

Experience, Gender Composition, Social Presence, Decision Process Satisfaction And Group Performance

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Abstract

The aim of this paper is to examine the important relationships among social presence, decision process satisfaction, group member's relevant experience, and group performance. The effects of gender composition on social presence and decision process satisfaction were also examined. Seventy-two voluntarily university students which were randomly assigned into 24 three-member groups were asked to work on a decision making task. The main findings include that (1) there is a positive relationship between groups' perceived degree of social presence and their decision process satisfaction, (2) there is a positive relationship between groups' decision process satisfaction and group performance, (3) there is a positive relationship between relevant experience gained in the same organizational environment and group performance, and (4) social presence of mixed-gender groups is higher than that of same-gender groups. Also, relevant experience is a moderator of the relationship between decision process satisfaction and group performance.

1. INTRODUCTION

Decision-making is the conscious selection of one alternative among two or more [22]. Other definitions can be found [e.g., 31, 41, 55], but they all include the idea of choice among alternatives. Empirical research studies on group decision-making have been primarily concerned with the interpersonal process and social relations within small task-oriented groups [16]. Although these empirical researches contributed to the development of valuable normative models and descriptive theories of actual group decision behavior, some important issues remain relatively inadequately studied. Some of those areas include (1) how social presence (SP), decision process satisfaction (DPS), group member's relevant experience (RE), and group performance (GP) are connected, (2) what are the effects of gender composition on SP, DPS, that is, - Do group members perceive different social presence and decision process satisfaction under different group gender composition (same-gender and mixed-gender)? This paper tried to examine the above-mentioned issues by an empirical experiment.

2. LITERATURE REVIEW

2.1 Gender Composition

According to Steiner [70], one factor associated with group performance is group composition. Although there are some research studies comparing the performance of same-gender groups with that of mixed-gender groups, the results are often contradictory and inconclusive [e.g., 2, 36, 37, 38, 48, 53, 69]. For example, Hoffman and Maier [36, 37] found that mixed-gender groups outperformed same-gender teams, but Kent and McGrath [48] found mixed-gender groups performed worse than same-gender groups. Moreover, the above-mentioned research has only compared same-gender groups with balanced-gender groups. However, the proportion of men to women in a group is usually unequal. Only in a recent research by Rogelberg and Rumery [64], the effect of all kinds of gender compositions (same-gender, unbalanced-gender, and balanced-gender) was examined. In the writers' point of view, the main limitation of Rogelberg and Rumery's [64] research is that they did not consider the effects of experience on performance. Also, Rogelberg and Rumery [64] did not examine if gender composition has any effect on DPS although they used a decision making task. In this research, these issues are addressed.

2.2 Social Presence

Social presence is defined as the degree to which individuals perceive the others as being physically present during the communication process [67]. It has been stated differently as the extent to which an individual is thought of as being real during computer-mediated communication (CMC) [10]. Social presence theory [67] regards social presence as a subjective quality of communication medium although it must be dependent on the medium's objective qualities. The theory further argues that communication media that convey more nonverbal

cues such as physical distance, facial expressions, eye contact, body position, and intimacy of topic would lead to a higher degree of social presence. Therefore, media, which provide more communication cues, are seen as being human, sociable, personal, and warm. Social presence theory advocates that media with a high degree of social presence are better suited to ambiguous and equivocal tasks which require resolution of different views or opinions among people and lean media are better for uncertain tasks which require quick transmission of information and facts. A lot of research about social presence has been done on various learning activities [e.g., 8, 15, 29, 30, 33, 47] because of the importance of social presence in a learning environment [67]. The main finding is that social presence is positively related to academic performance [15, 47] and satisfaction [8, 29, 30, 33]. However, social presence was not found to influence the degree of group consensus in a decision-making experiment [78]. This is contradictory to what predicted by social presence theory which argues that a high level of social presence helps people to overcome and to reconcile their differences of opinion in decision-making tasks [67].

