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Employees' participation in electronic networks of practice within a corporate group: perceived benefits and costs

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Abstract This paper explores benefits and costs of knowledge exchange perceived by individuals in connected electronic networks of practice (ENoP) in a corporate setting. The results of 25 semi-structured interviews show 9 perceived benefits and 5 perceived costs to be of importance for knowledge exchange. Altruism and reciprocity are the two main perceived benefits from the knowledge providers' perspective; problem solving is the main perceived benefit from the knowledge seekers' perspective. Five perceived costs are identified for both knowledge seekers and knowledge providers; time and effort are the most frequently cited.

Keywords Knowledge exchange · Electronic networks of practice · Perceived benefit · Perceived cost · Corporate group

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Introduction

Contemporary knowledge management (KM) systems have promoted a new approach to leverage knowledge exchange within an organization. Novel systems, such as electronic networks of practice (ENoP) are created by new technical platforms to connect participants within and between organizations (van Baalen et al. 2005). Knowledge exchange is defined as a process of knowledge sharing (participants who send knowledge) and knowledge seeking (participants who acquire knowledge) (Wang and Noe 2010), to which employees are expected to contribute. From the perspective of an organization knowledge exchange is a no-control and open activity requiring voluntary participation in social interactions among employees (Choi et al. 2014). Further, knowledge exchange is an important support for organizational innovation and leveraging knowledge assets.

ENoPs are developed to connect geographically dispersed participants who exchange their knowledge in a computer-mediated technology based on common interests (Wasko et al. 2009). As corporate groups are developed in geographically distributed locations, they need to use such technologies to enable knowledge exchange. Notwithstanding the substantial growth of implementing ENoPs, few knowledge networks are successful in supporting sustainable participation for knowledge exchange (Phang et al. 2009).

Participants exchange knowledge in electronic communities, but it is unclear if they expect anything in return (Chang and Chuang 2011). The social exchange theory (Blau 1964) has been explored in the KM literature. This theory clarifies that knowledge exchange phenomenon strongly depends on contributors' expectations about perceived benefits and costs (Bock et al. 2005). Participants' perceived benefits are key enablers of participation in

knowledge sharing and knowledge seeking activities (Sedighi and Zand 2012; Sedighi et al. 2015). Further, perceived costs of knowledge exchange as barriers of knowledge exchange play an important role in the performance achievement of KM systems. Hence, exploring simultaneously both perceived costs and benefits helps us to clarify knowledge exchange in ENoPs. This study examines perceived benefits and costs of knowledge exchange in a corporate group, within a holding, whereas past studies have examined single company or groups of independent companies' datasets.

This exploratory qualitative study extends current studies about perceived benefits and costs of participation in knowledge exchange by exploring different types of individuals' benefits and costs in ENoPs in a corporate group. The goal of the study is to answer two research questions: (1) What are individual benefits of participation in knowledge exchange through ENoPs in a corporate group? (2) What are individual costs perceived of participation in knowledge exchange through ENoPs in a corporate group?

This exploratory study starts with backgrounds of knowledge exchange within networks of practice and perceived benefits and costs of participation based on relevant literature in "Background". The data collection methods and data analysis strategies are discussed in "Methodology". "Findings" presents the results and "Discussion" discusses the results. This paper concludes in "Conclusion and future research" with research limitations, future research directions and practical implications.

Background

Knowledge exchange includes both the sharing of knowledge by knowledge providers and the acquisition of knowledge by knowledge seekers. Actually, knowledge exchange is a process of knowledge sharing (participants who send the knowledge) and knowledge seeking (participants who receive the knowledge) (Wang and Noe 2010). Both knowledge sharing and knowledge seeking activities identify two distinct simultaneously participants' roles in knowledge communities: knowledge providers and knowledge seekers. Both activities are essential to develop sustainable knowledge exchange in communities (Phang et al. 2009). Exploring these two sides of knowledge exchange support us to comprehend how to improve and promote knowledge exchange. In this paper, "knowledge exchange" is used to indicate both knowledge sharing and knowledge seeking activities.

Two knowledge exchange approaches have been identified during two generations of KM. The first generation of KM is developed by growing information technology (Huysman and Wit 2004), focuses primarily on static

mechanisms such as knowledge repositories to share documents. The second generation of KM focuses on participants' social interactions to share both explicit and tacit knowledge with developing dynamic knowledge exchange tools (van den Hooff and Huysman 2009). Networks of practice encourage knowledge exchange with connecting geographically distributed professional experts which may never meet each other face-to-face (Wasko and Faraj 2005). Wasko and Faraj (2005) developed the electronic networks of practice (ENoP) concept by adding computer-based communication technologies to the definition of networks of practice. Specifically, ENoP is defined as computer-mediated, self-organized systems in which participants exchange their knowledge voluntarily (Wasko et al. 2009). Self-organizing and voluntary attributes of ENoPs promote participants' autonomy to personalize their participation.

