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The Effects of Permanent and Rotating Leadership on Team Performance

Nisakorn Wattanasiripong[*], Karen Wang[**], Chartchai Leenawong[***]

Abstract

Empirical research for studying the relationship between two leadership modes, namely, permanent and rotating leadership, and team performance is proposed. Permanent leadership refers to the situation when a team has only one leader throughout time period, while rotating leadership refers to the situation when every team member has an opportunity to be a leader for an equal amount of time. This research is conducted in post-graduate management classes at the University of Technology Sydney (UTS), Australia. The empirical result shows that permanent leadership is more effective on team performance than rotating leadership. This conclusion is based on the time limitation associated with the empirical experiments. As a complement to this work, an introduction of computational models closely related to the situations of those in the empirical research is also presented.

Key words: Permanent Leadership, Rotating Leadership, Team Performance, Computational Models

1 Introduction

In classroom environment, team activities have been becoming one of the most important parts for higher levels of education. It is popular not only in business programs (Siciliano, 2001) but also in several others (Adams and Slater, 2001). Teamwork assists students in getting familiar with working in the real world. It is an added value to employee who can work efficiently in teams (Schatz, 1997), (Thacker and Yost, 2002). In contrast, some researchers indicate that the teamwork in a classroom can be ineffective (Buckenmyer, 2000), (Jones, 1996) because many process problems may obstruct the team performance such as free riders or social

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loafers, skilless leader and so on. In case of the team having a leader, the leader is an essential person who can use various leadership roles (Yukl, 1989), (Sosik and Megerian, 1999) to motivate team members so as to achieve their good individual performances and thus the overall team performance.

Despite the importance of the leaders on the team performance, not much empirical research has been dedicated to examining this relationship, not to mention about non-empirical one. Particularly, the impact of leadership types or *modes* on team performance has not yet been thoroughly investigated. Consequently, this is an inspiration for both empirical and non-empirical research to be proposed in this paper in order to verify the significance of leadership modes on team performance. There are several modes (Markulis and Sashittal, 2006), (Erez, Lepine, And Llms, 2002) of team leadership commonly known; for instance, emerging, permanent, rotating, and designated leadership.

In this paper, team leadership modes are classified into two groups according to the time constraint, namely, *permanent* and *rotating*, whose definitions will be given later. Empirical research using questionnaire survey for team projects in undergraduate management classes is proposed. More precisely, the effects of leadership modes on team performances measured by the scales from the questionnaires and the grades the teams receive for their team assignments are investigated.

Accepted by most modern organizational behavior researchers, mathematical modeling and computer simulation are viewed as valuable tools (Robbins, Judge, Millett, and Waters-Marsh, 2008), (Ilgen and Hulin, 2000), (Rouse and Boff, 2005) in studying organizational behaviors with less time and money. As a result, the idea of modeling the two leadership modes computationally is suggested and served as a complement to this work.

In the next section, the empirical research conducted at University of Technology Sydney (UTS) along with its Hypotheses, methodology, and results is presented. Afterward, the introduction of the computational models for studying permanent and rotating leadership is rationally provided. Conclusion and suggestions of this research are presented in this final section.

2 An Empirical Survey at the University of Technology Sydney (UTS)

In this section, the methodology of the proposed study is first explained. It is followed by the measures and the analysis of the empirical results.

2.1 Methodology

Description and Hypotheses

An empirical survey for studying the relationship between leadership modes and team

performance is simultaneously carried out in six sections of the Managing People class at the School of Business, University of Technology Sydney (UTS) in Australia for the duration of one semester. In each section of the class, the students are approximately divided into eight teams, each of which basically consists of six members. As for the leadership modes to assign for each team, the total numbers of teams are split in half for the permanent and rotating modes. Once the teams have been formed, they are assigned equivalent and identical team projects for the whole semester.

In this research, the definition of the two leadership modes for investigation is given as follows. The first of the two modes, namely, permanent leadership, refers to appointing only one person to be as the team leader throughout the entire assignment time period. The appointed leader is chosen right after the first time period spent on the team members for getting acquainted with each other. Rotating leadership refers, in contrast, to the situation when each and every team member alternately assumes the leader position for an equal period of time.

Each time period in this survey comprises two weeks. The entire semester covers fourteen weeks in total. Therefore, the first time period or the first two weeks is used by the teams for getting familiar with each other. Then, the leader chosen after the first two weeks stays on in the leader position for the next twelve weeks for the permanent leadership case; whereas for the rotating case, each of the six members served as a leader for just two weeks until everyone has once become a leader.

In total, 288 questionnaires are distributed in class after the semester is over and the project is finished. 220 completed questionnaires were returned to their teacher, creating an overall response rate of 76.39 percent. The hypotheses of this research are stated in the following:

H_0: the effects of permanent and rotating leadership on team performance are not different.