2.3 Decision Process Satisfaction

According to Simon [68], decision-making process (DMP) involves four major phases: intelligence, design, choice and implementation. The DMP starts with the intelligence, where reality is to identify to problem. In the design phase, the process design is to identify potential alternative solutions. The choice phase includes selection of proposed solutions. Upon the proposed solutions seems to be reasonable, we are ready to implementation. A successful implementation results in solving the real problem. Group decision-making can be considered as a social process, which takes individual preferences and concatenates them into a single group preference [28]. Therefore, group decision-making process is essentially a complex interactive process [20, 55]. Decision process satisfaction measures the contentment of group members with their decision making process [28]. According to Baltes et al. [5], one general point of consistency of many experimental studies which have examined the impact of communication media on group decision making process and outcomes is that the various communication media can be generally described by the extent to which the media are synchronous and the extent to which the media convey para-verbal and nonverbal aspects of communication and thus to the extent that a particular medium is high on one or both of the two dimensions, the greater will be the satisfaction with the communications and decision making process.

2.4 Relevant Experience

Past research has shown that experience (either task experience or group experience) has a significant effect on individual or group performance [e.g., 7, 9, 19, 39, 49, 54, 57]. However, the task experience in the above-mentioned research studies was exactly the experience individuals gained in performing the same kind task. Recently, Wong [76, 77] found that the experience (i.e. knowledge and skills) is the most significant input influencing task performance. As a result, in this research, we looked at the effects of relevant experience, which defined as the experience gained in any situation by performing any task, as long as the experience is relevant to the experimental task. In this research, we did not examine the effect of group experience.

2.5 Group Performance

In this paper, group performance is defined as how well the group carries out the decision they make but not the quality of decision although decision quality is often used as an indicator of group performance [e.g., 32, 34]. This is because what we are interested with is whether the group members' experience on their decision making process (i.e., social presence and decision process satisfaction) will affect the implementation of their final decision (in this sense, group performance) but not decision quality. There are number of studies [11, 66] which show that the relationship between the amount of experience and the performance. In the human performance theory, Campbell's theory [12] suggests that experience, knowledge, and motivation could affect task performance (see Figure 1).

$$\text{Performance} = f(\text{declarative knowledge, procedural knowledge and skills, motivation})$$

Figure 1: Determinants of task performance

In particular, Campbell [12] proposed that performance is a function of individual's declarative knowledge, procedural knowledge and skill, and motivation. Declarative knowledge is defined as knowledge required to complete a task. Procedural knowledge refers to skill-based knowledge about how effectively to perform a task. Declarative knowledge and procedural knowledge are based on education, training, experience and motivation.

3. RESEARCH HYPOTHESES

There are reasons to believe that groups, which perceive higher degree of social presence of a medium, will be more satisfied with decision process. Empirical research has shown that nonverbal cues such as eye contact and

gestures tend to decrease disruptions in the flow of communication and makes it easy to understand the discussion [e.g., 71, 72, 75]. Moreover, several studies comparing communication media report that group members are more satisfied with the process or have less difficulty when using rich media for tasks requiring group coordination [40, 52, 72]. With higher social presence, one is more likely to engage in socio-emotional communication, which focuses on the interrelationships among group members [4]. Kahai and Cooper [45] demonstrated that there is a positive relationship between positive socio-emotional communication and process satisfaction. The preceding discussion leads to the following hypothesis:

Hypothesis 1: There is a positive relationship between social presence and decision process satisfaction.

As mentioned before, social presence is found positively related to academic performance and satisfaction [8, 15, 29, 30, 33, 47], so the following hypothesis is proposed:

Hypothesis 2: There is a positive relationship between social presence and group performance.

