Investigating Process-Parameters for Decision Quality in Software Development Teams

Sharon Coyle
sharon.coyle@sydney.edu.au
Business Information Systems, University of Sydney Business School
Sydney, Australia

Kieran Conboy
kieran.conboy@nuigalway.ie
Lero & Business Information Systems, National University of Ireland Galway (NUIG)
Galway, Ireland

Thomas Acton
thomas.acton@nuigalway.ie
Lero & Business Information Systems, National University of Ireland, Galway (NUIG)
Galway, Ireland

Abstract

This paper presents a conceptual model that collectively depicts three explicitly-cited process parameters for achieving group decision quality. The research proposes that the existence of any one of these three parameters can positively impact group decision quality in software development teams. Firstly, by encouraging a reasoning orientation and employing a method of group consensus by giving group members instructions or rules prior to their engagement in the decision-making process may improve decision quality. Secondly, divergent thinking, which results in a broad range of ideas being considered by a group, may be encouraged by minority dissent and positively impact decision quality. Finally, following an inquiry approach during group decision making (by promoting collaborative problem solving, testing and evaluating, critical thinking, constructive criticism and minority views) may also improve decision quality. It is envisaged that by investigating the existence of these parameters in software development teams we can better understand how to achieve decision quality in groups.

Keywords: Group Decision Making, Group Decision Quality, Software Development Teams

1. Introduction

According to Scholten et al. [28], “groups are commonly assumed to be better decision makers than individuals.” Group decision making is recognition that ‘the whole is greater than the sum of its parts’ (Aristotle) or that, ‘two heads are better than one’ because when members of groups “share the information they have, the group as a whole can access a larger pool of information than any one member acting alone, potentially enabling them to make better decisions” Dennis [10]. Enforcing this helps to reduce the impact of bounded rationality on decision making because it recognises that on an individual basis people can only contemplate a small number of decision alternatives [26]. In addition, to minimise individual cognitive biases, researchers have advised managers to include others in the decision-making process” by embracing a “team-based structure for decision making” [20]. This is conducted in order to maximise the potential for making informed decisions in environments that are subjected to rapid changes and inherent decision complexity such as that of software development. A rationale for a group approach to decision making is therefore “recognition that changes are occurring so rapidly that it is impossible for one decision maker to evaluate all the factors for an effective decision” (Thierauf, 1989, pg. 55). This is especially true in the
context of software development teams who consist of a cohort of team members with very diverse skillsets, perspectives and priorities.

The key rationale for a group approach to decision making “is primarily to enhance decision quality” [1]. Despite the importance of effective decision making, research has shown that “most leaders get decision making all wrong” and yet “leaders are made or broken by the quality of their decisions” [16]. While this conveys the importance of effective managerial decision making, it is also important to recognize its significance from a software development team and organizational perspective where “high quality decisions are expected to lead to more productive actions, quicker problem solving and better organizational performance” [11]. It has been asserted that in order to be able to “evaluate the quality of a decision, researchers must know the utility of the decision maker” as well as their objectives [26]. In a group setting, knowing the utility of a decision maker is an extremely difficult thing to capture because bounded rationality tells us that decision makers’ preferences are multi-criterion-based and changeable for a given choice “meaning that it is impossible to spell out an overall utility function for a given choice” [26]. The purpose of this paper is to investigate what constitutes group decision quality in the context of software development teams.

2. Group Decision Quality

In the context of information systems development, the primary goal of decision support systems (DSS) and group decision support systems (GDSS) is to improve decision quality [23] by helping groups and individuals maximize the potential for reaching an accurate decision. In DSS literature for example, the terms decision quality and decision accuracy are used interchangeably [34]. Decision quality is defined as “the deviation of a particular solution from the solution that would be provided in a normative strategy, such as expected value maximization or utility maximisation” [32]. In other words, a quality decision is a close as possible to an ideal decision that would be made using a normative model. It is the best decision that can be made within a specific environment or context that is subject to all the challenges associated with time pressure, incomplete information, organizational constraints and so on. In many instances, individuals are often willing to settle for imperfect accuracy in their decisions in return for a reduction in effort [15]. In a group context, this would be extremely problematic if each team member were to accept imperfect accuracy for decision making. A fundamental problem therefore of ascertaining the quality of decision making, particularly in a group context, is its measurement [31].

2.1. Outcome and Process-based quality parameters

Garvin and Roberto [16] explain that the reason managers get “decision making all wrong” is that they deal with decision making as an event forgetting the complex social and organizational contexts under which decisions need to be made. Complex social contexts are particularly relevant within software development teams where participants vary from business users to developers to project managers. “The fact is that decision making is not an event. It’s a process” [16] and there exists a “whole lengthy, complex process of alerting, exploring and analysing that precede that final [decision] moment” [30, pg. 1]. Therefore, ascertaining what constitutes decision quality can be process based. Historically however, decision quality has predominantly been evaluated utilising outcome information [3]. Common outcome information includes decision time [35], decision confidence [25, 27] and decision satisfaction [25, 27].

