know-how) in international strategic alliances between firms (Neilsen, 2001). In a study of new product development in high technology firms Thomson & Heron (2002) consider knowledge sharing activity that contributes to the output of knowledge creation as desirable organizational citizenship behavior. This paper highlights how social exchange theory has been used in the past to support the argument that employers and employees need a precise understanding of their obligations to one another in order to create positive psychological contracts at work (Thomson & Heron, 2002, p. 3).

Research by Constant, Keisler and Sproull (1994) refers explicitly to social exchange theory, advocating support for an exchange and expressive theory of information sharing. The goal of this work was to understand the factors that encourage and inhibit information sharing in organizations that make extensive use of technology. Their work has since been extended. In greater detail, Jarvenpaa & Staples (2000) consider contextual aspects of information and knowledge sharing such as the information culture of organizations and task interdependence of individuals. They express surprise that few others have built on Constant et al.'s work and explain that they found "very few articles that make reference to the Constant et al.'s theory of information sharing and have been unable to locate any substantive extensions to the work" (Jarvenpaa & Staples, 2000, p. 148). It is likely that, when Jarvenpaa and Staples were conducting their literature search they would only have had knowledge of five earlier papers published between 1996 and 1998 [3]. They claim that the "Constant et al. theory is an important piece of work that has yet to receive the attention that it deserves in information and knowledge management literature" (Jarvenpaa & Staples, 2000, p. 148). Their own later investigation of factors that determine perceptions of the ownership of information and expertise, and the impact of such "property rights" on individual propensity for knowledge sharing, with direct acknowledgement of social exchange theory, addresses their remarks on the importance of the earlier work (Jarvenpaa & Staples, 2001). The results of this later study reveal that knowledge sharing in a university setting is more likely to occur when individuals hold strong beliefs of organizational ownership of their information and expertise (Jarvenpaa & Staples, 2001, p. 165).

Recently a number of studies by a wider range of researchers have advanced the argument for considering social exchange theory in information systems work. For example, a prototype for actualizing social exchange theory to encourage knowledge exchange in virtual communities of practice has been designed with encouraging results (Tiwana & Bush, 2000). Ba, Stallaert and Whinston (2001b, pp. 230-231) preface a discussion of a proposed research agenda for incentive-alignment in information systems design with a consideration of the concepts of social exchange and gift economies. This introduction is followed by a critique of the concept of the "knowledge market" (pp. 232-233). They conclude that "[e]conomic findings need to be factored into the design of knowledge management technologies" to facilitate

knowledge sharing (p. 233), while conscious of the difficulties of identifying the appropriate theoretical mix to support such work (p. 236). In another article they outline the design of a mechanism for knowledge trading within an organization. This takes into account economic incentives as drivers of management decisions (Ba, Stallaert & Whinston, 2001a). Bock & Kim (2002) have reported on a survey of 467 employees of four large public organizations designed to discover determinants of knowledge sharing behavior. Their research model drew partially on the constructs of social exchange theory. Their findings reveal that a positive attitude towards knowledge sharing, rather than anticipation of reward, is the more significant motivational factor of knowledge exchange (Bock & Kim, 2002). Matzat (2001a, p. 243) makes several conclusions in recent doctoral work on the benefits of academic Internet discussion groups, highlighting discipline differences in their operation and factors that determine their success (including levels of collaboration). This is done with reference to Blau's discussion of patterns of help in exchange for enhanced social status (see section 2 above) (Matzat, 2001b, p. 157). The exchange resource of reputation gain is found to be a greater stimulator of discussion group participation than any reciprocal information exchange between members (Matzat, 2001a, p. 249). Similar studies in the information systems domain are proposed. For example, there are plans to investigate reciprocal information sharing in virtual communities with reference to social exchange theory with recognition of knowledge as a public good created, held and exchanged in social groups (as discussed by Brown & Duguid, 1991) (Desouza, c2001, p. 4).

There is also growing interest in the knowledge sharing motivations of members of the open source community, i.e. those who create software in their own time and make it available to the public in source code form [4]. According to classic exchange theory open source software should not exist (Lerner & Tirole, 2001, p. 3). Von Krogh (2002) has proposed that those researching the activity of the open source community should look to anthropology for explanations of the willingness of some of the world's best programmers to share their expertise, seemingly without reward, for the public good. To do so would be to follow the example of researchers in organizational learning, who are conscious of how cultural anthropology provides distinct contributions to and concepts of problems in their subject

domain (Easterby-Smith, 1997). Indeed, the work of Mauss (1925) is considered by Czarniawska (2001, p. 121) to be the "anthropology of knowledge".