Knowledge exchange in ENoPs is a type of social exchange behaviour, in which participants spend resources to gain benefits (Bock et al. 2005). If the cost of individual contribution is perceived to exceed an individuals' expected benefit, individuals may no longer be motivated to participate. This social exchange behaviour is subject of the "social exchange theory" in organizational environments (Blau 1964). Participants attempt to gain more by increasing individual benefits and reducing individual costs in knowledge exchange. Self-determination theory (SDT) has identified as a theoretical framework to examine different motivations' categories, to address individual perceived benefits of knowledge sharing: intrinsic, internalized extrinsic, and external regulation (Ryan and Deci 2000). Intrinsic benefits are identified by inherent satisfaction of participation while, external regulation is examined by external reward expectations (Ryan and Deci 2000). Internalized extrinsic benefits are factors that are initially external but internalized by participants (Deci and Ryan 2002). A few studies have also examined individual perceived benefits from the knowledge seeking perspective. For instance, Ardichvili et al. (2003) mentioned problem solving as an incentive of knowledge seekers to engage in the knowledge exchange.

This paper defines perceived costs as individual costs perceived by participants for knowledge sharing and knowledge seeking activities. KM studies have identified effort and time as the two main examples of individual perceived costs of knowledge sharing (Cyr and Wei Choo 2010). Further, few studies consider perceived costs of knowledge seekers such as taking time and expending efforts for knowledge seeking (He et al. 2009).

This paper assumes that ENoPs provide a knowledge exchange platform within which participants are free to assess their own perceived benefit and costs of participation. They participate in the network only if their expected benefits outweigh their expected costs.

Methodology

A qualitative research design was used in a case study to explore different perceived benefits and costs in the both actions of knowledge exchange. Data were collected from 25 semi-structured interviews. The case study methodology is used as it is an appropriate research method for exploring complex problems in practical environments (Yin 2013). As mentioned earlier, knowledge exchange includes knowledge sharing and knowledge seeking. Hence, research questions are explored in both sides of knowledge exchange. Two main research questions explore employees' perceived benefits and costs of participation in ENoPs:

1. What are individual benefits of knowledge exchange (knowledge sharing and knowledge seeking) perceived by participants of ENoPs within a corporate group?
2. What are individual costs of knowledge exchange (knowledge sharing and knowledge seeking) perceived by participants of ENoPs within a corporate group?

Organization context

The organizational context of this study is that of a corporate group, with fifteen subsidiaries in the initial phase of adopting ENoPs in the energy industry in the Middle East. This corporate group operates in worldwide construction and development of electrical power plants. Eight ENoPs of the corporate group contribute to this study within which knowledge is exchanged on design, development, installation and maintenance of electrical generators. The largest amount of shared knowledge in ENoPs is classified as “*practical experiences*”, which represents participants' experiences and lessons learned in the projects. Such knowledge is not described in technical documents or scientific articles.

Participants

Twenty-five participants, randomly selected from the 8 ENoPs, have been interviewed individually. Table 1 summarizes demographic data of the participants. As depicted in Table 1, 36% respondents hold managerial positions, and 64% work as experts, 84% are male and most of them in the 36–42 age range.

Procedure

Semi-structured interviews are used to explore individual perceived benefits and costs (Louise Barriball and While 1994). Interviewing is a fundamental qualitative method for exploring human factors in case studies (Yin 2013). Twenty-two of the 25 interviews, are held face-to-face on location of the respective interviewees, each taking 40–55 min, with the first author of this paper. Three

Table 1 Demographic characteristics ($N = 25$)

	Items	Frequency	%
Gender	Male	21	84
	Female	4	16
Age	18–28	3	12
	29–35	7	28
	36–42	12	48
	>42	3	12
Organizational position	Managers	9	36
	Experts	16	64

interviews are conducted by telephone, each taking between 30 and 45 min due to geographical distance. The research protocol for the semi-structured interviews distinguishes three distinct parts. The first part contains questions related to demographics data. Questions such as “*What is your organizational position?*” and “*How old are you?*”. The second part contains detailed questions about subjects' perceived benefits of participation in knowledge sharing and knowledge seeking. Questions such as, “*What types of individual incentives or perceived benefits do you experience when participating in the ENoPs?*”. The third part contains questions related to perceived costs of participation in knowledge sharing and knowledge seeking. Question such as “*What kinds of individual perceived costs do you receive when sharing or seeking knowledge in the ENoPs?*”. In total 35 pages of interview records are acquired as the raw data for analysis.

