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Decision-making effectiveness: The role of IT use, decision processes and organizational culture

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Abstract
This paper proposes and studies the relationship between individual and group decision-making effectiveness and organizational culture, organizational decision processes, and individual decision-making practices. This study has been motivated by the fact that although behavioral aspects and managerial processes are crucial determinants of outcomes in organizational decision environments, they have remained an understudied area. In particular, while decision-making techniques and tools have received a lot of attention, the process of decision-making and decision-making effectiveness has yet to be seriously studied – especially in the context of IT-enabled decision making. After developing the research model, survey data were collected from 1355 respondents in 32 organizations. One of the main findings was that the importance of individual as well as group decisions. Individual decisions are far more likely to be influenced by organizational processes and procedures and technology while group decisions are far more likely to be influenced by organizational culture. In addition to this finding, we discuss many of the subordinate findings and provide implications for future research as well as managerial practice – with particular emphasis on the use of information technology for decision making.

Keywords: Decision making, decision process, organizational culture, effectiveness
Introduction

Decision making has remained a conceptual challenge because of the inherent complexities associated with the concept. These complexities arise due to the multiple lenses like behavioral, analytical, political, and organizational among other factors that can be used to understand the concept. This richness and intractability associated with decision making is captured by Langley et al. (1995) who show that decision making processes are driven by the emotion, imagination and memories of decision makers,” and even when a decision is isolated, the process leading up to it can not be. We agree with their conclusion that decision making must be studied at the individual and collective levels by incorporating the organizational culture and the context where decisions are made. However, in the past, the approach to study decision making has been dominated by the normative and rational (notwithstanding, bounded) approach inspired by Simon (1960).

The variety of the determinants of effective decision making and the existing intellectual void associated with our understanding of how these factors interplay amongst each other characterize the state of research on decision making today. Therefore, our paper is as much motivated by the need to provide a theoretical model as it is to uncover the complexities associated with framing the problem and analyzing and interpreting the results that emerge from such a study.

Although decision making is so central to individual and collective activities in organizations, the outcome of the process of decision making has remained surprisingly understudied. Therefore our approach to this study was to retain the richness of the phenomenon while studying the relationship between known but less researched determinants of decision making effectiveness in organizations.

The logic of this study is premised on the adage that the quality of any process determines the quality of the outcome of that process. The essential argument we make in this paper is that individual and organizational processes that are cognate to decision making determine the effectiveness of decision making (Mawby, 2005).

This paper achieved two objectives. First, the notion of effectiveness or quality associated with decision making has been formalized. Secondly, we have, to some extent, been able to disentangle the “interwoven networks of issues (Langley et al., 1995)” associated with decision making by delineating processes at different levels of abstraction that have an impact on decision making effectiveness. These processes pertain to organizational culture, the decision domain and the individual decision maker.

The rest of the paper is structured as follows. First, we introduce and clarify the notion of decision making effectiveness and then present the three determinants of decision making effectiveness. This section concludes with an integrated research model that helps frame hypotheses about individual and group (collective) decision effectiveness. The next section explains the research methodology and covers how we operationalized the constructs, collected and analyzed the research data. After
presenting the results of the analyses, we discuss the results and provide implications for both practice and theory.

Theoretical background

Since decision making encompasses both thought and action, we take up factors like organizational culture, individual practices and organizational processes as potential determinants of decision making effectiveness. Before we theorize the relationships between decision making effectiveness and its antecedents, we clarify our conceptualization of decision making effectiveness.

Decision making effectiveness

According to Keren and de Bruin (2003) assessing how good (or bad) decisions are, is crucial to helping improve people’s decision making. An associated fundamental question has been whether decisions should be judged by the process (by which they were derived) or by outcome (and the associated consequences). Some, (Savage, 1954; Luce and Raiffa, 1957; Edwards et al., 1984; Lipshitz, 1989) advocate evaluating a decision on the basis of how it has been structured and modeled. Others like Herschey and Baron (1992) and Frisch and Clemen (1994) defend the focus on the outcomes. Since, in this study, we have conceptualized the outcome variable of interest as the outcome of decision related processes (for individuals and for collections or groups), we will consider decision processes and decision-related processes as the antecedents of decision making effectiveness – which is the outcome variable of interest.

