Creating competitive advantage through knowledge sharing in the digital economy

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Abstract

***Purpose of the paper**: Starting from an extensive literature review on Knowledge Sharing (KS), this paper aims to identify factors influencing KS and to identify the impact of these factors on the use of Information and Communication Technologies (ICTs).*

***Methodology:** Using the Theory of Reasoned Action, we collect data by applying snowball methodology. We then analyze three major determinants of individuals' KS attitude - expected rewards, expected associations, and expected contribution - and consequently attitude as a determinant of their intention to share knowledge. In turn, KS intention is suggested as an immediate predictor of KS behavior.*

***Findings**: Results suggest that KS beliefs, attitudes, intentions and behavior impact on the individual use of ICT, whether in its instant or constant form. Results also confirmed that ICT is involved in the whole KS process and represents a critical component.*

***Research limits:** The most evident limit is related to the limited generalizability of the sample investigated from which it follows that our conclusions are only tentative. We focus (the second limit) only on the salient beliefs which affect the KS attitude, because we assume that the KS behavior is motivated and executed mainly at the individual level.*

***Practical implications:** Findings highlight how important is for organizations to provide constant ICT tools to direct its members to develop attitude, intention and behavior for enacting KS. Within this frame, they would have the ability to monitor the role of each determinant in knowledge accumulation among their members.*

***Originality of the paper:** This paper attempts to confirm ICT as the critical component of entire KS process. In this sense, it analyzes the impact of expected rewards, expected associations, and expected contribution on the choice of ICT.*

Key words: knowledge sharing; ICT; quantitative analysis; theory of reasoned action

1. Introduction

The strategic management of knowledge resources is considered as one of the key sources of sustainable competitive advantage and, ultimately, the primary driver of a firm's value (Grant, 1991, 1996; Spender 1996; Teece 2000; Vicari, 2008; Tardivo, 2008).

In order to be able to capitalize on these resources, organizations are increasingly moving away from the search for mass production

efficiencies, as well as hierarchical and bureaucratic structures to get closer to new organizational forms, aimed at creating learning and knowledge exchange (Daft and Lewin, 1993). It follows that there is a rapid spread of new ways of creating, finding and sharing knowledge. While innovative practices in knowledge management create opportunities for organizations and individuals, they also implicate new challenges when confronting the development of strategic agendas worldwide. Digital technologies are changing our relationship with information: in fact, they are changing how we create, distribute and consume knowledge. Many of these changes have profound, far-reaching implications not only in terms of the scale, access and availability of knowledge, but also with respect to the relationship of individuals with this knowledge.

In an Information Age in which employers are "knowledge workers" and the amount of "information" expands exponentially with the use of Information and Communication Technologies (ICTs), managing knowledge in all of its forms has become a major organizational challenge (Becker, 2007). Knowledge management has been defined as the process of capturing, storing, sharing, and using knowledge (Davenport and Prusak 1998). Nonaka (1994) and Hansen and Avital (2005) have already showed that organizational knowledge and, in particular, its sharing (knowledge sharing) constitute a strong foundation of business performance.

These actions and interactions create the knowledge economy, which refers to an ever transforming economy where most of the capital major capital is invested in "knowledge based" assets such as R&D, design, software, and human and organizational capabilities. The use of knowledge-based assets in today's digital economy is the result of major changes in three major economic and social forces which collectively prompted the radical change in economic structures: the introduction of dynamic and increasingly powerful ICT, globalization and the growing standards of living in advanced industrialized economies (Brinkley et al 2009).

Knowledge sharing (KS) concerns the willingness of individuals to share the knowledge they have acquired or created with others (Gibbert and Krause, 2002). The sharing of knowledge is a key process without which an organization may lose many of the benefits resulting from effective coordination among organizational functions and resources (Wasko and Faraj, 2000; Jarvenpaa and Staples, 2000; Bock *et al.,* 2005; Chen and Hung, 2010).

New technologies provide various means that can be of aid in overcoming KS barriers. Based on this paradigm, many initiatives have been undertaken by organizations to consolidate, accumulate, disseminate and manage the many aspects of the knowledge possessed by their members, especially through the use of new ICT. Several studies (Jarvenpaa and Staples, 2000; van den Hooff and de Leeuw van Weenen, 2004; Choi *et al.,* 2010) have revealed that the use of ICT can significantly impact KS in organizations by enhancing the KS process and reducing KS barriers.

Although the benefits related to the use of ICT in KS may be evident, the real question on the use of technology still seems to be posed in terms of human resource management and individual motivations. As knowledge is rooted in individuals' minds, it is important to understand

what exactly motivates them to share it in order to design and implement effective KS schemes in organizations. In fact, as Davenport (1997) has already affirmed, it is often unnatural. People will not readily share their knowledge as they think their knowledge is valuable and important, rather, storing knowledge while looking suspiciously upon knowledge from others is the natural tendency. In addition, this natural tendency is difficult to change. It follows that technological barriers seem to represent a minor obstacle compared to the difficulties in engaging people and persuading them to share their knowledge.

Only when individual knowledge is translated into organizational knowledge can the organization start to effectively manage this vital resource. Therefore, determining which factors promote or impede the sharing of knowledge within organizations constitutes an important area of research (Du *et al.,* 2007; Homan *et al.,* 2008).