Demographical data are recorded, unique keys assigned and all personal data removed. Interviewees are assigned a unique key to maintain anonymity during data analysis. All interviews are performed during a 4-week period in November 2014 and December 2014.

Data analysis

The 25 interview scripts are transcribed and analysed as follows. The answers to the second and third open-ended questions on the perceived benefits and perceived costs of participation that influence knowledge exchange are analysed to identify relevant themes. In total, 28 independent initial codes (i.e. themes) are constructed. Axial coding is used on the initial coding results to create a new classification integrating similar categories (Corbin and Strauss 2014). The axial coding procedure distinguishes 18 cost and benefit categories. Figure 1 represents different steps of the data analysis procedure.

The result of the categorization process is validated by domain experts. The encoding of the interviews' results is validated by three independent KM experts in the company. Based on subject-matter experts' validation results,

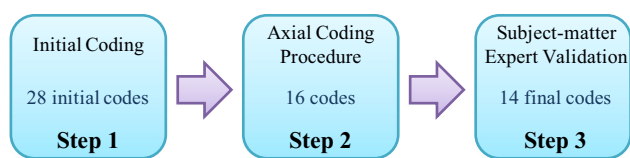


Fig. 1 Analysis procedure

14 benefits and costs classifications are refined to better represent the interviewees' perceptions. During the validation procedure: (1) monetary and non-monetary rewards are integrated to create a new perceived benefit of participation, and (2) two different kinds of altruistic behaviours are integrated as a new perceived benefit. Table 2 in Appendix indicates details of data analysis procedure.

Findings

This section reports on the results of interviews on perceived benefits and costs of participation in knowledge exchange through ENoPs in the corporate group. The subsections below explain perceived benefits and costs of participation in detail. Three levels of coding analysis are distinguished in Table 3 in Appendix.

Participation perceived benefits

This section analyses results of interviews regarding this open-ended question: *What are individual benefits of knowledge exchange perceived by participants of ENoPs within a corporate group?* As shown in Fig. 2, the most

common perceived benefit of knowledge recipients (knowledge seeking) is problem solving, while the most common perceived benefit of knowledge providers (knowledge sharing) is altruism closely followed by reciprocity.

Knowledge sharing perspective

Altruism 23 respondents (92%) share their knowledge because they enjoy helping others. This motivation represents participants' willingness to share knowledge without expecting anything in return. This kind of benefit has two dimensions: (1) altruism for colleagues and (2) altruism for the whole of the organization. In the first dimension, participants indicate that knowledge is shared through an ENoP because they enjoy helping their colleagues. Further, 34% (8 subjects) of all respondents who name altruism as a perceived benefit do so with a religious narrative as one of the several reasons about altruistically sharing knowledge. For instance, expert P17 explains: *"I like to help others to solve their problems. I am feeling good about answering questions. Moreover, I believe in an Islamic narrative, which emphasizes sharing knowledge, is obligatory alms of knowing knowledge"*. On the other hand, the second dimension explains participants' altruism helping the organization as a whole. 12 respondents (52%) of those subjects who mention altruism as a perceived benefit indicate that they want to help their organization to reach its goals. For instance, expert P15 indicates: *"I would like to improve organizational service quality, efficiency and reduce organizational costs and reworks' times."*