Although a lot of research tried examine the effect of social presence [e.g., 8, 15, 29, 30, 33, 47], few tried to examine the relative influences of social factors on individuals' perceived social presence [78]. It seems that research on the effect of group gender composition on social presence is surprisingly rare, especially research comparing same-gender groups with mixed-gender groups. Previous studies showed that women will behave consistently with maintenance or socio-emotional roles and men will behave consistently with task oriented roles [e.g., 1, 3, 13, 23], so we expected that as the ratio of females increases in the group cohesion will increase. This is supported by Robinson and Smith-Lovin's [63] research in which they found that female-groups the rates of humor and successful humor are significantly higher comparing with mixed-gender groups and male-groups and many researchers argued that humor is a mean of building cohesion [e.g., 17, 26, 27, 65, 74]. However, this does not necessarily mean that female-groups will have higher cohesion scores than mixed-gender groups. According to Tolbert, et al. [73], social contact theory posits that diversity allows more contact and thus more opportunity to explore commonalities. Hence, diversity will produces greater group cohesion and concomitant effects, such as greater group effectiveness [61]. Moreover, the psychological minority phenomena [21] or critical mass [46] concepts argue that a small proportion of diversity in not only tolerated but also may be encouraged and this has been supported by the research of Knouse and Dansby [50]. Based on the above discussion and the fact that the positive effect of cohesion on social presence was tested by Yoo and Alavi [78], we have the following hypotheses:

Hypothesis 3: Social presence of mixed-gender groups is higher than that of same-gender groups.

As noted above, women behave consistently with maintenance or socio-emotional roles [e.g., 1, 3, 13, 23], so we expected more socio-emotional communication will occur with more female group members. Because there is a positive relationship between positive socio-emotional communication and process satisfaction [43] and again, diversity will produces greater group cohesion and concomitant effects, such as greater group effectiveness [61] as well as considering our Hypotheses 1 & 3, we have:

Hypothesis 4: Decision process satisfaction of mixed-gender groups is higher than that of same-gender groups.

Most of the research studies treated decision process satisfaction (although maybe under different labels) as a variable of group outcomes, just as decision quality, decision satisfaction, length of time to decision [e.g., 5, 28, 56], so it is not surprised to see that none of the literatures we reviewed tries to examine the effects of decision process satisfaction on group performance. The lack of empirical examination on the effects of decision process satisfaction upon group performance poses a difficulty to propose the relationship between the two variables in this research study. However, because most models of work group dynamics depict group processes (which describe how individual members work together to achieve desired performance) as critical factors influencing group performance [20, 32, 35], we believe that there should be a relationship between decision process satisfaction and group performance. Furthermore, two meta-analyses in psychology have demonstrated that job satisfaction and job performance are positively related [e.g., 42, 62]. Hence, we expect decision process satisfaction and group performance shall be positively related and thus have the following hypothesis:

Hypothesis 5: There is a positive relationship between decision process satisfaction and group performance.

As noted before, past research have shown that experience (either task experience or group experience) has a positive effect on individual or group performance under most circumstances [e.g., 7, 9, 19, 39, 49, 54, 57]. However, we want to explore if there is any different effect of relevant experience gained in the same

organizational environment and other organizational environments. According to Korman [51], the consequences of different (organizational) environments for behaviour are different. Hence, we think people may use the experience they gained in different environments in different ways and thus the experience individuals gained in different organizational environments may have different effect on group performance. We believe that the experience individuals gained in the same organizational environment will have a positive effect on group performance but doubt if there will be a relationship between the experience gained in other environment and group performance. Hence, we have:

Hypothesis 6: At least the experience individuals gained in the same organizational environment will have a positive effect on group performance.

A model shown as Figure 2 presents all the above-formulated hypotheses.

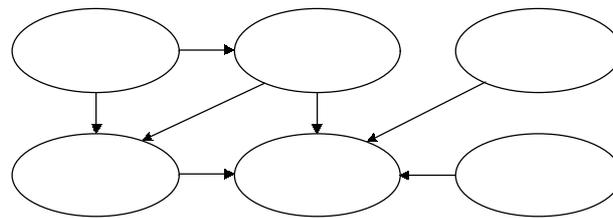


Figure 2 Research Hypotheses

4. METHODOLOGY

4.1 Experimental Settings and Subjects

A total of 72 subjects voluntarily participated in the research. The subjects were undergraduates enrolled in an information systems course at a large public university in Australia. All the subjects are majored in Information Systems. They were randomly assigned to totally 24 three-member groups. Table 1 shows the summary information of the subjects' gender, age, and year of school. Roughly, half of them are male, half are female. Most of them are between 21 to 25 years old. A great majority of them are 3rd year student.