In this regard, this paper maintains that organizations should be especially concerned about how to manage the ways in which individuals' motivation affects their behaviors. More precisely, the purpose of this study is to deepen the understanding of the determinants that influence individuals' decision to share their knowledge. These determinants can support or constrain the individual's KS behavior in organizations. It is therefore important to comprehend how they could influence the KS behavior of individuals.

The central research proposition of this article is the following: expected rewards, expected associations, and expected contributions are suggested as the major determinants of individuals' KS attitude; consequently, attitude is considered as a determinant of their intention to share knowledge. KS intention is then proposed as an immediate predictor of KS behavior. The study also attempts to investigate individuals' expectations, attitudes and behavior with respect to the use of different modes of ICT as KS enablers.

The paper is organized as follows. The next section introduces the literature related to KS and its determinants, followed by an explanation of the research model with the specification of the hypotheses to be tested. The methods section delineates the target group, the sample and applied measures. Results are displayed and subsequently discussed in terms of main findings, limitations and implications. Finally, concluding remarks, including recommendations for further research, are presented.

2. Theoretical background and hypotheses development

In this particular study, knowledge is considered as the information that is stored in the minds of individuals in relation to procedures, facts, concepts, ideas and judgments that can help an individual to take action (e.g., solve work-related problems, use a machine, write a research paper) (Alavi and Leidner, 2001).

The general assumption is that understanding the KS process among individuals represents one step towards a better understanding of KS as a whole in organizations. It follows that KS can be understood as a social interaction culture in which employees swap work-related experiences,

skills, and know-how with colleagues (Cummings, 2004; Lin, 2007) while delivering task information and know-how that may help them do something better, solve problems more quickly and develop new ideas (Cummings, 2004). KS encourages individuals to think critically, express their creativity, and generate new knowledge. In so doing, it ultimately leads to the enhancement of the firm's innovation capability (Lin, 2007; Antal and Richebé, 2009).

As knowledge is embedded in individuals' minds, it is essential to recognize what motivates them to share it. Employees' intrinsic motivation has been found to strongly influence employees' behaviors in sharing knowledge and information with colleagues (Osterloh and Frey, 2000; Bock *et al.,* 2005; Cabrera *et al.,* 2006). Intrinsic motivation characterizes those individuals who perform an activity (e.g. task, action, etc.) for its inherent satisfaction and interest rather than for other consequences it may produce.

With the advent of the knowledge management paradigm, researchers examined many variables believed to affect the individual's KS behavior. In this study, Ajzen and Fishbein's (1980) theory of reasoned action (TRA) was employed to investigate factors affecting individuals' attitude toward KS. The TRA is regularly utilized to estimate and define behaviors in social psychology (Lin, 2007). The TRA proposes that an individual's behavior is predicted by his/her behavioral intention, which in turn is determined by the individual's attitude towards and subjective norm regarding the behavior. Each attitude and subjective norm is affected by a set of salient beliefs. An individual may have a large number of beliefs about a given behavior, but he/she can only attend to a relatively small number of beliefs at a specific moment (Ajzen and Fishbein, 1980). The attended beliefs are salient beliefs, which are prioritized uppermost in the individual's mind.

Attitude is settled by "behavioral beliefs" regarding the likely consequences of performing the behavior. A subjective norm is determined by "normative beliefs", which concern the likelihood that important referents encourage or discourage the behavior. The fundamental assumption of the TRA is that human beings are rational and that they make systematic use of available information to form beliefs (Fishbein and Ajzen, 1975).

Several researchers have used the TRA to study KS behavior. Ding and Ng (2009) empirically tested the TRA model in predicting architects' KS behavior in project design teams. They found that attitude is more important than subjective norms in determining architects' KS intention. Bock and Kim (2002) studied salient beliefs associated with KS attitude. They identified expected association and expected contribution as two significant determinants of individuals' attitude towards KS. Starting from the TRA, Bock *et al.* (2005) developed a comprehensive research model examining factors supporting or inhibiting individual KS intention. The results indicate that anticipated reciprocal relationships positively affect attitude towards KS, while sense of self-worth influences the subjective norm of KS.

In this paper three variables are proposed as the salient beliefs for the KS attitude. Starting from the work of Bock and Kim (2002), the three

factors assumed as perceived benefits are expected rewards, expected associations, and expected contribution. These factors constitute the major determinants of an individual's KS attitude, while attitude is a determinant of the intention to share knowledge.

2.1 Expected rewards

KS will occur when its rewards exceed its costs (Kelley and Thibaut, 1978; Constant *et al.,* 1994). That is why many researchers have emphasized incentive systems for successful knowledge management. This is connected to the concept of extrinsic motivation, which refers to individuals gaining tangible rewards or valuable outcomes in return for their KS contribution (Deci and Ryan, 1980). It follows that an individual's willingness to share knowledge is determined by the perceived expected benefits that can be reaped such as monetary rewards, promotion, educational opportunity and enhanced expertise (Moore and Benbasat, 1991). In other words, individuals are more likely to share knowledge when they have strongly perceived the relative advantage of KS.

Hence, expected rewards imply that if employees believe they will receive extrinsic benefits from their KS, they will develop a more positive attitude towards its practice:

H1: Expected rewards will have a positive effect on an individual's attitude towards KS.

2.2 Expected associations

Expected associations suggest that if employees believe they could improve their relationship with other employees by offering their knowledge, they would develop a more positive attitude towards KS (Gupta and Joshi, 2012).

H2: Expected associations will have a positive effect on an individual's attitude towards KS.