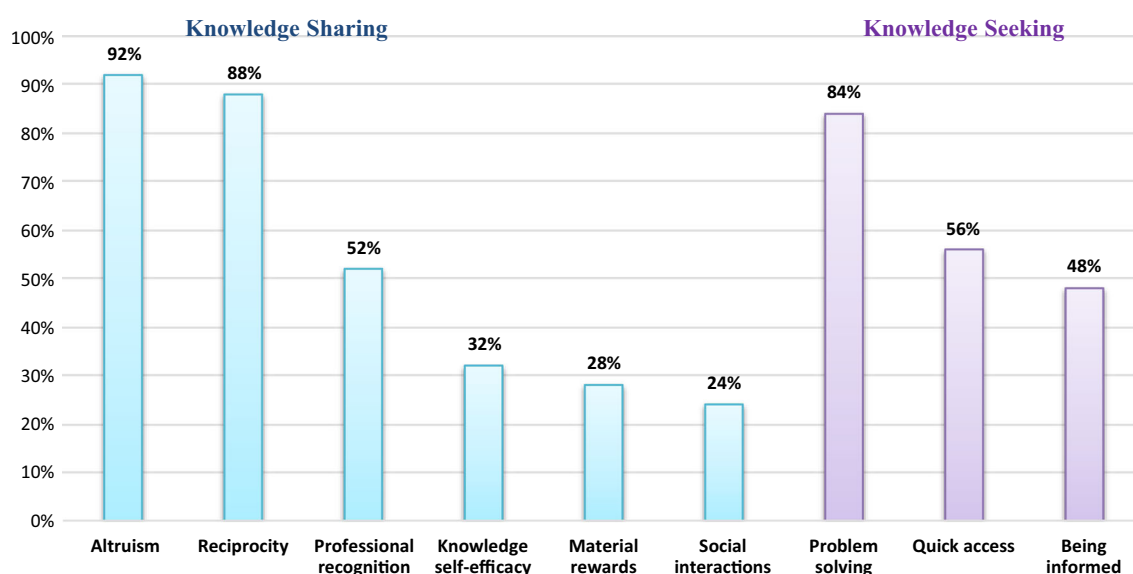


Fig. 2 Frequency of perceived benefits from two perspectives

Reciprocity 22 participants (88%) feel an obligation to share their knowledge in return for knowledge they have received from the community. Participants indicate that they value generalized reciprocity in which employees return knowledge to the group. Knowledge is shared within ENoPs, because participants expect to receive knowledge in return from other network members. For instance, expert P12 elaborates: *"I share my knowledge, because I received knowledge from the network in the past. I don't like to be a knowledge lurker of the system that only gets knowledge from the network. Also, I share my valuable experiences because I expect to receive knowledge in return in the future"*.

Professional recognition 13 participants (52%) mention that they share their knowledge in the ENoPs for the purpose of professional recognition in the corporate company. Although professional members including managers and experts have access to the ENoPs' knowledge, this expert community is an appropriate environment to increase reputation. Furthermore, participants indicate that it is essential to gain status in the company to acquire credit for personal networks and recognitions. For example expert P10 clarified: *"I like to participate in the network, because I need to show my expertise to the managers and network members. Also, my informal expert status in the network gets a chance for me to be selected by managers for new projects"*.

Knowledge self-efficacy 8 respondents (32%) indicate that they believe their knowledge is valuable and that they can help people to solve practical problems and improve organizational efficacy. They are confident of their ability to create knowledge through ENoPs. For example manager P2 explained: *"I have enough valuable knowledge to share helpful knowledge for my company"*.

Material rewards 7 participants (28%) mention that they need material rewards for knowledge sharing through ENoPs. Material rewards include a spectrum of tangible rewards from monetary rewards such as organizational bonuses and travel packages' subsidies to non-monetary rewards such as job promotions. For instance expert P9 explains: *"I share my knowledge in the ENoPs because my organization pays a bonus for each knowledge object. Also, my job security (extending contract) depends on the level of my contribution in the long term"*.

Social interactions Six participants (24%) mention that they need social interaction, through participation in ENoPs. This can help employees to develop their social network within the firm. This kind of knowledge in relationships supports participants to develop a professional

network with other experts. For instance manager P8 explained: *"I can improve my social connections with experienced users and professionals of NoPs' knowledge domains"*.

Knowledge seeking perspective

Problem solving 21 participants (84%) indicate that using practical knowledge and project experiences are their main perceived benefits of using ENoPs. A strong motivator is the geographically distributed nature of power plant projects, through which participation in ENoPs provides access to different experiences in different places. Secondly, a participant highlights the ability to send customized questions, resulting in adjusted answers from ENoPs' members fine-tuned to their specific question. For instance, expert P23 explains: *"This system helps me to reach geographically dispersed knowledge and lessons learned from an integrated system to solve my practical problems"*.

Quick access 14 respondents (56%) use ENoPs as knowledge seekers to acquire knowledge more quickly and efficiently than traditional means. For instance, expert P15 describes: *"I use ENoPs to acquire practical experiences quickly from knowledge creators whom I have never met face-to-face"*.

Being informed 12 interviewees (48%) indicate that they deploy ENoPs to be aware of new knowledge of designing, installing and maintaining electric generators. The main incentive is to support the alignment of their various efforts throughout the company to handle new problems. For instance, manager P7 examined: *"I would like to know new problems and experiences from different power plant projects to design new projects or new solutions. Also, I can keep myself informed about new experiences"*.