Since our objective was to preserve the richness of the issues surrounding decision making, we based our inquiry on the situation-actor-process model (Sushil, 2000) that helps to address an organizational phenomenon more completely. We address how processes at each level are associated with decision making effectiveness. In the context of decision making, organizational culture provides the most generic type of situation; the actor is the decision maker; and the process of interest is the decision making process. We now discuss how each of these is related to decision making.

Organizational culture and decision making effectiveness

While there are multiple conceptualizations and hence definitions of organizational culture, we consider organizational culture to comprise of the attitudes, experiences, beliefs and values that prevail in an organization. The role that organizational culture plays in influencing decisions and in doing so, determining decision making effectiveness, has received attention. For instance, Berthon (2001) has shown that organizational culture influences managers’ perceptions of
decision-making context and consequently on the quality of the managerial decision.

From a process perspective, organizational culture represents high level routines and rituals that help to provide individuals a sense-making structure to develop a framework for their decisions and an evaluative context for their behavior. In general, people need to understand the meaning and implications of decisions before they know what decisions to make. This process of meaning creation can be considered to be the essence of culture. In that sense organizational culture has the potential to influence both thinking and behavior – and both these dimensions are adequately represented in decision making. Organizational culture has been linked to decision making across many studies. For instance, Burke et al. (2005) have shown using Hofstede’s culture dimensions (Hofstede et al., 1990) how high uncertainty avoidance is associated with formal rules for decision making and how high power distance is associated with centralization of decisions. The influence of organizational culture on decision making permeates through the entire organization. For instance, in the context of production and operations, it has been found that cultural values influence the locus of decision making and, as a result, the effectiveness of decisions depending where they are made (Koufteros et al., 2007). It has also been shown that organization cultures that foster dialogue and dissent appear to enable ethical decision making (Gottlieb and Sanzgiri, 1996).

Of direct relevance to this study are the results from Coeling and Wilcox (1989) who showed that differences in workgroup culture were able to explain a number of decisions that were made in the context of nursing administration. These studies that relate organizational culture to decision making reconfirm that cultural values can influence individual behavior (Mead 1978).

Decision processes and decision making effectiveness

The steps managers use to make decisions is called a decision process (Hitt and Tyler, 1991). Mintzberg et al. (1976) define decision processes as a set of actions and dynamic factors that begin with the identification of a stimulus for action and ends with the specific commitment to action. In essence, the steps that help understand how a decision is conceptualized, worked on and reached constitute a decision process. However, decision processes generally do not have neat sequences of steps implied in any typology (Null, 1984). In addition, decision processes exist at individual as well as organizational levels (Dean and Sharfman, 1996; Mintzberg et al., 1976). Using the generic argument that process quality determines the quality of the outcome of the process, it is reasonable to assume that the decision process determines decision making effectiveness. Dean and Sharfman (1996) provide evidence of such a relationship by demonstrating a relationship between the success of strategic decisions and the steps managers use to make them.

Since, decision processes can exist at the individual or the organizational levels of abstraction, these processes could be formal and sometimes these processes need not be formally defined. At the individual level, these processes could include
steps that have to do with search for meaningful information that could be useful for making the decision or the steps could form the basis for understanding the implications of taking the decision. For instance Dean and Sharfman (1996) mention that decision processes could involve the collection of information relevant to the decision and the reliance upon analysis of this information in making the choice. In general it can be argued that steps that form part of any decision process could respond to the need for “prospective, introspective and retrospective (Langley et al., 1995)” requirements of the decision maker. This is because people in organizations have differences in interests resulting from functional, hierarchical, professional and personal factors. It is also useful for decision makers to assess the acceptability and appropriateness of the decision that could end up influencing the decision itself.