4.2 Task

The task employed in this research was a project management exercise in which subjects were required to produce a wedding plan using Microsoft Project 2000. The requirements of the task included major and sub tasks design, milestones, resource allocations, and duration time for all tasks. Each group member required proposing his or her solutions for the wedding plan and all group members must agreed and selected one alternative from the proposed solutions. The aim of the task was to allow groups to perform decision-making process. Subjects were allowed to use Microsoft Project Manual during the exercise.

Table 1 Survey subjects

No. of Subjects	Gender	Age	Year of School
72	Male	37	16-20 16
	Female	35	21-25 55
			2nd 4
			3rd 64
			4th 4

4.3 Experimental Procedure

The experimental procedure considers six major steps: 1. Training – one-hour tutorial training on how to use Microsoft Project 2000; 2. Briefing the purpose of the task – lab supervisor distributed the task instructions and went through the requirements; 3. Assigning group – lab supervisor randomly assigned three subjects in a group.; 4. Performing group task – group member followed the requirements and performed the task; 5. Post meeting survey – all subjects completed and returned the questionnaire to the lab supervisor; 6. Debriefing – feedbacks and comments.

4.4 Measurement of Variables

Social presence was measured by using 4 questions taken from Short et al. [67]. Decision process satisfaction was measured by using five questions from Green and Taber [28]. The questions measuring social presence were anchored on seven-point bipolar semantic differential scales; the questions measuring decision process

¹ Pre-experiment survey showed that only 3 subjects had more than one hour experience with Microsoft Project 2000. Post-experiment survey showed that the performance of the three groups with these three subjects as one of their members were not significantly different with that of other groups.

satisfaction were rated on five-point bipolar semantic differential scales. Group scores for both variables were the average scores of all group members. Gender composition is a dummy variable coded 1 for mixed-gender group and 0 for same-gender group. Relevant experience was measured by the months of experience with software application except for Microsoft Project. In this research, relevant experience gained in the same organizational environment is termed as university experience, which refers to the experience gained in the process of university studying because the research participants are university students. On the contrary, the experience gained in other industrial environments is termed as industrial experience. Group scores for both university and industrial experience were the average scores of all group members. Group performance was measured by the grade assigned to the group project by the lecturer-in-charge (the first author). To assess the reliability of this measuring criterion, all the finished projects were also graded by another lecturer and then the interrater agreement between the two lecturers were assessed using the r_{WG} approach provided by James et al. [43]. The interrater agreement between the two lecturers was found to be .90 which indicated the above-mentioned group performance measuring criterion has a reasonable degree of reliability.

5. ANALYSES AND RESULTS

5.1 Reliability and Validity

Reliability and validity tests were conducted. Cronbach's [18] alphas of social presence and decision process satisfaction are 0.81 and 0.85 respectively, which shows good reliability based on Nunnally's Criteria [59]. A principal components factor analysis with varimax rotation exactly reproduced two factors, explaining 68 percent of the variance indicates both nomological and discriminate validity of the instrument (see Table 2).

Table 2: Factor Analysis

Variables	Questions	F1	F2
Decision Process Satisfaction	Inefficient vs. Efficient	0.88	
	Uncoordinated vs. coordinated	0.92	
	Unfair vs. Fair	0.75	
	Dissatisfying vs. Satisfying	0.73	
	Confusing vs. Understandable	0.70	
Social Presence	Unsociable vs. Sociable		0.81
	Cold vs. Warm		0.80
	Impersonal vs. Personal		0.79
	Mechanical vs. Human		0.76