Participation perceived costs

The second research question concentrates on the individual cost factors that negatively influence participation in knowledge exchange through ENoPs. This section represents results of subjects' answers regarding the open-ended question: *What are individual costs of knowledge exchanged perceived by participants of ENoPs within a corporate group?*

The results are categorized for the two sides of knowledge exchange. Three main individual costs are identified: (1) time for knowledge contribution in networks, (2) efforts for knowledge contribution, (3) fear of losing face. Figure 3 represents the frequency percentages of individual perceived costs of participation in knowledge exchange.

Knowledge sharing perspective

Taking time for knowledge sharing 22 respondents (88%) indicate that spending time for knowledge sharing through ENoPs is a critical individual cost. This cost is a barrier for knowledge contribution in ENoPs, because it reduces the time available for their normal tasks within their respective companies. For example, expert P3 mentions: “Because of pressures for delivering project tasks to the project employer, usually I am busy to write my lessons learned in the ENoP”.

Expending effort for knowledge sharing 13 participants (52%) indicate that effort required to use and contribute knowledge to the network is a perceived cost of participation. However, ENoPs can reduce these efforts by enhancing their user interfaces. Participants comment that considerable effort is needed to transform the complex nature of practical knowledge of electric generator’s context to understandable experiences, even though they have acceptable levels of technological skills. For instance, manager P10 remarked: “I should take too much effort for preparing clear documents about my experiences in installing interface between turbines and generators in power plants”.

Risk of losing face 5 employees (20%) indicate that the risk of losing face in the professional communities is an individual perceived cost of knowledge contributions through ENoPs. They are concerned about the quality of

experiences, which can lead to a decline in reputation for the contributors. For example, expert P3 states: “sometimes, I have the threat of losing face, because I am not sure whether my experience is reliable or not”.

Knowledge seeking perspective

Taking time for knowledge seeking Eleven respondents (44%) indicate that taking time for knowledge seeking in ENoPs is a main perceived cost. Like spending time for knowledge sharing, this perceived cost is a barrier for knowledge seekers’ participation in ENoPs. This cost reduces the participants’ free time for organizational activities. Lack of time for searching knowledge provides an environment for participants to solve problems using their own knowledge. For example, expert P6 highlights: “I need to search for relevant knowledge through ENoPs, which can reduce my available time to spend on other organizational activities”.

Expending effort for knowledge seeking Three participants (12%) indicate that effort for searching knowledge is a perceived cost for participation in the knowledge seeking perspective. Although ENoPs reduce participants’ expending effort using search engines, few respondents perceive a cost of using such system. The researchers could not find any pieces of evidence about the lack of participants’ skill in using the system. For instance, expert P1 states: “I need to expend effort to find the relevant information and knowledge of CHP’s generators maintenance from networks”.