Von Krogh's suggestion has been already anticipated by Kollock (1999) and Bergquist and Ljungberg (2001). Kollock (1999, pp. 221-222) prefaces his discussion of online co-operation through generalized exchange with a discussion of the gift. Bergquist & Ljungberg (2001) have written about the importance of gift economies in open source communities (and, to a lesser extent, academic research communities) to facilitate openness, relationship building, and, ultimately, the sharing of knowledge to lead to high quality innovations. While they draw important parallels between the work of economic anthropologists such as Mauss (1925) and the activities of the open source community, they point out a number of limitations. For example, they explain how the scarcity and cost of transaction of *material* objects contrasts with the ease of replicating and distributing *digital* products. They demonstrate how Mauss' argument that the recipient of the gift is subordinate to the giver can be reversed when the act of gift refusal indicates superiority. Digital gifts, they argue, are regularly "given" to no one in particular (and technically not "received" until someone actually makes use of them), and that gift value is calculated on of the basis of the amount of attention it receives from potential users and actual use (Bergquist & Ljungberg, 2001, pp. 309-314). A recent paper proposes that degrees of "ownership" in inter-organizational networks might be better understood if the network links were investigated as relations in a gift economy (Carlsson, 2002, p. 9).

4   Exchange theories and information science

The previous sections have demonstrated that social exchange theory has served as backdrop to research in a number of subject area domains. However, as is the case with the discipline of information systems, it would appear that social exchange theory has not yet been discussed widely in the context of information science [5].

It is believed, however, that, although research in information science is not generally situated with social exchange theory, information science is a discipline that addresses issues of

relevance to its concepts and assumptions. For example, studies of scholarly communication represent it as a social process where actors share information and have social relationships through research communities and invisible colleges (Borgman, 2000, p. 144). Research on the processes of scholarship consider how and *why* scholars publish (Meadows, 1998) and citation analysis refers to the social connectivity of researchers and the impact of this on the development of knowledge bases (Bergquist & Ljungberg, 2001, p. 318). Aspects of these scholarly relationships, such as trust as a basis for co-operative work (Davenport & Cronin, 2000), it might be argued, depend to a degree on social exchange as is described above.

There is a body of research by information scientists on information sharing across networks. One of the best known researchers in this area is Haythornthwaite (n.d.) who "addresses information exchange in computer-mediated environments – who talks to whom about what and via which media – and how these information exchange support or constrain group activities such as accomplishing work goals, achieving community, and engaging in the co-construction of knowledge" (Haythornthwaite, n.d, paragraph 1). Her approach "considers the *interactions* (social network "*relations*") that occur between people as the building blocks that determine social behavior. It is not an individual's behavior, but rather their [sic] behavior with others that is the important unit of analysis. Thus to understand how people work together, form communities or gain access to information, it is necessary to examine the types of interactions they engage in. The interactions show us patterns, and the patterns reveal how social groups organize themselves to accomplish certain goals" (Haythornthwaite, n.d, paragraph 2). This approach – social network analysis (Haythornthwaite, 1996) - has various links with social exchange theory. Several theorists take positions in both camps, in particular the anthropologists and, from sociology, Homans, Emerson, and Cook (see Cook, 1982, p. 178). Social exchange theory has influenced the development of social network analysis: "developments in social network analysis already point the way to novel frameworks of sociological theory, or to the reassertion of earlier theories. Advocates of an exchange theoretical perspective on social networks" have been particularly influential (Scott, 2000, p. 37). In the past exchange theory was identified as a "possible source of "grounding" for a development theory of social networks" (Cook, 1982, p. 195).

Scholarly acknowledgement has been observed in the information science literature as a form of gift giving: "we might think of gift giving and reciprocation in the context of scholarly communication as being modulated by social relations" (Cronin, 1995, p. 107). Acknowledgements are gifts given in recognition of earlier gifts of help (Cronin, 1995, p. 18). This analysis is set within the context of the work of the anthropologist Mauss (see Table 2 above). Cronin (1995) also demonstrates how the expectation of exchange motivates collaborative working in the research environment as summarized in Table 3.

Insert Table 3 here

Other reasons for collaboration include access to sources of funding. Often this is a requirement of research bids. Practitioners in certain disciplines, most notably biotechnology, can only progress their research through collaboration (Cronin, 1995, pp. 7-8). Although not stating it explicitly, Cronin describes exchange processes where there are actors (*collaborative researchers*) in exchange relationships (*predominantly direct and and/or productive*) who exchange resources (*motive for collaboration*).

More recently in a study of knowledge sharing across distributed computing support staff at a university, Sawyer, Eschenfelder, and Heckman, (2000) made direct reference to social exchange theory, and also to the work of Constant, Kiesler and Sproull (1994).