5.2 Hypotheses Test

All data analyses were carried out on group level at a significant level of 0.05, two tailed. Pearson's correlation test was used to test the relationships among social presence, decision-process satisfaction, relevant experience, and group performance. Table 3 shows the results of the Pearson's correlation test. The results show that this is a positive relationship between social presence and decision process satisfaction ($r = 0.59, p < 0.01$); there is a positive relationship between decision process satisfaction and group performance ($r = 0.43, p < 0.05$); there is a positive relationship between university experience and group performance. However, this is no evidence that social presence is related to group performance ($r = 0.36, p = n.s.$). Hence, H1, H5 were supported but H2 was not supported. Although correlation analysis demonstrated the positive relationship between university experience and group performance, a regression analysis is necessary in order to test the cause-and-effect relationship. Also, because correlation analysis showed both decision process satisfaction and university experience are positively related to group performance, we want to know which variable is the most significant determinant of group performance. Hence, we carried out a set of regression analyses: group performance on decision process satisfaction, group performance on university experience, group performance on decision process satisfaction and university experience. Figure 3 shows the regression results. Hypothesis 6 was supported because university experience is a significant determinant of group performance. Analysis of variance (ANOVA) was used to examine the effects of gender composition on social presence and decision process satisfaction. The results are shown in Table 4. Hence, H3 was supported ($F_{1, 23} = 6.31, p < 0.05$) and H4 was not supported ($F_{1, 23} = 0.69, p = n.s.$).

Table 3 Results of correlation analysis on the relationships among GP, SP, DPS, & RE

	Group Performance	Social Presence	Decision Process Satisfaction	University Experience	Industrial Experience
GP	1.00				
SP	0.36	1.00			
DPS	0.43*	0.59**	1.00		
UE	0.49*	•	•	1.00	
IE	-0.31	•	•	0.41*	1.00

• Not tested because lack of theoretical base * $p < 0.05$, ** $p < 0.01$.

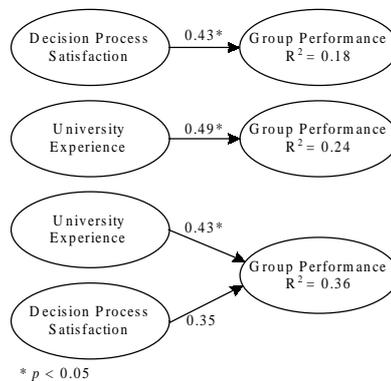


Figure 3 Results of regression analysis on GP, DPS, & RE

Table 4 Results of ANOVA analysis

Gender Composition	Social Presence			Decision Process Satisfaction		
	Mean	S.D.	F	Mean	S.D.	F
Mixed-gender Group	5.85	0.51	6.31*	4.40	0.47	0.69
Same-gender Group	5.21	0.74		4.22	0.58	

For all comparisons, $df = 1, 23$. * $p < 0.05$.

The supported hypotheses are presented in Figure 4.

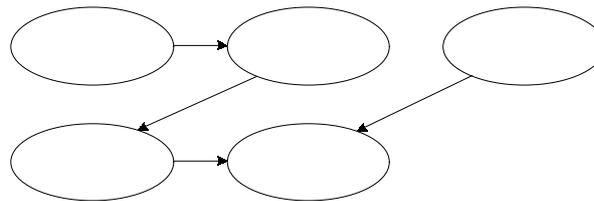


Figure 4 Supported Hypotheses

5.3 Moderator Effect of University Experience

The interesting thing is that the regression analysis shows that decision process satisfaction is no longer a significant determinant of group performance when it was regressed together with university experience (see Figure 3). It seems that university experience moderates the relationship between decision process satisfaction and group performance. To test the moderator role of university experience, a partial correlation analysis with controlling for university experience was carried out. Table 5 shows the results. The results support our guess that university experience is a moderator of the relationship between decision process satisfaction and group performance because after controlling the effect of university experience, the significant positive correlation between decision process satisfaction and group performance is no longer significant.

Table 5 Results of partial correlation analysis on GP, DPS, & RE

	Group Performance	Decision Process Satisfaction
Group Performance	1.00	
Decision Process Satisfaction	0.39	1.00

Controlling for University Experience

6. DISCUSSIONS AND CONCLUSION

The main goal in this study was to identify the relationships among social presence, decision process satisfaction, and group performance. Five main findings of this study are summarized and discussed below.