An important aspect of a decision process is the use of information technology for seeking or exchanging information and, in many instances, processing such information using specialized decision support systems (Huber, 1990). However, past research has not resulted in unambiguous findings regarding the impact of IT use on decision making. For instance Todd and Benbasat (1992) have reported that the use of computerized support for decision making may not have a positive impact on decision quality usually assumed in the literature. Similar findings, that do not find a clear cut advantage of information technology for decision making, have been reported by Pezzo and Pezzo (2006) who found that using computer based decision aids may even reduce favorability of a decision after a positive outcome. Such ambiguous results relating information technology use for decision making in collective or group frameworks is also reported by Chun and Park (1998).

**Theoretical integration**

While we have been able to identify numerous studies that allow us to link organizational culture and decision processes to decision making effectiveness, taken together, their results are not coherent enough for us to develop fine grained hypotheses. Furthermore, organizational culture, decision process and decision making effectiveness (both at the individual level and at the group level) are multi-dimensional constructs. Based on the discussion in the section on the theoretical background for this study, we provide the research model shown in Figure 1.
Figure 1 shows the hypothesis that organizational culture has an impact on decision making effectiveness. There are many dimensions along which we can conceptualize organizational culture. Similarly there are multiple decision process attributes. Furthermore, given that there is more than one dimension on which we can assess decision making effectiveness, we state the research hypotheses in the null form,

**Hypothesis 1**: there is no relationship between organizational culture and decision making effectiveness.

**Hypothesis 2**: there is no relationship between decision processes and decision making effectiveness.

As is characteristic of many multivariate studies, the evidence against the null hypothesis can mount as the number of dimensions of the independent variable, found to be associated with the number of dimensions of the dependent variable, increases. We need to adopt this approach because just as organizational culture is inherently dynamic (Hatch, 1993), the nature of the decision-process construct is not normative (Rudnicka et al., 2005). This approach is also consistent to the one adopted by Kanungo et al. (2001) who studied the relationship between organizational culture and IT strategies.

We further hypothesize that attributes of organizational culture that are associated with individual decision making effectiveness will be distinct from those attributes that are associated with group decision making effectiveness. This is because, since both organizational culture and group decision making effectiveness are group constructs, their relationship will be less mediated compared to the relationship between organizational culture and individual decision making effectiveness. Results from social psychology (Levine and Moreland, 1998) further substantiate the phenomenon that when acting in groups, individuals may behave differently from when acting alone, and, as a consequence, group decisions may not necessarily be the simple sum (however aggregated) of individuals’ decisions in case they had acted alone. This allows us to refine our hypotheses further as is shown in Table 1.
Methodology

Data used to test the hypotheses come from a survey that was administered in 32 organizations. These organizations represented a wide cross-section of industry. The sampling plan was designed to ensure that organizations employing widely varying practices would be included. The sample of organizations included insurance companies, federal agencies, consulting organizations, hospitality services, banking operations, and defense contractors. The questions were designed such that multiple respondents answered all perceptual questions. This increases the probability of receiving accurate information on various aspects of organizational culture and decision making. We developed a questionnaire based on the operationalization of constructs described below. We received completed and usable responses from 1355 respondents.

Operationalization of constructs

Three constructs had to be operationalized based on the research model shown in Figure 1. They were decision effectiveness, organizational culture and decision processes.

*Decision effectiveness*

In assessing decision effectiveness, we followed the approach used by Dooley and Fryxell (1999) by employing a multi-item measure. However, we did not use their measure as it was based on process-oriented items. Trull (1966) also helped identify the notions of timeliness and acceptability of decisions as important dimensions of decision quality. We added two more items – correctness of, and satisfaction with, a decision – which are, respectively, objective and perceptual measures of the effectiveness of a decision.

