Information Use in Group Decision Making Teams

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ABSTRACT
We reviewed 22 papers to identify the most prominently studied factors related to information use in group decision making processes and explore the research gaps in this topic. We identified eight main factors of information use in the process: sense of group identity and group diversity, group heterogeneity or homogeneity, task perception, and personality/individual viewpoints; and access to information, argument analysis, communication medium, and decision rule. Our literature review suggested several research directions: investigations of the members’ motivations in sharing information; studies that use mixed research methods to examine a topic; and exploration of various information sharing and use modes besides verbal and written information channels.

Keywords
Information use, group decision making, literature review

INTRODUCTION
There have been a lot of research studies to examine various variables that affect the team decision-making process and outcome. These studies come from different fields such as Management, Psychology, Information System, and Information Science. The large amount of research related to decision making in groups has inspired researchers to review the literature in order to help synthesize our understanding of the team decision making research. For example, Lu, Yuan and McLeod (2012) reviewed the research studies about hidden profile tasks, tasks in which unique information is distributed among groups members, over the last twenty-five years. The authors studied 65 papers to bring together the research related to the topic thus far. By completing a very in-depth meta-analysis they found that Stasser and Titus’ (2011) work which found that groups discuss shared information more than individual information was confirmed in many ways. The also concluded that communication medium does not affect either information pooling or decision quality. Wilson (2010) reviewed research papers to explore the influencing variables for information sharing in the team decision making activities. He identified four variables that appeared to be independent of the decision-making domain: trust, risk, reward, and organizational proximity.

Interested in the current progress of information use studies in the team decision making context, we reviewed 22 papers to identify the most prominently studied factors related to information use in group decision making processes and explore the research gaps in this topic.

CORPUS
A search was conducted in January 2014 via the Web of Knowledge, Scopus, Wiley and Jassist databases using the search terms, “team”, “decision making” and “information”. This initial search resulted in the creation of a list of 100 articles.

We next eliminated six articles that were published in journals that held a ranking below a Q2 according to the SCImago Journal & Country Rank system. This ranking system uses information attained through the SCOPUS database and the Google page rank algorithm to assign rankings to journals from various fields. Then, we searched for the terms “team” and “group” in the abstracts of the remaining papers. We were left with a list of 71 articles.

We read the 71 abstracts to select those that focused on the information aspect of the team decision making activities. Many such articles were about the hidden profile tasks. As Lu, Yuan and McLeod’s (2012) literature review paper on hidden profile task research is very recent and comprehensive; we decided not to include these articles if they were published before 2012. Through our iterative filtering process, we had 31 articles remaining.

As we began to read papers, we found that some were not appropriate to the research, either because they focused on hidden profile tasks even though it wasn’t evident in the abstract, or because they did not focus closely enough on group information processes. We eliminated the inappropriate papers and went back to the list of 71 to select...
more papers. We did this until there were no more appropriate papers left on those lists. In total we read and coded 22 relevant papers.

CODING SCHEME
In the analysis of the papers, we are interested in their research goals and methodologies in general. We are specifically interested in the information aspect in the studies, e.g., the types/format of the studied information, the information behavior such as sharing and use, the factors of information sharing, and the impact of information sharing. Our initial coding list was comprised of 15 codes. The two authors read and coded three papers separately, then compared and discussed the results, and reached agreement. Based on this initial coding and discussion process, we finalized the code list that had 13 codes: research purpose, research finding, factors of information use/sharing, motivations of sharing information, types of information, format of information, methodology, discussion behavior, impact on performance, impact on information sharing, information flow, information design, and size of the studied group(s).

RESULTS
In the reviewed papers, the studied groups had two to twelve members with the majority of them focused on groups of three to five members and only one paper examined the groups of twelve members.

Of the 22 papers we reviewed, 14 used lab experiment approach, four modeling method, and four used other methods. We found that the authors that used modeling methods aimed to present a theory or model of group decision making that could be used to improve decision quality or increase our understanding of the process, e.g., Raghu et al., 2005, Karunakaran et al., 2013. The researchers who used the experiments sought to examine, determine, investigate, or identify specific factors and their influence on group decision making in particular group situations, e.g., van Ginkel and van Knippenberg (2008).

The four papers that used the methods other than the modeling and experiment had slightly different purposes. In Zorn et al.’s (2006) case study, the authors examined how the group situation and group work process affected the individual members. Taking an ethnographic approach, Solomon (1997) studied the effects of personal sense-making styles on group decision quality and efficacy. Carroll et al. (2006) analyzed error reports and surveyed employees of nuclear power plants in order to find linkages between group decision making teams and quality. Finally, Shelton (2006) applied group theory to jury processes with the intention of improving jury decision quality.

Motivations of Sharing Information
Bower (1965) used monetary rewards to influence the ways in which participants would share information. Because different groups were rewarded financially on different scales, individuals changed the ways in which they shared information. In another study conducted by Citera (1998), participants’ motivation to share information was influenced by evaluation apprehension.

However, in general, the motivation for sharing information was an under-studied area of research. For example, we did not find a study that compared different motivations and how they interacted with one another.

Types/Formats of Information and Information Design
All the 16 studies dealt with information that was delivered in an explicit form through either writing or group discussion. However, the type and format of the information was generally not a key component or factor in the research in these articles except Raghu, et al. (2005), De Dreu and Beersma (2010), Schulz-Hardt, et al. (2000), Spring and Vathanophas (2003), and Reimer and Katsikopoulos (2004). Raghu and his colleagues (2005) built a model to support group decision making through argument analysis. In order to identify argument strength, they take into account the difference between implicit and explicit information, which requires consideration of non-verbal and unwritten cues. By contrast, De Dreu and Beersma (2010) used purposely ambiguous information as a mediating factor in their experiment to explore the effects of group confidence. Other types of information that were used as variables in research were confirmatory and divergent (Schulz-Hardt, et al., 2000), unique and alternative (Robertson, 1980), peripheral social (Spring and Vathanophas, 2003), and in one case the lack of information (Reimer and Katsikopoulos, 2004).