Although outcome-based information cannot be entirely relied on as a measure of achieving decision quality [3, 14], it is “remarkable how little attention has been given to this view” [12]. While the assessment of the quality of outcomes should not be neglected, calls have been made for approaches which assess the quality of the decision process [7]. In order to achieve decisions of higher quality there is growing “consensus of the need to consider decision process as well as decision outcome” [12]. According to Elwyn and Miron-Shatz [12], simply measuring decision outcome is not a meaningful indicator of quality. Conversely,
process-based considerations “are generally accepted by experts and analysts as being the fundamental drivers of decision quality” [2]. The rationale for this is based on the idea that ‘prevention is better than cure’ and an emphasis on process leads to an understanding of the effect on outcomes in improving decision quality [5]. For these reasons, this research examines process-based decision quality parameters.

3. Conceptual Framework

Whilst improving the quality of decisions is a “major area of concern to researchers and practitioners” [21], there are limited explicitly-cited decision process parameters for achieving decision quality in groups. By conducting an extensive review of literature, this section develops a conceptual framework for achieving group decision quality. We propose that the collective existence of these parameters can maximise the potential for decision quality in software development teams.

3.1. Reasoning Orientation

Innami [21] proposes a reasoning orientation for group verbal behavior which relates to the “degree to which group members exchange facts and reasons supporting positions in group discussion” where a higher reasoning orientation leads to greater contributions and better decision quality. This prevents groups from adopting premature solutions or reaching premature consensus and increases the quality of group decisions [21]. In the context of software development, the exchange of facts and reasons among project team members to support decision propositions is critical due to the fact that software development teams consist of a cohort of members with extremely divergent skillsets ranging from technical (e.g. system architect) to non-technical (e.g. business analyst). Hall and Watson [18]; Nemiroff and King [24] and Bottger and Yetton [4] outlined a set of ‘instructions’ for group discussions and decision rules that help to improve group decision quality. These instructions can be applied during the group decision making process in software development and have been summarized by Innami [21] as follows:

<table>
<thead>
<tr>
<th>Table 1. Group Instructions for Decision Making</th>
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<tr>
<td>1. Present your position as lucidly and logically as possible</td>
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<tr>
<td>2. Avoid ‘win-lose’ stalemates in the discussion</td>
</tr>
<tr>
<td>3. Avoid changing your mind only to avoid conflict and to reach agreement and harmony. Withstand pressures to yield</td>
</tr>
<tr>
<td>4. Avoid conflict-reducing techniques such as majority voting, averaging, bargaining, coin flipping and the like. Press for additional sharing of information</td>
</tr>
<tr>
<td>5. View the differences of opinions as both natural and helpful rather than a hindrance in decision making</td>
</tr>
<tr>
<td>6. View initial agreement as suspect. Explore the reasons underlying apparent agreements</td>
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</tbody>
</table>

Groups who are required to reach decision consensus are usually given instructions similar to those presented above, prior to their engagement in the decision making process. Such consensus groups are similar to any interacting decision making groups except, “members are instructed to follow specific guidelines designed to foster conflict resolving behaviours” [13]. Nemiroff and King [24] studied the difference between groups who were given rules or procedural instructions to be followed for group decision making and those who weren’t. Their findings revealed how “the quality of the decision produced by instructed groups” were “significantly superior to those produced by uninstructed groups.”

Proposition 1: Encouraging a reasoning orientation and employing a method of group consensus by giving group members instructions or rules [similar to those presented above]
prior to their engagement in the decision-making process may improve decision quality in software development teams.

3.2. Divergent Thinking

A primary function of groups is to reach consensus on a task or decision so the eventual convergence of ideas “is a natural consequence of demands made on groups to select one position that reflects the diverse member(s) preferences and perspectives [19]. Kaner et al. [22, pg. 20] discuss the process of divergence and convergence at length and their illustration is presented in Figure 1.

![Fig. 1. Diamond of Participatory Decision-Making](image)

The diamond of participatory decision making “describes the process a group goes through to solve a difficult problem” [22]. Its theory is based on two primary thinking processes; divergent and convergent thinking. Divergent thinking occurs when members of the group express their own point of view resulting in a broad range of ideas shown in the left quadrant of Figure 1. A lack of divergent thinking is said to impede group decision quality [17]. As ideas are deliberated and alternatives are considered there is an interim period where justifications and opinions are openly explored. This space can be typified by “a period of confusion and frustration” which is “a natural part of group decision making” [22].

Once the group passes this difficult stage, convergent thinking then occurs whereby the group will “want to narrow their differences and aim the discussion toward closer” [22]. By doing this a decision point will eventually be reached. The point of decision “is the point that separates thinking from action” [22]. Premature convergence in the early stages of decision making will have adverse affects on decision quality [1] and can relate to symptoms associated with groupthink particularly in agile software development teams [8]. Therefore, when a group lacks the motivation to search beyond their most obvious solutions they are unlikely to reap the benefits of divergent thinking which impedes their decision quality [17].