*Organizational culture*

According to Wallach (1983) shared values, norms and beliefs of people in an organization can be mapped on to an innovative, supportive and bureaucratic culture. Wallach describes these as independent cultures, but in order to describe an organizational culture completely, all three elements – present in varying proportions – are required. Culture is, therefore, measured in terms of parameters describing these three elements. Covering almost all aspects of the organization culture,
Wallach provides a validated instrument for empirically assessing three forms of organizational culture. The three forms are briefly described below.

Bureaucratic cultures have clear lines of responsibility and authority; work is highly organized, compartmentalized and systematic. The information and authority flow is hierarchical and based on control and power. Overall bureaucratic organizations tend to be mature, stable and relatively cautious. Adjectives used for describing this culture are hierarchical, procedural, structured, ordered, regulated, established, solid, cautious and power oriented.

Innovative cultures are characterized by creative work environments. In such cultures challenge and risk taking are the norms. Stimulation is a constant companion to workers, but innovative environments also take their toll on people who often are under great stress and burned out. Adjectives used for describing this culture are risk-taking, result-oriented, creative, pressurized, stimulating, challenging, enterprising and driving.

Supportive cultures provide a friendly environment, and workers tend to be fair and helpful to each other and to the organization. An open, harmonious environment is encouraged and ‘family’ values are prompted. The adjectives used are supportive, trusting, equitable, safe, social, encouraging, relationships-oriented and collaborative.

**Decision process**

A decision process is made up of a set of actions or steps (Hitt and Tyler, 1991; Mintzberg et al., 1976). In operationalizing decision processes we identify steps or actions that individual decision makers take that pertain to either the individuals making the decision or to the procedures prescribed within the organization or those that have to do with the use of information technology in the context of decision making.

Individuals can take steps in the context of decision processes based on their volition or predisposition (Hickson et al., 1986). These include interacting with others to exchange ideas about the decision, consulting with domain specialists, following a standard set of steps, developing their own procedure to make decisions, and assessing the political implications of making a certain decision.

The second set of actions or steps pertaining to a decision process are organizational in nature. They are either formal requirements in an organization or form the basis for a shared expectation. For instance, an organization can have a well-defined decision process and a part of the standard operating procedures followed in the organization. Sometimes, business rules are so well laid out that they can help in, and form the basis for, decision making. On other occasions consensus is valued in organizations. In some organizations, dissent is valued while in yet others deliberation and discourse are encouraged as a part of the decision making process.

The third set of actions has to do with the use of information technology in the context of decision making. Decision makers often need to communicate with others and coordinate with their peers or experts. They could use general purpose
software like email or a groupware like Notes of Domino® to accomplish that. Decision makers can also use general purpose software like spreadsheets or specialized packages like Microsoft Project® for decision support.

Scale reliability and aggregation

Table 2 and Table 3 show that the scales used in this study are reliable and valid. The construct INDIVPROC (comprising of actions at the individual level constituting a decision process) shows weakness in terms of factor loadings (2 factor loadings are below .50). This appears to have pulled the corresponding Cronbach alpha (for INDIVPROC) to 0.559 which is the only one less than 0.6.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Composite Reliability</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDIVPROC Decision process - individual</td>
<td>0.625</td>
<td>0.559</td>
</tr>
<tr>
<td>ORGPROC Decision process - organizational</td>
<td>0.768</td>
<td>0.622</td>
</tr>
<tr>
<td>ORGCULT Organizational culture</td>
<td>0.797</td>
<td>0.616</td>
</tr>
<tr>
<td>ITPROC Decision process – IT use related</td>
<td>0.817</td>
<td>0.662</td>
</tr>
<tr>
<td>DECNEFFIN Decision effectiveness – individual level</td>
<td>0.780</td>
<td>0.624</td>
</tr>
<tr>
<td>DECNEFFGR Decision effectiveness – group level</td>
<td>0.817</td>
<td>0.811</td>
</tr>
</tbody>
</table>

Table 2. Reliabilities for measures

Table 3. Factor loading for measures

Since group decisions and organizational culture are group constructs, and further since we hypothesize that organizational level attributes influence individual level decision making, our unit of analysis was the organization. As a result, we aggregated all data to the organizational level of aggregation.
Results

The hypotheses were tested by assessing association between the sets of organizational culture, decision process and decision effectiveness variables. We employed correlations between the sets of variables. This method is suitable for research where complex interactions between multi-dimensional constructs are used to describe a phenomenon or when new relationships are being explored. We believe that these conditions describe the state of research here making correlation analysis an appropriate method.