(1) There is a positive relationship between groups' perceived degree of social presence and their decision process satisfaction (H1 was supported). This demonstrates that social presence theory is a useful framework to explain and predict the differences in the extent to which group members are satisfied with decision process under different communication media. For example, it is obviously that face-to-face (FTF) groups should be more satisfied with decision process than computer-mediated (CM) groups because according to social presence theory [67] FTF communication processes higher degree of social presence than CM communication. This has been demonstrated by many research studies [e.g. 5, 56, 60, 71, 72]. (2) Social presence perceived by unbalanced

mixed-gender groups are higher than that perceived by same-gender groups (H3 was supported). This further confirms the claim that social presence is a subjective quality of communication medium [67], which means that perceived social presence of a medium was decided not only by the medium itself but also by the people who used the medium. However, because in this research all the mixed-gender groups are unbalanced in terms of gender, more research should be done on comparing with balanced mixed-gender groups. (3) There is a positive relationship between groups' decision process satisfaction and group performance (H5 was supported). Although the data supported the positive relationship between decision process satisfaction and group performance, the mechanisms that create this relationship are open to speculation. Perhaps although decision process satisfaction does not affect how satisfied group members are with the group's final decision [28], it will affect group cohesion which was defined as "the resultant forces that are acting on the members to stay in a group" [25] and thus affect group performance. This inference is based on the research findings that group cohesion was positively related to decision process satisfaction [56] and group cohesion has a positive effect on group performance [e.g., 14, 24, 44, 58]. However, the relationship between decision process satisfaction and group cohesion may be reciprocal and depend on the characteristics of the group. This means that in established groups, the cohesion-satisfaction relationship would be stronger than the satisfaction-cohesion relationship; however, in ad-hoc groups, the satisfaction-cohesion relationship would be stronger than cohesion-satisfaction relationship. Or, maybe when group members feel more satisfied with their decision making process, the more they are willing to put effort and use their experience and knowledge to implement their final decision. Nevertheless, these issues await further research. (4) The experience individuals gained in the same organizational environment have a positive effect on group performance (H6 was supported). Although this finding was very interesting and may help researchers to explore why the experience and performance relationship is always controversial in many research studies, the writers have to say more research needs to be done in this direction because there is at least another way to interpret the result, that is – because of the performance measurement. As we mentioned before, in this research group performance was measured by the grade assigned to the group project by the lecturer-in-charge. However, because the norms and standards used to judge what is good performance or bad performance are different with those used in industrial environments, if we ask someone from industrial environment, he/she may grade the group performance differently and thus industrial experience may have a more significant effect on group performance if the students know that their performance will be assessed by people from industrial environment. Hence, although H6 was supported, the writers would like to say the conclusion about experience-performance relationship is exploratory in nature. After all, this experiment is only a pilot test. (5) The experience individuals gained in the same organizational environment (in this research, university experience) is a moderator of the relationship between decision process satisfaction and group performance. In the writers' opinion, this means that although high decision process satisfaction may make group members intend to finish the task better, how well they can finish the task still depends on the relevant experience they possessed. However, the moderation function of relevant experience may be a step function as shown in Figure 5. This is because even the group members are very satisfied with their decision process and thus have strong desire to finish the task, but because they do not have enough experience (before point A), their performance can be only slightly improved; same, if the experience they have reaches to a certain level (after point B), no matter how satisfied they are, also their performance can be only slightly improved because they can finish the task almost perfectly. Only between point A and B, the moderation effect of experience on DPS-performance will be significant. This is just our inference because we do not have any evidence to specify the exact point at which the step in the function occurs and the point at which the function ends. We further suppose that there is a lot of other variables will moderate the relationship between decision process satisfaction and group performance, such as group goal, task complexity, etc.