2.3 Expected contribution

Expected contribution refers to the idea that if employees believe they could make contributions to the organization's performance, they would develop a more positive attitude towards KS (Bock and Kim, 2002).

H3: Expected contribution will have a positive effect on attitude towards KS.

2.4 Individual's KS attitudes and individual's intention to share knowledge

Attitudes can be termed as a determining factor of people's behavior. An attitude is a learned disposition that determines a positive or negative response to a specific object, situation, institution, or person (Aiken,

2000). An attitude reflects what the individual is and, therefore provides people with a framework within which to interpret the world and integrate new experiences. Attitudes affect people in everything they do and reflect on what they are. Thus, by understanding an individual's attitude towards something, it is possible to predict his/her overall pattern of behavior towards the object.

An attitude directed toward a behavior is a precursor to an individual's intention of performing a behavior (Bock and Kim, 2002). In the context of this study, this implies that if a worker has a favorable attitude towards sharing his/her knowledge with other workers, there is a high possibility that he/she will share available knowledge. A less favorable attitude may result in little or no knowledge being shared.

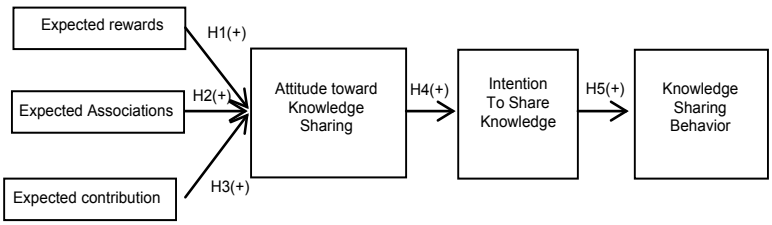
Hypotheses 4 and 5 examine the relationship between KS attitude and intention, and the relationship between intention and behavior in the KS context.

H4: Attitude toward KS will have a positive effect on an individual's intention to share knowledge.

H5: Intention to share knowledge will have a positive effect on an individual's KS behavior.

The above discussion is summarized in the research model illustrated in Figure 1.

Fig. 1: Research Model



Source: Adapted from Bock and Kim, 2002

2.5 The individual's usage of ICT

ICT is considered as an important enabler in knowledge management (Davenport, 1997; Ruggles, 1998, O'Dell and Grayson, 1998). In other words, ICT facilitates knowledge transfer not only through the exchange of data but also the exchange of knowledge. In today's digital world, knowledge transfer can be made at exponentially high speed that is invisible to the human eye. Nonetheless, this requires a double transformation process: from knowledge to information and then to data, and back from to information, and finally, to knowledge and its management.

Bolisani and Scarso (1999) claimed that the transfer of knowledge (especially in its tacit form) often requires proximity between the transmitter and the receiver. For example, videoconferencing and virtual

chat rooms may aid the transfer of tacit knowledge by enabling virtual proximity between players while information (especially the codified form) may be distributed worldwide with the touch of a button. In line with this viewpoint, it is helpful to consider ICT in two forms: as "information tools" and as "communication tools". These labels may become especially necessary because of the fact that some values are built upon "instrumental" and "expressive" information forms (Raber and Budd, 2003).

In addition to these issues, ICT tools need to be formulated in accordance to their formats and contents which communicate both informative and cognitive elements (Pigg and Crank, 2004). Researchers attempted to classify ICT applications in line with facilitated relationships among users (Altheide, 1994, cited in Pigg and Crank, 2004). According to Altheide (1994), different formats with the same information and communication technologies are brought together both "doing it" and "reporting it". On this basis, Internet usage has created different formats for information technology that enable a flow of communication that is not passive, but rather a two-way transaction, like e-mails, chatting, and the use of social media. With regard to this classification, DiMaggio *et al.* (2001) suggest that online communities interacting via the Internet present some differences when compared with earlier technologies. The Internet offers different modes of communication (broadcasting, individual searching, and group discussion) and different kinds of contents (text, audio, visual images) in a single medium. Consequently, Pigg and Crank (2004) differentiate between information and communication functions.

The information function is complex because an Internet-based information transfer can take place using a variety of features of the network (Pigg and Crank, 2004). Information transfer can be "active", in that people share information using various communication features provided by online networks, including e-mail and video conferencing, or it can be "passive", based on one person's search for resources on the Internet and using, for example, its archiving or knowledge management capabilities. According to these authors, the communication function refers to the acts of transmitting information of different types, e.g., ideas and feelings, from one person to another. Pigg and Crank (2004) also propose that the communication function is multi-faceted and interactive, including text, audio and video. At the same time, it may also be executed in real-time (as in VOIP), asynchronous, or archival/historical form.

Grounded on these challenges in classifying ICT based on its format and the role in users' relations, Yuan *et al.,* (2013) consider the role of ICT tools in KS by dividing ICT into the following three groups: Social media tools - as a generator of KS among community members, communication tools - as a channel for KS, and long standing tools. They state that social media can better address the challenges confronting KS because using social media helps users to develop better awareness of both other users' expertise (e.g., from employees' profiles) and their personal lives (e.g., from status updates). In contrast, communication tools connect users (transmitter and receiver) directly, are highly informative and, more importantly, most efficient in providing up-to-date information. Besides, they may help build stronger connections between users and therefore

make providers more motivated to share knowledge (Yuan *et al.,* 2013). Based on the given discussion, as a KS platform, social media tools and communication tools may lead to basic changes in users' opportunities, motivations and abilities in their sense of building and maintaining trust in the network. Within the frame of the purpose of this study, social media tools are utilized with their constant structure (referred to as constant tools), while communication tools are utilized with their instant real-time structure (referred to as instant tools). This research also includes the most popular ICT used by organizations for KS: e-mail, intranet, institutional social networking tools, file sharing tools, phone or voice over IP systems. It is expected that some of these tools are handled by users for instant interaction, whereas others are preferred for constant linkages (for example: uploading or downloading data/information from knowledge repositories), and others for both types as hybrid tools offering instant and constant connectivity.