Results for hypothesis 1

To test for hypothesis 1, we correlated the set of organizational culture variables with the decision making effectiveness variables both at the individual level and at the group level. The results of the correlation analysis are shown in Table 3.

<table>
<thead>
<tr>
<th>p-values appear in parentheses</th>
<th>INDIVIDUAL</th>
<th>GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CORRECT</td>
<td>TIMELY</td>
</tr>
<tr>
<td><strong>BUKE</strong></td>
<td>-0.56781</td>
<td>-0.5793</td>
</tr>
<tr>
<td></td>
<td>(0.0383)</td>
<td>(0.0333)</td>
</tr>
<tr>
<td><strong>INO</strong></td>
<td>-0.11292</td>
<td>-0.12066</td>
</tr>
<tr>
<td></td>
<td>(0.5383)</td>
<td>(0.4770)</td>
</tr>
<tr>
<td><strong>EQUA</strong></td>
<td>-0.28081</td>
<td>-0.01383</td>
</tr>
<tr>
<td></td>
<td>(0.1198)</td>
<td>(0.9401)</td>
</tr>
</tbody>
</table>

Table 4. Correlations between organizational culture and decision making effectiveness

It can be seen that, in general, organizational culture is related to group decision making effectiveness more strongly compared to individual decision making effectiveness. In the case of individual decisions, the effectiveness is negatively related to bureaucratic organizational cultures when it comes to correctness and timeliness of decisions. Acceptability of individual decisions is also negatively related to the strength of the equitable dimension of organizational culture.

Innovativeness and equitable dimensions of organizational culture are positively related with all dimensions of group decision making effectiveness. Barring the satisfaction dimension, each of the other dimensions is significant at the 5% level. While, the bureaucratic dimension is negatively related to all dimensions of group making effectiveness, the correlations are not significant.

Results for hypothesis 2 (decision processes and decision effectiveness)

There were three types of decision processes considered in this study. Correlations linking each of the three decision processes to decision making effectiveness at the individual as well as the group level are shown in Table 5, 6 and 7. Correlations significant at the 5% level are highlighted (p-values appear in parentheses).
Table 5. Correlations between individual decision processes and decision making effectiveness

<table>
<thead>
<tr>
<th>INDIVIDUAL</th>
<th>GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORRECT</td>
<td>TIMELY</td>
</tr>
<tr>
<td>INDIVFRO1</td>
<td>-0.13706</td>
</tr>
<tr>
<td>INDIVFRO2</td>
<td>-0.11164</td>
</tr>
<tr>
<td>INDIVFRO3</td>
<td>-0.08653</td>
</tr>
<tr>
<td>INDIVFRO4</td>
<td>-0.23833</td>
</tr>
<tr>
<td>INDIVFRO5</td>
<td>0.02163</td>
</tr>
</tbody>
</table>

Table 6. Correlations between organizational decision processes and decision making effectiveness

<table>
<thead>
<tr>
<th>INDIVIDUAL</th>
<th>GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORRECT</td>
<td>TIMELY</td>
</tr>
<tr>
<td>ORGFRO01</td>
<td>-0.27912</td>
</tr>
<tr>
<td>ORGFRO02</td>
<td>-0.05916</td>
</tr>
<tr>
<td>ORGFRO03</td>
<td>0.03265</td>
</tr>
<tr>
<td>ORGFRO04</td>
<td>-0.08463</td>
</tr>
<tr>
<td>ORGFRO05</td>
<td>-0.0369</td>
</tr>
</tbody>
</table>