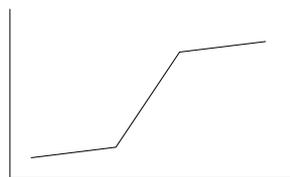


Figure 5: An illustration of the moderation function of RE

Although the effect of gender composition on decision process satisfaction was not significant, it may be due to the pilot test nature of this experiment in which the sample size is quite small. Anyway, the mean DPS score of mixed-gender groups (4.40) is higher than that of same-gender groups (4.22) and the variance of DPS scores of mixed-gender groups (0.47) is lower than that of same-gender groups (0.58). This fact, in the writers' opinion, demonstrated the effect of gender composition on decision process satisfaction in a directional manner. One point must be noted here, although the mean perform score of same-gender groups (5.76) is higher than that of mixed-gender groups (5.06), we cannot infer that same-gender groups outperform mixed-gender groups, even in

a directional manner. This phenomenon is actually caused by the fact that the mean university experience of same-gender groups (34.42) is higher than that of mixed-gender groups (23.32).

6.1 Implications and Future Research

These findings can have some implications for researchers and managers. For researchers, the finding that there is a positive relationship between decision process satisfaction and group performance indicated that treating decision process satisfaction solely as group outcomes may be inappropriate. It should be treated as group process variables as well, just as group potency, cohesion, etc. Further research on group decision-making should pay more attention on the roles played by decision process satisfaction. Also, since gender composition affects group members' perceived social presence, researchers must pay attention on the groups they used when carrying out communication research. They should check if their dependent variables are affected by gender composition. In the writers' opinion, if this conclusion held in CMC some research studies done in CMC should be reviewed because gender composition was not considered although gender difference was noted. Moreover, since this research found different experience might have different impacts on group performance, the characteristics of experience should be considered when carrying out experience-performance related research.

For managers, they should pay attention to the quality of the decision process when making group decision because the quality of the decision process is important to attain better performance. Since social decision schemes do affect the quality of the decision process [28], when it is possible, decision schemes that lead to higher decision process satisfaction should be chosen. Furthermore, managers in organizations must carefully consider the benefits and damages brought by their selection of communication media on group performance when making decision. For example, choosing computer-mediated media may save travel expenses. However, due to low social presence of CM media, low decision process satisfaction will occur and thus the group performance will be impaired. Moreover, when managers arrange groups to perform tasks, they should consider the gender composition of the groups. Even when managers want to recruit a new staff for a department, they better consider the gender composition after the new staff is assigned to the department. Furthermore, when managers assign a task to a group, they should consider the relevant experience of the group members, especially the experience that group members gained in the same working environment. The research finding on experience-performance relationship can also help human resources managers to make a better selection of potential employees.

The current research findings suggest a few research issues for future studies. The mechanisms that create the positive relationship between decision process satisfaction and group performance await future research. Although the moderation effect of relevant experience was supported by the data, the exact role played by decision process satisfaction in group decision-making and its relationship with other group process variables, group outcome variables should be more extensively examined. For example, whether group goals will moderate the relationship between decision process satisfaction and group performance? Another valuable way to extend this research study is to examine if the effect of social decision schemes on decision process satisfaction will be moderated by media conditions because this study has found that decision process satisfaction is affected by social presence that is a subjective quality of different media. Moreover, more research can be done on whether the effect of gender composition on perceived social presence holds or not across different media conditions. This is especially meaningful and useful for new media research, for example, CMC. Furthermore, the effects of group size can be examined. For example, if group size affects the effects of gender composition? Other issues, such as task complexity, leadership, can also be incorporated in future research.

6.2 Limitations

One of the limitations of this study was the sample was small (N = 24 groups). In fact, small sample sizes are a common limitation plaguing many group-based research studies [cf. 6, 52]. However, although it could have contributed to lack of support for some of our hypotheses, full support was found for four of the research hypotheses. Another limitation of this study was its laboratory setting. Laboratory experimental study is normally limited by its low external validity although its internal validity is high. As a result, the generalization of the research findings into real world contexts should be done cautiously. On the other hand, one potential problem of internal validity is the selection effect. Selection effect is due to natural variation of human performance. For example, random assignment of subjects may accidentally create an elite team. Therefore, differences in-group performance may be in fact the differences in the above-mentioned groups' natural ability.

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