In addition to the main constructs presented above and based on the discussion concerning ICT usage, further hypotheses are derived and presented below. The models from which the hypotheses originate are proposed so as to investigate the impact of each group of KS variables on the constructs of ICT.

H6: Expected reward has a significant impact on the use of instant ICT tools.
H7: Expected reward has a significant impact on the use of constant ICT tools.

Model 6: $Y_{ins} = \alpha + \beta_1 Mon_i + \beta_2 Car_i + \beta_3 Ben_i + \varepsilon$
Model 7: $Y_{cns} = \alpha + \beta_1 Mon_i + \beta_2 Car_i + \beta_3 Ben_i + \varepsilon$

Where Y_{ins} represents the instant tools and Y_{cns} represents the constant tools of ICT while Expected rewards are presented as Mon for Money, Car for Career advancement, Ben for Benefit

H8: Expected association has a significant impact on the use of instant ICT tools.
H9: Expected association has a significant impact on the use of constant ICT tools.

Model 8: $Y_{ins} = \alpha + \beta_1 Bnd_i + \beta_2 Soc_i + \beta_3 Net_i + \beta_4 Col_i + \beta_5 Com_i + \varepsilon$
Model 9: $Y_{cns} = \alpha + \beta_1 Bnd_i + \beta_2 Soc_i + \beta_3 Net_i + \beta_4 Col_i + \beta_5 Com_i + \varepsilon$

Where Y_{ins} represents the instant tools and Y_{cns} represents the constant tools of ICT while Expected associations are presented as Bnd for Bonding, Soc for Socialization, Net for Networking, Col for Collaboration and finally Com for Common Interests.

H10: Expected contribution has a significant impact on the use of instant ICT tools.
H11: Expected contribution has a significant impact on the use of constant ICT tools.

Model 10: $Y_{ins} = \alpha + \beta_1 Prb_i + \beta_2 Opp_i + \beta_3 Prc_i + \beta_4 Pro_i + \beta_5 Per_i + \varepsilon$
Model 11: $Y_{cns} = \alpha + \beta_1 Prb_i + \beta_2 Opp_i + \beta_3 Prc_i + \beta_4 Pro_i + \beta_5 Per_i + \varepsilon$

Where Yins represents the instant tools and Ycns represents the constant tools of ICT while Expected contributions are presented as Prb for Problem solving, Opp for new business opportunities, Prc for Improved work processes, Pro for Organizational productivity and finally Per for reaching performance targets.

H12: Knowledge sharing attitude has a significant impact on the use of instant ICT tools.
H13: Knowledge sharing attitude has a significant impact on the use of constant ICT tools.

Model 12: $Y_{ins} = \alpha + \beta_1 Gd_i + \beta_2 Ple_i + \beta_3 Val_i + \beta_4 Rig_i + \varepsilon$
Model 13: $Y_{cns} = \alpha + \beta_1 Gdi + \beta_2 Ple_i + \beta_3 Val_i + \beta_4 Rig_i + \varepsilon$

Where Yi_{ns} represents the instant tools and Y_{cns} represents the constant tools of ICT while Knowledge sharing attitude are presented as Gd for perceiving it as good, Ple for pleasurable, Val for valuable, Rig for righteous.

H14: Knowledge sharing intention has a significant impact on the use of instant ICT tools.
H15: Knowledge sharing intention has a significant impact on the use of constant ICT tools.

Model 14: $Y_{ins} = \alpha + \beta_1 Wil_i + \beta_2 Req_i + \beta_3 IntF_i + \beta_4 Eff_i + \beta_5 Use_i + \varepsilon$
Model 15: $Y_{cns} = \alpha + \beta_1 Wil_i + \beta_2 Req_i + \beta_3 IntF_i + \beta_4 Eff_i + \beta 5 Use_i + \varepsilon$

Where Y_{ins} represents the instant tools and Y_{cns} represents the constant tools of ICT while Knowledge sharing intention are presented as Wil for willingness, Req for sharing knowledge on request, IntF for intention to increase KS in the future and finally Use for usefulness in the organization.

H16 Knowledge sharing behavior has a significant impact on the use of instant ICT tools.
H17: Knowledge sharing behavior has a significant impact on the use of constant ICT tools.

Model 16: $Y_{ins} = \alpha + \beta_1 Man_i + \beta_2 Bp_i + \beta_3 MM_i + \beta_4 IR_i + \beta_5 Exhw_i + \beta_6 Std_i + \varepsilon$
Model 17: $Y_{cns} = \alpha + \beta_1 Man_i + \beta_2 Bp_i + \beta_3 MM_i + \beta_4 IR_i + \beta_5 Exhw_i + \beta_6 Std_i + \varepsilon$

Where Y_{ins} represents the instant tools and Y_{cns} represents the constant tools of ICT while Knowledge sharing behavior are presented as Man for manuals, methodologies and models, Bp for best practices, MM for the knowledge transferred via mass media, IR for places or people from whom to retrieve information, Exhw for experience and knowhow and finally Std for skills arising from studies.