Table 7. Correlations between IT use processes and decision making effectiveness

<table>
<thead>
<tr>
<th>INDIVIDUAL</th>
<th>GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORRECT</td>
<td>TIMELY</td>
</tr>
<tr>
<td>ITPRO01</td>
<td>-0.09428</td>
</tr>
<tr>
<td>ITPRO02</td>
<td>-0.21277</td>
</tr>
<tr>
<td>ITPRO03</td>
<td>-0.02106</td>
</tr>
</tbody>
</table>

Results in Table 5 (pertaining to individual decision processes) show only two out of 40 possible correlations to be significant. One correlation shows that in the context of making an individual level decision processes, following a pre-defined or standard set of steps is positively correlated with individual satisfaction with the decision. The other significant result points out that in the context of making an individual level decision processes, consulting with experts domain specialists is positively correlated with satisfaction with the decision when it comes to group decisions.

Results in Table 6 show that decision processes at the organizational level are related with group decision making effectiveness but not with individual decision making effectiveness. The results show that correctness of decisions is positively correlated with all organizational decision making processes. Satisfaction with decision making is correlated positively with four out of five decision making processes. Acceptability of the decision and timeliness of the decision are positively correlated with well laid out business rules in an organization and when disagreements and alternative viewpoints are encouraged.

The use of information technology in the context of decision making has marginal relationship with individual decision.
making effectiveness as shown by the single significant correlation for satisfaction with individual decisions in Table 7. Group decision making effectiveness shows a more pronounced relationship with IT use. Correctness of group decisions is positively correlated with all three type of IT use while satisfaction with group decisions is positively related with the use of general purpose communication and coordination software as well as specialized applications for decision support.

**Discussion and conclusion**

Our overall results are consistent with what we had hypothesized. While group decision making effectiveness showed a strong relationship with organizational culture, its relationship with decision process can be termed moderate. Individual decision making effectiveness was weakly related to both organizational culture and decision processes. We now take up some specific findings for discussion.

The role of IT did not emerge as important a determinant of decision making effectiveness as either decision processes or organizational culture. A major implication of this finding is that decision support systems in particular need to be designed, implemented and used so that they can be aligned to an organization’s culture. From the standpoint of IS research, these findings may appear discouraging. However, when seen in the context of the work by Soh and Marcus (1995), IT assets need to be used appropriately and supported by meaningful processes in order to result in IT enabled value. Clearly an information system (general purpose or specialized) is not enough when it comes to making effective decisions.

The role of organizational culture emerged as a strong influencer of decision making effectiveness. In particular, a bureaucratic culture is negatively related to timeliness and correctness of individual decisions while is not a significant influencer of group decisions. However, when juxtaposed with the finding that innovative and supportive cultures positively impact all group decision effectiveness dimensions, we have reasons to believe that certain organizational cultural traits tend to predispose an organization to effective decision making. Since every organization presents a cultural profile made up of bureaucratic, innovative and supportive dimensions, organizations can choose to target specific cultural values in the innovative and supportive dimensions to help enhance decision making.

Mature and established organizational processes, in the form of well laid out business rules encouragement of disagreements and alternative viewpoints, are positively related to effective group decision making. Clearly organizational processes have been shown to provide the requisite structure to facilitate effective decision making behavior. This finding assumes importance because it provides the basis for managerial conduct to facilitate and engender meaningful use of information technology in decision making contexts. A possible approach is by the choice of appropriate technologies such that business rules can be embedded in such systems; moreover, information systems need to show the requisite variety that can meaningfully enable and enhance the communication, information exchange and discourse surrounding any decision.
Findings from this research open up multiple avenues for future research. Given the polythetic nature of culture, we expect future research to identify how alternate conceptualizations of culture are related to decision making effectiveness. This study can form the basis for investigations that can help unravel the processes and organizational dynamics that form the basis for the reflexive relationship between organizational culture and organizational processes in influencing decision making effectiveness. This study represents an initial attempt at addressing the dynamic and complex linkages of decision making to individual and organizational factors that lead to the existence of multiple ambiguities and interactions.

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