Of the 22 papers the most common method of information design (10 papers) was to create groups with different member profiles (e.g., Reid et al., 1997). In other examples, rather than creating information divergence within a group, information design was an independent variable. For example, De Drau and Beersma (2010) provided groups with either ambiguous and unpredictable information or straightforward and predictable information.

Factors of Information Use/Sharing
In the reviewed studies, we found that the researchers sometimes manipulated the information flow in the group decision making processes at the group level (e.g., Bower, 1965) or at the individual level (e.g., Schulz-Hardt et al., 2000). The factors of information use and sharing relate closely with the manipulations of information flow, and also had different levels of influence on the group process and performance. We identified the following four main individual level factors: sense of group identity and group diversity, group heterogeneity or homogeneity, task perception, and personality/individual viewpoints. The first type of influence refers to how the manipulation affected the group members’ feeling of the group identity and group cohesiveness, to how strong group cohesion is among members. The second focuses on the internal make-up of the group’s heterogeneity or homogeneity in such issues as
physical proximity or received information. The task perception influence was induced by the manipulations of the task instructions or representations, i.e., the manipulations on the shared information among the group, so as to affect the group members’ understanding of the task at hand. The last type of influence refers to issues such as different sense-making styles or personality types within groups. Seven papers focused on one of these individual level factors, e.g., De Dreu and Beersma (2010), Schulz-Hardt, et al. (2000), and Alvarado et al. (2005).

From the reviewed literature, we also identified four main group level factors: access to information, argument analysis, communication medium, and decision rule. Access to information refers to the amount and type of information that the group had access to. Argument analysis refers to the process of assigning credibility or strength to different statements or arguments. Communication medium refers to the way in which the group members communicated with one another. The decision rule refers to whether teams were instructed to reach a decision unanimously or through a majority rules process. Three papers focused solely on one of these group level factors. Also, eight papers examined both individual and group level factors. For example, in Propp’s (1997) study, the author examined the pre-discussion preferences of group members (personality/individual view points) and the valence of a piece of information (argument analysis) in order to determine how groups reach decisions.

Factors other than the seven most prominent discussed included: evaluation apprehension (Citera, 1998), cognitive load (Raghu et al., 2005), time scarcity (Reid et al., 1997), the group size (Shelton, 2006), vigilance (defined as explicit, consistent, conscious attention to decision making process) (McLeod, 2013), and cognitive ability (Devine, 1999).

Impact on Information Sharing

It has been shown that information sharing positively impacts performance by Shelton (2006), van Ginkel et al. (2009), and van Ginkel and van Knippenberg (2005). We identified six factors that were associated with increasing information sharing. They are conflict, task-related differences, psychological safety, shared task representations, unanimous decision rule, and vigilance. Of these six, task related differences was the most strongly associated with increased information sharing as three different papers made the connection: Propp (1997); Rink and Ellemers, 2010; and van Ginkel et al. (2009). Also, one paper found that shared task representation created the same effect (van Ginkel and van Knippenberg, 2008).

Personality was found to have different effects on information sharing depending on many mitigating variables. Citera (1998) found that less dominant group members shared more information over less immediate (computer or telephone) media than in face-to-face situations whereas more dominant personality types shared the same amount of information across media. Solomon (1997) found that some personal sense-making styles will encourage information sharing whereas others may hinder it. This was also affected by the dynamic of certain groups. Shelton (2006) similarly found group decision process can be affected by other variables which cause it to increase information sharing in some circumstances while decreasing it in others.

It was shown from the selected papers that group confidence, cognitive conflict, and computer-mediated peripheral social information had no effect or negative impact on information sharing (Raghu et al., 2005; Bower, 1965; Reid et al., 1997; Dre Dreu and Beersma, 2010, van Ginkel et al., 2009 and Devine, 1999). These factors were also shown to negatively affect performance.

Similarly, three of the six factors are shown to increase information sharing also positively impact performance. Shared task understanding/goals was shown to be positively related to both information sharing and group performance (Schulz-Hardt et al. 2000) as were the use of a unanimous decision rule and vigilance (Karunakaran et al., 2013 and McLeod, 2013).

DISCUSSION AND CONCLUSION

In our literature review, we noticed that the motivations of sharing information in group decision-making have not caught sufficient research attention. As discussed above, information sharing is intricately linked with decision quality. More investigations on the motivations could shed light on possible methods to improve group decision quality.

Another area for further research is to begin combining some of the methods discussed in these papers. The papers reviewed in this study did not include a combination of modelling with actual team experiments or case studies. By testing models for application in real situations, their function in this field could be strengthened. Similarly, it would be useful to see some of the conclusions drawn through experiments reflected through case studies of actual working teams. Sumpter et al. (2012) also made similar suggestion for future group studies.

Different modes of group processes were looked into in the reviewed studies, e.g., face-to-face, computer mediated, etc. However, non-verbal cues such as body language or visual information was not studied. More research should be explored in this direction, e.g., the motivations of using and sharing non-verbal information for group decision-making and the factors of this information sharing style.

A major limitation of our literature review study was the limited coverage. Our next step is to exhaust the literature search for papers that focused on one or more of the identified factors of information use/sharing for a more comprehensive understanding of the effects of these factors.
REFERENCES