5   Applying the concepts and assumptions of exchange theories to knowledge exchange

Table 1 described the analytical concepts and assumptions of exchange theories. The assumptions related to the concepts of exchange actors, the exchange network, exchange structures, and exchange processes can be envisaged relatively easily in an organizational setting. The term "exchange resource", however, in the form of knowledge, merits further discussion. Although original social exchange theory did not take into account information or knowledge as an exchange resource (Jarvenpaa & Staples, 2000, p.132), this is now the case. If it is assumed that knowledge is a private good then it is up to the owner of that good to decide whether to share it or not. To entice people to share their knowledge, in terms of a

social exchange transaction, these *actors* need to be persuaded it is worth entering into a *transaction* in exchange for some kind of *resource*. Boisot & Griffiths (1999) explain that "the capture of knowledge involves more than simply making it easier for employees to articulate their idiosyncratic experiences and know how. It involves creating an incentive structure making it worth their while to do so" (Boisot & Griffiths, 1999, p. 662). To some, this is a high priority management objective (Pedersen & Larsen, 2001, p. 142).

Earlier work (Hall, 2001a) explored the theme of incentives for knowledge sharing and has classified one set of incentives as rewards, breaking these down into two categories: (1) explicit/hard and (2) soft rewards. These rewards articulate well with the concept of the exchange resource and might be labeled as "currencies" of exchange. Table 4 summarizes rewards as incentives for knowledge exchange as they might be applied in a corporate environment.

Insert Table 4 here

Factors other than rewards have also been identified as incentives for knowledge sharing (Hall, 2001a, pp. 140-142). These enabling conditions can be designated as "infrastructure": (1) social infrastructure (Davenport & Hall, 2001, p. 3; Davenport & Hall, 2002, p. 201); (2) technological infrastructure; and (3) boundary infrastructure. If the concept of the "knowledge market" is adopted, then these conditions form the environment in which the trading takes place (see Figure 1). The knowledge market is populated with actors who may play one or more roles: knowledge buyer, knowledge seller and/or knowledge broker. When a deal is struck between a buyer and a seller, two sets of knowledge can be traded as a straightforward swap, or knowledge can be exchanged for other "currencies" such as money; career advancement/security; enhanced reputation or personal satisfaction. These currencies map on to rewards as incentives listed in Table 4. The knowledge market itself needs to be supported by adequate infrastructure. These "frame" the knowledge market in Figure 1 and are listed with examples in Table 5. [6]

Insert Figure 1 here

This second set of incentives is summarized in Table 5.

Current work explores whether social exchange theory can be extended without modification to knowledge sharing practice within large, distributed, information intensive organizations. It builds on earlier studies of knowledge sharing over computer networks (e.g., Faraj & Wasko, c2001; Jacoby Petersen, & Poulfelt, 2002; Newell, Scarbrough, Swan, & Hislop, 1999; Newell, Scarbrough, & Swan, 2001; Pedersen & Larsen, 2001; Scott & Kaindl, 2000) in focusing on the role of the corporate intranet as a tool of designated KM staff as agents of knowledge exchange. In terms of its position in the tradition of social exchange theory development, the work hopes to address some of the issues that have been neglected in recent years, such as the power of reciprocity and issues related to generating trust.

Given that previous work hints that social exchange may be a driver of knowledge sharing, it is anticipated that the work will highlight how social exchange theory might contribute to an understanding of knowledge management in general, and knowledge sharing in particular. Findings will thus point to the applicability of the concepts summarized in Figure 1. For example, it may be the case that knowledge sharing is perceived as a form as gift giving in line with the anthropological tradition, albeit that such "gifts" are not material objects. Similarly, research into the productive exchange processes observed in case studies will aid theory development along lines that can include corporate entities as "collective" actors in exchange networks, since corporate groups typically form to facilitate productive exchange (Cook, 1982, p. 195) for company profit. Whether actors "learn" exchange behavior in their knowledge-sharing interactions as a result of experiencing the reward and/or punishment consequences of earlier actions, or need to be socialized into exchange processes (Bergquist & Ljungberg, 2001, p. 306) will also be of interest. Individual and group perceptions of the exchange resources, levels of commitment to exchange partners and the enabling conditions (e.g. network factors - personal and formal networks, and network position – and/or the means by which knowledge management is introduced into an organization) will be examined. Ranking data of individual aspects, or combined factors, may lead to an understanding of the relative importance each element. Such research, concerned with borrowing theory and then testing it, may serve to develop new theory on knowledge sharing in distributed organizations. It

responds to calls to draw on the knowledge of various disciplines to explain activity in another. For example, it has been noted in the information systems literature that "there are very few systematic studies of the social-psychological forces affecting the transfer of knowledge. Our ignorance of these matters is considerable. Great opportunities exist for making contributions" (Huber, 2001, p. 78).