3. Methodology

3.1 Sample and data collection

To test the hypotheses developed in the previous section, a survey targeting a randomly selected sample of participants residing in Italy was drawn up and conducted in May 2015 using a snowball sampling technique (Wrenn, *et al.,* 2007). Through referral mechanisms, this technique provides researchers with an ever-expanding set of potential respondents (Goldenberg *et al.,* 2009) in a very inexpensive and efficient way. While this method can recruit an exponentially high number of participants, its main disadvantage is that it is based on a non-random sampling approach, which is considered a convenience, and a non-probability sample.

A draft questionnaire was pilot tested with 30 initial subjects that were students attending the Master on "Management and internationalization of business networks" at the "G. D'Annunzio" University of Chieti-Pescara (Italy) to ensure that its content and wording were free of typos, mistakes and misunderstandings. Students were invited to complete the online questionnaire by clicking on a link embedded in the e-mail. Following this initial stage, the students were invited to forward the revised online questionnaire by email and their Facebook profiles, to their friends, relatives and general contacts (over 18 years of age) residing in Italy. As

stated by Bhutta (2012, p. 57), "online social networking sites (SNSs) offer new ways for researchers to conduct studies quickly, cheaply, and single-handedly, especially when seeking to construct 'snowball' samples for exploratory work".

A total of 622 questionnaires were returned. Of these, 12 were discarded due to missing data. The final result consisted in 610 usable questionnaires. The snowball technique applied created an additional 592 responses or a net incremental effect of 1, 933% based on 610 useable responses. The data was analyzed using various quantitative statistical techniques, including factor analysis and multiple regression analysis. The results are presented in Tables 1, 2 and 3.

3.2 Measurement of variables

The questionnaire consists of two parts. The first part of the survey consisted of questions regarding respondents' demographic characteristics, such as age, gender, position/title, education, field/sector, type of organization, and duration of employment. The second part invited participants to state the extent to which they agreed or disagreed with specific statements on KS behavior, intention, attitudes and associated beliefs together with their level of use of ICT applications. The statements and measures included in the questionnaire were developed on the basis of theory and previous studies (e.g. Bock and Kim, 2002).

Statements were specifically chosen to investigate respondents' perceptions and attitudes towards KS. The use of ICT is measured by asking respondents to state their usage level of the given tools for KS. All observations about the use of ICT were analyzed by following principal component analysis and named as instant, constant and hybrid tools. Responses were recorded on a 5 point Likert-type scale, with the anchors "strongly agree = 5" and "strongly disagree = 1". The resulting data is ordinal and can only be strictly analyzed in a very limited and descriptive way through frequency counts. However, it has been decided to treat the data points as representing five equidistant values. The assumption clearly is that the data is interval. Even though the data is not interval (strictly speaking) it is conventional procedure to subject the data resulting from Likert scales to statistical tests designed for interval data (Selltiz *et al.,* 1959, p. 367).

3.3 Constructs of variables

The construct of KS intention is developed by observing the following variables: willingness, acts on request, intention to increase in the future, effectiveness and usefulness to the organization. These variables are grouped and named KS intention by considering the results of the Principal Component Analysis (PCA) presented in Appendix 1-A. The construct of KS attitude is developed by observing the following variables: Perception, pleasure, value and righteousness. These variables are grouped and named KS attitude by considering the results of the PCA presented in Appendix 1-A. The construct of KS beliefs is developed by observing

the following variables: (1) Expected rewards in the form of money, career and benefits; (2) Expected associations in the form of bonding, socialization, networking, collaboration and communication; (3) Expected contribution in the form of problem solving, opportunity creation, process improvement, productivity and performance. These variables are grouped and named KS beliefs by considering the results of the PCA presented in Appendix 1-A. The construct of KS behavior is developed by observing the following variables: Sharing via manuals, best practices, mass media, repositories, experiences and studies. These variables are grouped and named KS behavior by considering the results of the PCA presented in Appendix 1-A.

The constructs of ICT are developed by observing the level of usage with regard to ICT tools: (1) Instant tools are developed in the form of using document sharing tools and voice over IP systems. (2) Constant tools are developed by observing the use of e-mail and intranet systems. Finally, (3) hybrid tools are presented by observing the use of social networking sites. These variables are grouped and named KS behavior by considering the results of the PCA presented in Appendix 1-B. In line with the purposes of this study - and understanding the impact of KS variables on the use of ICT constructs - hybrid tools are dismissed from the analyses due to the necessity to present the contrast between instant and constant use of ICT tools.

4. Main findings

This study aimed at finding the salient beliefs affecting an individual's KS attitude and applying Fishbein and Ajzen's model in the KS context to understand how these factors affect KS behavior. In addition, it attempted to explicate the role of IT as an enabler of KS behaviors. The hypothesized relationships depicted in Figure 1 were tested using IBM SPSS 23 by means of multiple regression analyses. Reliability analysis, performed on the cumulative data set, revealed a Cronbach's Alpha value of .861 which is considered as an adequate level.