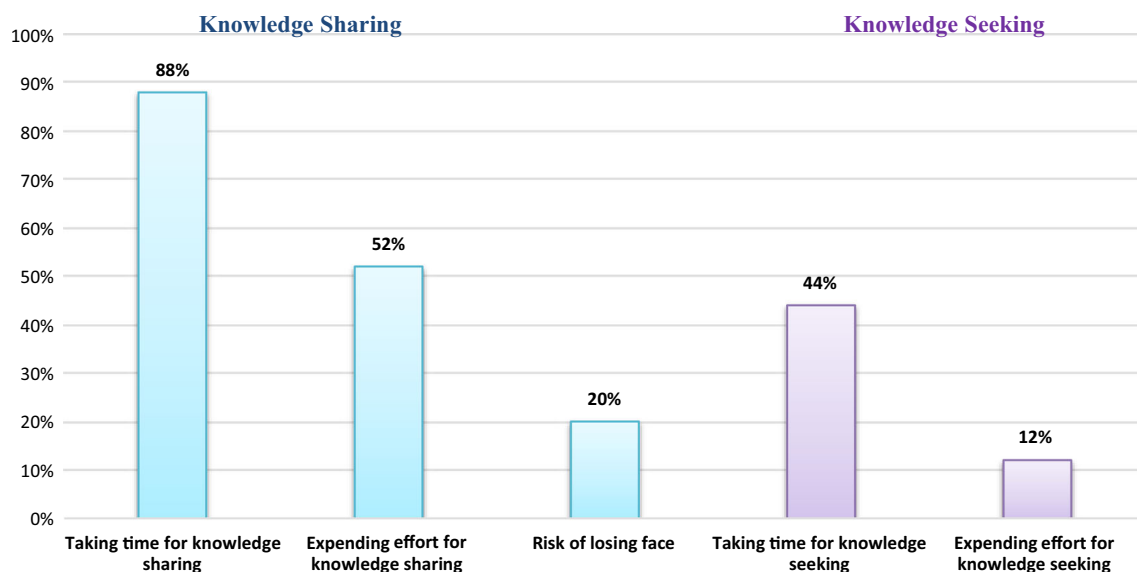


Fig. 3 Frequency of perceived costs from two perspectives

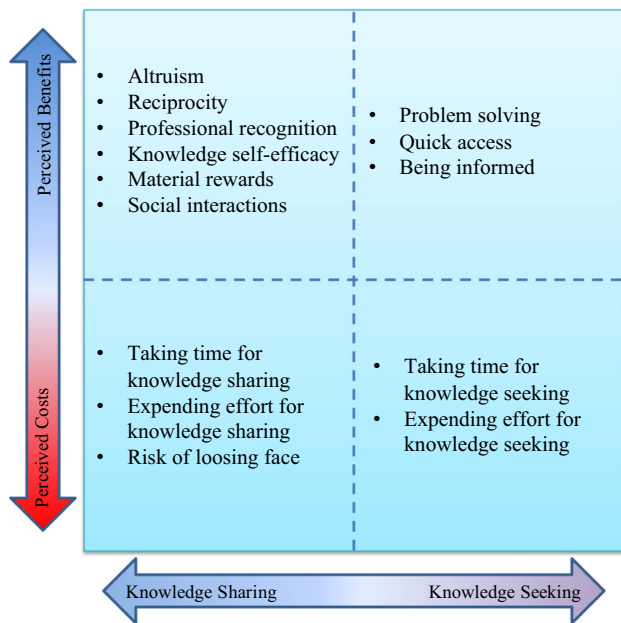


Fig. 4 Perceived benefits and costs of knowledge exchange in ENoPs

Figure 4 signifies research results with clarifying perceived benefits and costs of knowledge exchange. Both perceived costs and perceived benefits are presented from the individuals' perspective, thus lack of benefits can also be interpreted as a cost (demotivation), and vice versa.

Discussion

Perceived benefits and costs of participation in knowledge exchange through ENoPs is the focus of this paper, from the perspective of knowledge sharing and from knowledge seeking.

Perceived benefits

Results identify six different perceived benefits for knowledge sharing in ENoPs from the knowledge sharing perspective. Most respondents (92%) felt that they need to help others with their valuable knowledge. As mentioned earlier, two main dimensions describe participant altruistic behaviour. The first dimension shows that "enjoy helping" is related to doing the right thing and enjoyment from helping people (Wasko and Faraj 2000). This finding is consistent with several studies that have found altruism to be an important autonomous intrinsic motivation for knowledge sharing (e.g. Wu et al. 2009; Ma and Chan 2014). On the other hand, another type of altruistic behaviour is related to organizational commitment. This finding indicates participants' willingness to contribute to organizational success and support to reach strategic goals (Vuori

and Okkonen 2012). This dimension is mentioned in KM studies to indicate participants' commitment to organizational values (King and Marks 2008). This finding is consistent with Liu et al. (2011) who found that team members' commitment can improve individual knowledge sharing behaviour.

Reciprocity as the second most frequent perceived benefit of participation in knowledge sharing, explains knowledge contribution regarding the expectation of knowledge return (Bock et al. 2005). Direct reciprocity is limited to participant expectations to receive knowledge from the knowledge recipient, while generalized reciprocity signifies employees' expectations to gain knowledge from third parties (Wasko and Faraj 2005). All participants who mention reciprocity as a perceived benefit (88%) emphasize when they share their knowledge, they expect to receive knowledge from network members in general, not only from a specific knowledge recipient. One possible reason is that knowledge exchange through a visible computer-mediate system is promoted by generalized reciprocity (Wasko and Faraj 2005). This finding is consistent with Hew and Hara's (2007) research, in which they found reciprocity to be a reason for members' contributions in online environments.

Professional recognition as a type of extrinsic perceived benefit of participation in knowledge sharing is indicated by some respondents. Reputation systems have been widely argued to be an incentive for contributors' activities and performance in knowledge sharing (Bock et al. 2005; Lu and Hsiao 2007). Indeed, professional recognition is a perception in which a participant believes that participation through a system could improve individual reputation through networks (Hsu and Lin 2008). This result is consistent with Kankanhalli et al. (2005), who indicate receiving reputation as an individual benefit for participants to improve their level of knowledge sharing.