Findings on the micro-sociological processes of handling a key organizational resource – knowledge – will also provide pointers for enhanced practice. This may be in terms of means of building adequate social infrastructure or enhancing systems design. The results may have wider applications that extend beyond identifying means to incentivize knowledge sharing: "How to align [incentives] is not only an aspect of management theory, but also an issue faced by funding agencies and governments and [those] interested in creating specific outputs" (Huberman & Hogg, 1994, p. 18).

6   Conclusion

It has been demonstrated that exchange theories have contributed to our understanding of trading-type relationships in a number of disciplines. To date, however, exchange theory has not been applied extensively to problems in information science. There are opportunities for information scientists to exploit the earlier work in economics, sociology and anthropology, particularly to explore knowledge transfer between individuals and groups of individuals, and the roles of knowledge brokers in these transactions. The outcome of such research has the potential of satisfying both intellectual curiosity and delivering business benefit. Studies that draw on social exchange theory to make sense of knowledge-sharing relationships in distributed working environments may generate results that point to an appropriate balance of rewards, conditions and infrastructure for effective knowledge exchange.

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Biographical notes

Hazel Hall is Senior Lecturer in the School of Computing at Napier University, Edinburgh, Scotland. Her current research interests include online information services provision, business information sources and services, the education and training of information professionals and knowledge management. In recognition of her contribution to information science she was made a Fellow of the Institute of Information Scientists in 2000 and is now a Fellow of the Chartered Institute of Library and Information Professionals. She gained her Masters degree in Library and Information Studies from the University of Central England, and holds qualifications in French and Italian language and literature from the Universities of Birmingham, Nantes and Paris Sorbonne. She is currently engaged in doctoral research on motivating knowledge sharing in distributed organizations. This work is sponsored by KPMG.

Table 1: Analytical concepts and assumptions of exchange theories

Concept	Assumptions
Exchange actors	• individuals or corporate groups such as a company • can be particular people, for example a named friend • can be an interchangeable holder of a structural position, for example the chief knowledge officer of a company • can be grouped into exchange categories, i.e. "sets of actors that occupy the same domain .. they are "substitutable" because they have the same resource(s) to offer in exchange" (Cook, 1982, p. 179).
Exchange network	• two or more connected dyadic exchange relations (a connection exists where the frequency and value of exchange in one relation affects the frequency and value in another) • contains positive connections, where exchange in one relation increases exchange in another • contains negatives connections, where exchange in one relation decreases exchange in another • contains mixed connections, where both positively and negatively connected relations exist • relations are conceived as longitudinal
Exchange resources	• the currency of exchange • may be tangible (e.g. sum of money) or intangible (e.g. social obligation) • may be perceived as gifts • when given to another the exchange resource is known as a *cost* • when received, or produced as a result, the exchange resource is known as an *outcome* • are attributes of relations, rather than actors, in that their value is determined by those setting up the exchange
Exchange structures	• dependent relationships that support the exchange (social capital)
Exchange processes	• interactions required to conduct an exchange • comprise exchange opportunities followed up by exchange transactions (negotiated or reciprocal) • may lead to an exchange relation when there is a series of exchanges between parties

(Sources: Coleman, 1990; Cook, 1982, p. 179; Mauss, 1925, 1990 trans; Molm, 1997, p. 15; Molm, 2001, pp. 260-262.)

Table 2: Theorists and themes of social exchange in anthropology, sociology and behavioral psychology

	Anthropology	Dominant themes	Sociology	Behavioral psychology	Dominant themes
Early C20th	Malinowski Mauss	Gift-giving as a moral obligation.			
1950s			Homans	Thibaut & Kelley	Exchange is ubiquitous. Trust generates exchange and trust.
1960s	Levi-Strauss	Shared with sociologists.	Homans Blau		Exchanges are non-negotiable, reciprocal & sequential. Focus on actions by individuals in dyadic relations.
1970s	Ekeh	Social cohesion achieved through social exchange.	Emerson Granovetter Heath		Power. Focus on relations. Social network analysis. Rewards and punishment.
1980s	Cheal	Gift giving for reproducing social relationships.	Cook & Emerson		Power & power processes.
Current	Godelier Godbout	Relevance of gift giving in modern societies, e.g. the nature of what is exchanged; charitable donations as a form of gift giving; power of marginalized participants in gift economies; wealth, patterns of gift giving and gift consumption as indicators of social position and power; universality of the general logic of exchange and reciprocity	Molm Lawler Lawler Yoon Uzzi		Coercive power. Bargaining. Quality of exchanges.