4.1 Demography

Detailed descriptive statistics of the respondents' characteristics are shown in Table 1. Respondents' gender is equally divided and the age well distributed across the range. Employees and academics constitute more than half of the population. The education level is generally high, with three quarters of the participants having bachelors and masters degrees. Almost one third of them work in education/formation/research fields and the rest are employed in a variety of sectors. More than one third work in education/research type of organizations. The duration of employment (current or previous job) is evenly distributed.

*Tab. 1: Demographic profile of respondents**

Measure	Items	Frequency	Percent
Gender	Female	299	50.2
	Male	302	49.8
Age	<26	29	5.0
	26-30	120	20.8
	31-40	191	33.1
	41-50	136	23.6
	51-60	92	15.9
	>60	9	1.6
Position/Title	Manager	31	5.1
	Middle-manager	40	6.6
	Employee	171	28.3
	Blue collar	18	3.0
	Academic	174	28.8
	Other	170	28.2
Education	Primary	5	0.8
	Secondary	91	15.1
	Vocational	59	9.8
	Bachelors	251	41.6
	Masters	197	32.7
Field/Sector	Formation/Research	185	31.7
	Administration	56	9.6
	Commerce	36	6.2
	Management	31	5.3
	Human resources	28	4.8
	Marketing	24	4.1
	R&D	21	3.6
	Logistics/Distribution	20	3.4
	Project management	19	3.3
	Production	19	3.3
	Finance	16	2.7
	Other	155	22
Type of organization	University/Research	218	36.4
	SME	82	13.7
	Public entity	64	10.7
	Large corporation	52	8.7
	Multinational corporation	42	7.0
	School	33	5.5
	Other	108	18.0
Employment duration	Less than 3 years	163	27.6
	3-5 years	85	14.4
	6-10 years	109	18.4
	11-20 years	155	26.2
	More than 20 years	79	13.4

**Please note that for some answers the total is not 610 because of non-responses*

Source: our elaboration

4.2 Regression results

Based on the regression results it can be understood that H1, H2, H4 and H5 are partially supported. H3, with regard to expected contribution, has been found to have no significant relationship with KS attitude (Tab. 2).

Tab. 2: Regression results among variables of KS

Hypotheses	Variables	R Square	Beta/Sig
H1 Expected Rewards	Knowledge Sharing Attitude	0.215***	
	Monetary		.146**
	Career advancement		None
	Any benefit		-.118*
H2 Expected Associations	Bonding		.328***
	Socialization		.210***
	Networking		-.104*
	Collaboration		-.321***
	Common interests		None
H3 Expected Contribution	Problem solving		None
	New business opportunities		None
	Improved work processes		None
	Organizational productivity		None
	Reaching performance targets		None
H4 KS Attitude	Knowledge Sharing Intention	0.256***	
	Good		None
	Pleasurable		None
	Valuable		-.160***
	Righteous		.624***
H5 KS Intention	Knowledge Sharing Behavior	0.087***	
	Willingness		.160**
	On request		None
	Intention to increase KS in the future		-.232***
	KS effectiveness		.273***
	Usefulness to organization		None

***p<0.001, **p<0.01, *p<0.05

Source: our elaboration

In order to test the impact of the variables of expected rewards, associations, contributions and variables of KS attitudes, intentions and behaviors, the factor scores of ICT components (see Appendix 1-B) as instant and constant tools (hybrid tools are excluded because of their purposive frame) are regressed. The components of ICT are used as dependent variable while the other variables are used as independent. The list of models and hypothesis can be seen in Table 3 which includes the results of the regression analyses with regard to the use of ICT applications.

H6, H9, H10, H11, H12, H13, H14, H15, H16, H17 are partially supported, while H7 and H8 are not significant in relation "To ICT usage".

Tab. 3: Regression results among variables of KS

Dependent Variable: The use of ICT applications		Instant			Constant		
Variables		R Sq.	Beta/Sig		R Sq.	Beta/Sig	
			H6			H7	
	Model Summary:	0, 013		*	None		
	Monetary		-0, 15	*		None	
Exp. Rewards	Career advancement		0, 146			None	
	Any benefit		None			None	
			H8			H9	
	Model Summary:	None			0, 056		***
	Bonding		None			-0, 132	
	Socialization		None			None	
Exp. Associations	Networking		None			None	
	Collaboration		None			0, 189	***
	Common interests		None			0, 121	*
		H10			H11		
	Model Summary:	0, 047			0, 021		*
	Problem solving		None			None	
	New business opportunities		0, 246	***		0, 151	**
Exp. Contribution	Improved work processes		-0, 163	*		None	
	Organizational productivity		-0, 126	*		None	
	Reaching performance targets		None			-0, 137	*
			H12			H13	
	Model Summary:	0, 017		*	0, 025		**
	Good		-0, 081	*		0, 154	**
KS Attitude	Pleasurable		0, 111	*		-0, 124	*
	Valuable		0, 089	*		None	
	Righteous		-0, 082	*		None	
			H14			H15	
	Model Summary:	0, 019		*	0, 062		***
	Willingness		None			None	
	On request		0, 141	*		-0, 122	*
KS Intention	Intention to increase KS in the future		-0, 095	*		-0, 94	*
	KS effectiveness		None			None	
	Usefulness to organization		None			0, 297	***
			H16			H17	
	Model Summary:	0, 07		***	0, 039		**
	manuals, methodologies, models		None			0, 166	**
	best practices		None			-0, 164	**
KS Behavior	Knowledge from Mass Media		-0, 157	*		-0, 087	*
	from whom to retrieve information		None			0, 105	*
	own experience, know how		None			None	
	skills deriving from studies		0, 256	***		None	