Knowledge self-efficacy as an intrinsic perceived benefit of contributors refers to participants' confidence in their capability to share valuable knowledge in ENoPs (Lin 2007). Few subjects mention self-efficacy as a perceived benefit for creating knowledge through ENoPs. This finding is consistent with Kankanhalli et al. (2005), who classify self-efficacy as an intrinsic benefit of participants in electronic KM systems. Certainly, ENoPs' participants that mentioned knowledge self-efficacy as a perceived benefit, have broader experiences in using ENoPs and they have more confidence in their capability to help ENoP's members (Wasko and Faraj 2005).

Material rewards, a spectrum of monetary and non-monetary rewards, is mentioned by a small group of participants. Material rewards include a range of monetary rewards (e.g. increased salary or monetary bonuses) to non-monetary rewards (e.g. job promotions or job security) (Lin

2007). Although all participants in ENoPs have the opportunity to use monetary rewards and job promotions, few respondents have mentioned this kind of rewards as significant incentive for knowledge sharing. This finding is consistent with Vuori and Okkonen's (2012) study, in which they show that financial bonus and career development programs have least priority for knowledge contribution.

Social interaction as a social need of employees is only indicated by a few articles. This benefit refers to a participant's need to strength their social ties with others within an organization (Vuori and Okkonen 2012). People use ENoPs to maintain social interactions with domain experts and improve their social network by contributing in the KM process. This finding is in contrast to the existing KM literature (Chang and Chuang 2011), in which participants' social interactions are positively associated with knowledge sharing performance. This paper shows a reverse relationship, in which participants share their knowledge to improve their social relations within organizations.

A high percentage of the participants use ENoPs as an experience repository, to solve practical problems from the knowledge seekers' perspective. This result is consistent with Ardichvili et al. (2003) who found that the majority of CoPs' members use a virtual knowledge sharing system as a kind of encyclopaedia to solve their problems.

Some respondents indicate that these networked systems help them to access relevant knowledge quickly and to solve their problems efficiently. This result shows the importance of knowledge exchange using computer-mediated technology, to help participants expeditiously access the lessons learned that are dispersed across different geographical places. This finding is consistent with Vaast's (2004) study that shows that networks of practice can improve project teams' performance by connecting participants and bridging geographical distance. In addition, 48% of the participants in this paper indicate that ENoPs are used as a knowledge system to spread new knowledge in a specific subject within the group of companies. This finding is consistent with Ardichvili et al. (2003) who found that participants use CoPs to keep themselves informed of developments in their professional fields.

Perceived costs

Five perceived costs are distinguished for the both knowledge sharing and knowledge seeking perspectives. This paper explores individual perceived costs of participation that may hinder participants to engage in ENoPs. Barriers such as technological or cultural barriers have been removed from the results. Risk of receiving low-quality knowledge has been identified as a perceived seeking cost (Brydon and Vining 2006). This factor is not recognized in this study. A feasible explanation is that

ENoPs are regularly monitored by domain experts, and that knowledge contributors avoid the risk of ruining their reputation by sharing low-quality knowledge.

From the knowledge sharing perspective, the most important perceived cost is the time needed for knowledge sharing in ENoPs. Although the ENoP's platform is a simple platform and networks' experts have skills to use technical features, time is a significant cost of participation. This finding is consistent with Vuori and Okkonen (2012) study, who found that users of organizational social media indicate that time is a significant barrier to sharing knowledge. Further, the effort for knowledge contributing through ENoPs is identified as an individual perceived cost of knowledge sharing—individual mental and physical efforts to acquire, create, document and share knowledge through ENoPs (Sun et al. 2014). This perceived cost refers to a knowledge sharing barrier, in which participants mentally assess contribution efforts: if the mental effort and time outweigh the overall benefit, they refuse to participate in an ENoP system. This finding is consistent with Vuori and Okkonen's (2012) study in which they found effort to be an important individual cost of participation in intra-organizational social media.

With regard to the result of the interviews, the outcome shows that participants avoid losing face in their professional knowledge communities. Participants feel that they lose face if they share low-quality knowledge in networks. Losing face cost is a sociological perception of feeling embarrassment and disrespect in society (Huang et al. 2008). This result is consistent with Ardichvili et al. (2003) who found that users of online knowledge sharing communities are concerned about their own face during active participation. They found that in the Asian culture, users fear loss of face during active participation in online environments.

From the knowledge seeking perspective, the most important perceived cost is time for knowledge seeking in ENoPs. A possible explanation is that experts have a limited time to spend on seeking relevant knowledge. This finding is consistent with Phang et al. (2009) findings, in which time and effort of knowledge seeking are named as two barriers of communications in online communities. Effort for knowledge seeking through ENoPs is shown to be a perceived cost—participants' efforts to search and find knowledge through ENoPs (Markus 2001). This finding is consistent with He et al. (2009) who found that effort for knowledge seeking is the main knowledge seekers' cost in KM systems.