According to other authors [6, 9], minority dissent can encourage divergent thinking. Minority dissent occurs “when a minority in a group publicly opposes the beliefs, attitudes, ideas, procedures or policies assumed by the majority of the group” [9]. Minority dissent produces a ‘tension’ whereby the majority want to resolve such tension and as a result they must consider issues or ideas from multiple perspectives suggested by the minority; generating divergent thinking [9]. The dissenting minority “stimulates a majority to engage in a divergent thinking process which in turn results in better performance, decisions and creativity” [6].

In the context of software development teams there is a danger of team members ‘converging’ too early in the decision making process. Due to diverse skillsets, a broad range
of alternatives to inform decisions may not be generated on the basis that a particular decision may only be informed by one or two team members who possess the relevant skillset.

Proposition 2: Divergent thinking (which results in a broad range of ideas being considered by a group) may improve decision quality in software development teams.

Proposition 2(a): Encouraging minority dissent (whereby a group minority freely opposes assumptions) can encourage divergent thinking and therefore may improve decision quality in software development teams.

3.3. Inquiry

Garvin and Roberto [16] describe two extreme decision making approaches among groups known as advocacy and inquiry. The latter approach generates “multiple alternatives”, fosters “the exchange of ideas” and produces “a well-tested solution.” The former approach treats “decision making as a contest” [16]. Table 2 summarises the central themes associated with advocacy and inquiry.

<table>
<thead>
<tr>
<th>Concept of decision making</th>
<th>Advocacy</th>
<th>Inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose of discussion</td>
<td>Persuasion and lobbying</td>
<td>Testing and evaluation</td>
</tr>
<tr>
<td>Participants’ role</td>
<td>Spokespeople</td>
<td>Critical thinkers</td>
</tr>
<tr>
<td>Patterns of behaviour</td>
<td>Strive to persuade others, Defend your position, Downplay weaknesses</td>
<td>Present balanced arguments, Remain open to alternatives, Accept constructive criticism</td>
</tr>
<tr>
<td>Minority Views</td>
<td>Discouraged or dismissed</td>
<td>Cultivated and valued</td>
</tr>
<tr>
<td>Outcome</td>
<td>Winners and losers</td>
<td>Collective ownership</td>
</tr>
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</table>

On analysis of Table 2, it is apparent that inquiry is a much more balanced and desirable approach to decision making. Where minority views are cultivated and valued this encourages minority dissent (section 3.2) which can lead to divergent thinking. In addition, where the purpose of the discussion during decision making is to test and evaluate this can lead to the exposure of a ‘devil’s advocate.’ As stated by Walz et al. [33] a formal role of a devil’s advocate is to act as a “critic in order to help a decision maker test the assumptions and logic of the ultimate decision.” Groups following an inquiry approach can set out to ensure that one member plays the role of a devil’s advocate during decision making. This individual will criticise proposals made by the group, generate counterarguments to solutions and try to identify any weaknesses in their arguments [29]. Research has shown that exposure to a devil’s advocate improves the quality of group decision making [9]. Furthermore, it has been positively asserted that “a process characterized by inquiry rather than advocacy tends to produce decisions of higher quality – decisions that not only advance the company’s objectives but also are reached in a timely manner and can be implemented effectively” [16].

In the context of software development teams particularly those deploying an agile methodology; inquiry would be essential as the ‘outcome’ (Table 2), needs to be that of ‘collective ownership’ as the team works together cohesively to achieve an agreed outcome. If a decision making approach such as that of advocacy is found then it may negatively impact decision quality in these environments.

Proposition 3: Following an inquiry approach during group decision making (which promotes collaborative problem solving, testing and evaluating, critical thinking, constructive criticism and minority views), may improve decision quality in software development teams.
Proposition 3(a): Dedicating a formal role of a “devil’s advocate” to test assumptions and logic during group decision making may improve decision quality in software development teams.

Figure 2 summaries the conceptual framework illustrating the positive impact that each of the three explicitly-cited, decision-process parameters may have on achieving decision quality in groups in software development.

4. Conclusion and Further Research

The extent to which these process parameters exist in the context of software development teams is unknown. Therefore, further research investigation is needed to ascertain their existence in the context of software development teams and their resulting perceived impact on group decision quality. This framework therefore serves as a starting point in collectively investigating decision process parameters that can result in decision quality in group contexts. Prior research in relation to this has been extremely limited and no prior research has investigated this in the context of software development, which is highly dependent on the input, and collaboration of its team’s members’ to inform decision making. It is envisaged that by investigating the existence and relevance of these parameters in software development environments we can better understand how to achieve group decision quality in teams that are extremely dependent on specialised skillsets and the input of its members to inform decisions.

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References