***p<0.001, **p<0.01, *p<0.05

Source: our elaboration

5. Discussion

In line with the purpose of the study, salient beliefs affecting an individual's KS attitude are represented as expected rewards, expected associations and expected contribution. The factor analysis results place the measured variables of salient beliefs within these groups. In this study, instead of regressing factor scores, it was preferred to use all

the variables of salient beliefs in one model. The components of salient beliefs conceptualized these matters to clarify the impact on KS behavior. According to the results of the regression analyses, expected rewards and associations are partially supported as two major determinants of individual KS attitude: therefore H1 and H2 are partially supported. However, expected contributions are not statistically part of these measure determinants, resulting in the rejection of H3. This unexpected finding may be due to the reflection of the different expectations in between long term and short term. Along with salient beliefs, KS intention is also affected by KS attitudes when individuals find it righteous. Similarly, H4 is partially supported within the conditions of perception and pleasure which are not significantly part of these attitudes. The difference between long and short term benefits (i.e. immediate or sooner) that are expected by individuals probably plays a role in the determinants of intention for KS behavior. The results suggest that individuals' intentions are significant determinants of KS behavior. While willingness and effectiveness are positive determinants of KS intention, expected increase in KS for the future does not positively affect behavior, but it is negatively related. On the other hand, usefulness and acting on request are not significantly part of the KS intention. This may be the result of the interaction between individual and community instead of individual and individual. Therefore, H5 is partially supported.

Finally, results suggest that KS beliefs, attitudes, intentions and behavior have impact on the individual use of ICT, whether in instant or constant form. The only contrast in instant tools and constant tools becomes clearer when independent variables are selected as expected rewards and associations. Expected rewards can be supposed as the factor affecting the use of ICT only if it is in the form of instant tools. On the contrary, expected associations are a factor of ICT usage only if the tool is chosen as constant. When individuals display money and career advancement as expected rewards, they have a higher tendency to use instant tools to communicate and share information. In addition, when individuals expect collaboration, bonding or finding common interests as expected associations, they have a tendency to use constant ICT tools to communicate or share knowledge. Thus, H6, H9, H10, H11, H12, H13, H14, H15, H16, H17 are partially supported while H7 and H8 are not significant with relation to ICT usage.

6. Limitations

This study has several limitations, however it is important to mention that the topic of shared knowledge is almost mature in published literature. Nevertheless, sharing knowledge by using ICT still offers opportunities to conduct research in this era of digital evolution. Hence, some subtopics, such as the influence of ICTs on shared knowledge between managers and employees and within stakeholders operating collectively in firms' operations are still under researched. In addition, the topic of how stakeholders communicate and share knowledge presents new challenges and opportunities for firms to create competitive advantage by appropriately using ICT to manage, protect and disseminate sensitive data.

To keep the study focused on one geographic location and on one main demographic, the researchers decided to concentrate on one country and conveniently selected Italy where two of the authors reside.

For data collection the researchers used the snowball methodology, also referred to as the chain referral method, which offers great social visibility to locate a sample. However, it has its limitations. For this study the researchers faced several challenges:

- finding participants to start the "snowball - referral process";
- verifying whether the potential participants qualified for the study;
- engaging every future participant as a research assistant by briefly summarizing the situation to them telling a short story, thus motivating them to participate in the study;
- controlling the type of chains being created by each participant (an engineer would invite another engineer; a HR manager would invite another HR manager, etc.);
- monitoring referral chains' information content and dissemination and monitoring data quality.

The most evident "limitation" is related to the limited generalizability of the investigated sample from which it follows that our conclusions are only tentative. A second limitation is related to the fact that we only focus on the salient beliefs which affect the KS attitude because we assume that the KS behavior is motivated and executed mainly at the individual level.

Based on the foregoing, the results show (see Table 1) that a major limitation consisted in the choice of master students as the starting point for the application of the chain referral method. About 31.7% of the respondents worked in the research and development field and about 36.4% worked at a research institution or university. This could also explain why the Cronbach's Alpha value was well above the threshold, .861 and why the R^2 for hypotheses 1-5 were rather low: 0.215***, 0.256***, and 0.087*** respectively at ***p<0.001 level.

7. Managerial implications

Organizations may need to provide constant tools of ICT to direct its members to develop attitude, intention and behavior for enacting KS. Within this frame, they would have the ability to monitor the role of each determinant in knowledge accumulation among their members. This in turn would contribute to an organization's competitive strength.

In contrast, instant tools are preferred by members for their KS activity except for the salient belief of expected associations (not significant). Instant tools may provide insights about the conversations of organizational members. The matter of the sharing is probably a form of implicit knowledge which cannot be documented by means of constant tools. Besides, the sharing activity via instant tools may help organizations to solidify members' sense-making on knowledge management applications.

Further, more organizations should assist their members in transforming their sense-making to sense-giving so as to ease the codification of information that will in turn lead to improved KS. In this

way organizations may highlight circumstances and determinants of KS activity to comprehend the benefits of choosing between instant or face-to-face communication.