This study did not find indication of participants' tendency to hoard their knowledge. A possible reason is that because most ENoP's members from different companies work on the same projects, with the same goals they promote knowledge sharing among members.

Conclusion and future research

This paper proposes a variety of insights into knowledge exchange through ENoPs by examining individual perceived benefits and costs of participation in a corporate group. The results signify perceived benefits and costs of participation for knowledge sharing as compared with knowledge seeking in ENoPs. Nine perceived benefits and five perceived costs of participation in ENoPs are explored. Altruism and reciprocity are the two main perceived benefits from the knowledge sharing perspective, while problem solving is the main perceived benefit from the knowledge seeking perspective. Knowledge seeking and knowledge sharing activities entail different individual perceived costs such as taking time and expending effort of participation.

The research outcome has several practical implications. One of the main practical implications of this research is that employees' attitude towards altruistic behaviour, embedded within an organizational culture, strongly influences employees' participation in knowledge exchange. KM designers need to consider organizational culture when designing virtual community tools. The results indicate that the ability to solve problems is a main perceived benefit from the knowledge seekers' perspective. Hence designers need to consider technical features to leverage this benefit (Majchrzak et al. 2013). Time for participation is

recognized by both knowledge exchanges' sides as the main cost. Practitioners need to consider this cost by assigning more time and opportunity for domain experts to participate in ENoPs. Since participants gain benefit from using ENoPs by gaining knowledge in return, designers could assign more time for users to participate in the networks.

Knowledge exchange through ENoPs is an emerging phenomenon, especially in corporate groups. The results in this paper show that individuals' knowledge sharing and knowledge seeking through ENoPs differ. Exploring the impact of individual characteristics requires future research. As a main future research direction, the role of cognitive trust can be explored in the ENoPs environments.

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Appendix

See Tables 2 and 3.

Table 2 Data analysis procedure

Data analysis level	Data collection/procedure	Findings
1. Creating initial codes	25 semi-structured interviews (face-to-face/ telephone)	28 initial codes represents individual perceived benefits and perceived costs of participation in ENoPs
2. Axial coding procedure	Reassembling codes in two different perceived benefits and costs clusters	Creating new codes: <ul style="list-style-type: none"> • 10 codes (perceived benefits of knowledge sharing) • 3 codes (perceived costs of knowledge sharing) • 3 codes (perceived benefits of knowledge seeking) • 2 codes (perceived costs of knowledge seeking)
3. Subject-matter experts validation	Validating codes with three independent KM experts in the company	Validation the coding procedure: <ul style="list-style-type: none"> • 6 validated codes (perceived benefits of knowledge sharing) • 3 validated codes (perceived costs of knowledge sharing) • 3 validated codes (perceived benefits of knowledge seeking) • 2 validated codes (perceived costs of knowledge seeking)

Table 3 Coding results

Perspective	Benefits/costs	First level	Second level	Third level
Knowledge sharing	Perceived benefits	Professional recognition	Helping others	Altruism
		Enjoyment helping colleagues	Helping organization	Reciprocity
		Enjoyment helping company	Reciprocity	Professional recognition
		Job security	Professional recognition	Knowledge self-efficacy
		Monetary rewards	Knowledge self-efficacy	Material rewards

Table 3 continued

Perspective	Benefits/costs	First level	Second level	Third level
		Promotion program	Monetary rewards	Social interactions
		Solving problems	Non-monetary rewards	
		Religious status	Social interaction	
		Receiving knowledge in future		
		Access to new knowledge		
		Self-efficacy		
		Reaching individual goals		
		Connecting with experts		
		Connecting with managers		
		Travelling package		
Knowledge sharing	Perceived costs	Taking time for reading	Time	Taking time for knowledge sharing
		Taking time for writing	Effort	Expending effort for knowledge sharing
		Mental efforts	Risk of loosing face	Risk of loosing face
		Physical efforts		
		Risk of loosing positions		
		Risk of bad reputation		
Knowledge seeking	Perceived benefits	Finding practical solutions	Problem solving	Problem solving
		Being informed	Quick access	Quick access
		Gaining new information	Being informed	Being informed
		Gaining organizational news		
Knowledge seeking	Perceived costs	Taking time for searching	Time	Taking time for knowledge seeking
		Searching effort	Effort	Expending effort for knowledge seeking
		Taking time for reading		

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