(Sources: Cheal, 1988; Ekeh, 1974; Emerson, 1976, p. 335; Galunic & Moran, 2000, p. 2; Godbout, 1988; Godelier, 1999; Gudeman, 1998, p. xi; Molm, 1997; Molm, 2001; Parry, 1998; Scott, n.d.; Sjostrand, 2001; Xrefer, n.d.)

Table 3: Motives for collaboration: a summary - Source Cronin (1995, p.7).

Access:	to special equipment or facilities
	to special skills
	to unique materials (e.g. chemical compounds)
	to visibility
	Recognition
Efficiency in:	Use of time
	Use of labor

to gain experience
to train researchers
to sponsor a protégé
to increase productivity
to multiply proficiencies (thereby increasing access to source of support, visibility, recognition)
to surmount intellectual isolation
need for additional confirmation of evaluation of a problem
need for stimulation or cross-fertilization
spatial propinquity
Accident (serendipity)

__Table 4: Rewards as incentives for knowledge exchange in a corporate knowledge market__ - Source Hall (2001a, pp. 142-144)

Reward category	Reward	Examples
Hard/explicit rewards	Economic reward	Enhanced pay, stock options, bonuses
	Access to information and knowledge, i.e. learning opportunities	Expertise from members of a mailing list
	Career advancement/security	Promotion, guarantees of future contracts
Soft rewards	Enhanced reputation	Status gains
	Personal satisfaction	Seeing the positive results of helping others

Table 5: Provide a suitable infrastructure to incentivize knowledge exchange in a corporate knowledge market

Infrastructure category	Condition	Examples
Social	Create a sense of community	Promotion of openness, co-operation, loyalty, trust; provision for social interaction: co-location of staff, social events
	Make knowledge sharing an explicit responsibility	Senior management buy-in
	Relegate status	Promotion of the idea that everyone is a knowledge contributor, regardless of their organizational rank
	Encourage experimentation	Provision of autonomy, permission to fail
Technological	Provide user-friendly systems	Ease of use; usefulness of use obvious
	Ensure that systems integrate with communities	Systems used in conjunction with "human" interaction
	Generate critical mass	Value of system seen to be monitored
Boundary[7]	Provide for artifacts, people or spaces that can act as common points of reference for different work group constituencies	Provision of shared repositories Provision of taxonomies and classification schemes Shared social space Opportunities for staff to become networked

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[1] The article is based in part on a paper presented in 2001 at the conference *Managing knowledge: conversations and critiques* held at the University of Leicester in the UK (Hall, 2001b).

[2] There has been some debate as to whether exchange theory is actually a theory or not: In the 1970s it was argued that ""Exchange theory" is not to be taken as a theory. Rather, it is a frame of reference that takes the movement of valued things (resources) through social process as its focus" (Emerson, 1976, p. 359).

[3] A search on the ISI citation databases on 18 June 2002 revealed sixteen instances of Constant et al.'s paper being cited. This listing included one paper from 2002, five papers from 2001 and four from 2000 (including Jarvenpaa and Staples' own paper). It would appear that attention *is* now turning to this work given that the past two years have seen a steady increase in citations: 69% of the total citations fall in this short period. It is also worth noting that Constant et al.'s work was published before the recent surge of interest in knowledge management, the proliferation of web-based tools at the desktop and the move to distributed systems in decentralized organizations.

[4] See the growing bank of papers held at http://opensource.mit.edu/online_papers.php (retrieved 13 September, 2002).

[5] A search of Library and Information Science Abstracts conducted on 18 June 2002 retrieved a single citation (Kern & Willcocks, 2000) when the exact phrase "social exchange theory" was used as the search term anywhere within the record. No citations were returned for "gift economy" .

[6] Readers are referred to Hall (2001a) for a more detailed discussion of rewards, and social and technological infrastructure.

[7] The concept of the boundary object was introduced by Star and Griesemer (1989). It has been taken up by some researchers in information science (e.g., Albrechtsen & Jacob, 1998; Robinson, 2000). Practical applications of boundary objects as tools for knowledge sharing

are found in the literature of several domains, for example: accounting (Briers & Chua, 2001);

artificial intelligence (Strubing, 1998); design engineering (Carlile, 2002; Henderson, 1998);

history of science (Galison, 1997; Hong, 1999) information systems (Harvey & Chrisman,

1998); organizational science (Boland & Tenkasi, 1995).