8. Conclusions

This paper attempts to identify the major determinants of individuals' KS attitude, and consequently attitude as a determinant of their intention to share knowledge. The impact of these determinants on the choice of ICT tools that enable KS is also tested and presented. Thus, ICT is involved in the entire process as the critical component of KS activity. Individuals' choice of ICT tools for their KS activity may provide powerful insights for comprehending the nature of these determinants. For example, the determinants of KS and the choice of ICT tools can be related with salient beliefs, attitudes, intention and behavior. Our results prove that there is significant relationship among determinants and tools. In future analyses, this relationship may be reversed in order to understand the impact of ICT tools on KS determinants. An appropriate knowledge sharing mechanism will contribute to the creation of competitive advantage, especially in regards to data communication, sharing and protection.

9. Recommendations

The current study is an initial exploration of KS human behavior and the role of ICT. Additional investigations are recommended to further explore the effect of ICT on the strategic management of knowledge sharing, especially within the digital evolution in regards to the creation of competitive advantage by appropriately using ICT to manage, protect and disseminate sensitive data.

The findings of the current study should encourage scholars to deepen the analysis, for example to focus on specific sectors or types of organizations. The role of social factors may also need to be studied in the future. For further studies, two new constructs, i.e. long term expectations and short term expectations, can be helpful to determine expected contribution as a major determinant of KS attitude.

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Appendix 1

A- Results for Knowledge Sharing
B- Results for ICT constructs

Appendix 1-A

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		, 882
Bartlett's Test of Sphericity	Approx. Chi-Square	9376, 343
	df	528
	Sig.	0, 000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8, 214	24, 892	24, 892	8, 214	24, 892	24, 892	3, 663	11, 101	11, 101
2	3, 369	10, 210	35, 102	3, 369	10, 210	35, 102	3, 628	10, 993	22, 093
3	2, 692	8, 158	43, 259	2, 692	8, 158	43, 259	3, 306	10, 018	32, 111
4	1, 840	5, 576	48, 836	1, 840	5, 576	48, 836	3, 035	9, 196	41, 308
5	1, 774	5, 377	54, 212	1, 774	5, 377	54, 212	2, 437	7, 383	48, 691
6	1, 468	4, 448	58, 660	1, 468	4, 448	58, 660	1, 928	5, 841	54, 532
7	1, 236	3, 746	62, 406	1, 236	3, 746	62, 406	1, 728	5, 235	59, 767
8	1, 117	3, 384	65, 790	1, 117	3, 384	65, 790	1, 667	5, 052	64, 819
9	1, 037	3, 142	68, 932	1, 037	3, 142	68, 932	1, 357	4, 113	68, 932
10	, 735	2, 228	71, 160						
11	, 677	2, 053	73, 213						
12	, 652	1, 975	75, 188						
13	, 606	1, 838	77, 026						
14	, 604	1, 831	78, 856						
15	, 574	1, 738	80, 595						
16	, 517	1, 567	82, 161						
17	, 487	1, 475	83, 637						
18	, 471	1, 427	85, 063						
19	, 435	1, 318	86, 382						
20	, 426	1, 289	87, 671						
21	, 398	1, 205	88, 876						
22	, 391	1, 184	90, 060						
23	, 379	1, 147	91, 207						
24	, 367	1, 113	92, 320						
25	, 365	1, 105	93, 424						
26	, 333	1, 008	94, 432						
27	, 322	, 976	95, 408						
28	, 303	, 919	96, 328						
29	, 295	, 895	97, 223						
30	, 262	, 795	98, 018						
31	, 243	, 737	98, 755						
32	, 238	, 723	99, 477						
33	, 173	, 523	100, 000						

Extraction Method: Principal Component Analysis

Rotated Component Matrix[a]									
	Component								
	1	2	3	4	5	6	7	8	9
Productivity	,862								
Process Improvement	,831								
Performance	,798								
Opportunity creation	,740								
Problem Solving	,659								
Experiences		,798							
Best Practices		,776							
Manuals		,737							
Repositories		,730							
Studies		,653							
Mass Media		,637							
Acts on Request			,794						
Willingness			,784						
Usefulness to the organization			,726						
Effectiveness			,723						
Intention to Increase in the future			,697						
Networking				,753					
Communication				,722					
Socialization				,719					
Bonding				,668					
Collaboration				,666					
Career					,893				
Money					,879				
Benefits					,874				
Pleasure						,749			
Value						,681			
Perception						,671			
Righteousness						,428			
Institutional Social Netw.Sites							,869		
Other Social Networking Sites							,842		
Voice over IP Systems								,832	
Document Sharing Systems								,824	
Intranet / Integrated Man. Softw.									,847
E-mail									,695

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization[a]

Appendix 1-B: Results for ICT constructs

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,635
Bartlett's Test of Sphericity	Approx. Chi-Square	749,893
	df	15
	Sig.	,000

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2,333	38,884	38,884	2,333	38,884	38,884	1,651	27,515	27,515
2	1,209	20,148	59,032	1,209	20,148	59,032	1,605	26,749	54,264
3	1,057	17,616	76,648	1,057	17,616	76,648	1,343	22,384	76,648
4	,578	9,632	86,280						
5	,443	7,375	93,655						
6	,381	6,345	100,000						

Extraction Method: Principal Component Analysis

Rotated Component Matrixa			
	Component		
	1	2	3
Voip	,864		
Instant Sharing Tools	,847		
Institutional Networking Tools		,892	
Social Networking Tools		,874	
Intranet Systems			,892
E-Mail			,721

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
Component 1: Instant tools
Component 2: Hybrid tools
Component 3: Constant tools

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