H_1: the effects of permanent and rotating leadership on team performance are different.

Sample

Respondents in this study are 220 students from various classes which are taught by different teachers. An outstanding characteristic of this sample is that the men are a majority of the students. Secondly, the feature of this sample is related to the country where the student comes from. Almost all students are from Asia and some of them are from Australia and New Zealand, Western Europe, Middle East, America and Eastern Europe and Russia. Age group of students is a third feature of this sample. For instance, 87.7 percent are 20-29 years old, 10.9 percent are 30-39, 0.9 percent are

under 20, and the rest are above 40. The forth feature is the different educational background such as Science and Engineering, Marketing, Accounting, Finance, Economics, Health studies, Social Science, and others. The final feature of this sample is that almost all students had work experiences (37.3 percent in Science and Engineering, 10.5 percent in Marketing, 10 percent in Finance, 9.1 percent in Accounting, and the rest in other areas).

2.2 Measures and Analysis

The performance of each team is contributed by both the scores on the questionnaire and the final evaluation by the teacher on the team project with the ratio of 30:70. The questionnaire basically contains questions regarding how well the team performs as a whole. The same questionnaire is used in both permanent and rotating leadership cases. However, for the permanent case, the team performance is based on that one chosen leader only; while for the rotating case, the performance is based on an average of all rotating leaders.

Additionally, it may be difficult for team members to assess the performance of team using a single measure. Therefore, the team performance in the questionnaire is evaluated by a seven-point Likert scale with responses ranged from "strongly disagree" (1) to "strongly agree" (7). The Cronbach's alpha used in estimating the reliability of multi-item scales is reported for this questionnaire at 0.89 which is an acceptable value.

The teachers' evaluation on the team final work at the end of the semester comes from the quality of their presentation and the cooperation among the team members. To avoid the bias that could occur from giving points to the questionnaire by the team members, the teachers' grades are weighted higher at 70 %.

Analyses are carried out in two stages with the Statistical Package for the Social Sciences (SPSS) Version 16. First, descriptive statistics are used to analyze the demographic information of the respondents which has been reported in the previous section. The second stage is the reliability analysis and the T-test for two independent samples.

2.3 Results and Discussion

The major objective in this paper is to examine the relationship between leadership modes and team performance as evident by the questionnaire scores and the grades the team receives from the teacher. In order to test the hypotheses stating that the impacts of permanent and rotating leadership on team performance are not different, the T-test for two independent samples is used. The results of the T-test shown in Table 1 indicate that the null hypothesis is rejected. Therefore, the effects of the two

leadership modes on team performance are significantly different.

To take a closer look into the difference between these two leadership cases, in Table 2, the mean of the team performance for the permanent leadership case (79.78 out of 100) is better than that for the rotating leadership case (72.87 out of 100). This result seems to contrast with some people's common instincts. Due to the fourteen-week time limitation for this study, the permanent leaders have more time than each of the rotating leaders who has only two weeks in learning and adjusting themselves to fit into the team. Hence, this can be one of the contributing factors for the permanent-leader teams outperforming the rotating-leader teams in this study.

However, for the longer time period when rotating leaders are allowed more time in each turn on the leader position, the rotating-leader teams may perform better than the permanent-leader teams because the rotating leaders can realize the mistakes of the previous rotating leaders and find a way to fix them.

	T	**df**	**Sig. (2-tailed)**
Team Performance	-6.054	218	.000

Table 1. Results of the Two Independent Samples T-Test

	Group	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Team Performance	*Rotating Leadership*	112	72.87	2.16335	.18483
	Permanent Leadership	108	79.78	2.88322	.31647

Table 2. Group Statistics

3 An Introduction to the Computational Models

In this section, the ideas of constructing computational models for studying the impacts of permanent and rotating leadership on team performance are introduced. The objective of the models is to imitate the empirical situations previously presented but with less time and costs related to data collection and analysis. The parameters used in the models can be simply experimented with numerous values to portrait the practical situations available at hand.

3.1 The Permanent Leadership Model

The idea behind the computational model for permanent leadership is based on the fact that there is only one appointed leader for the entire time of the team existence.

Therefore, the performance of the team will depend mostly on that person's ability in learning about the team and how to motivate the team members to work more cooperatively for the team.

Generally, when a person tries to learn something new, it usually takes time to adapt him/herself in the beginning and thus the learning ability tends to increase slowly at first. After the adjusting period is over, the person will learn faster until his/her learning ability approaches its maximum level. Consequently, due to this constraint, it will be difficult for that person to improve his/her learning ability (Baran, 1986), (Ezey). This pattern of a person's learning ability is here proposed to be represented by a cumulative distribution function or *cdf* curve of a normal distribution, notationally, $\Phi(m,s)$. As illustrated in Fig 1, varied from person to person and reflected in the values of the parameters m and s, the learning ability forms an *S-shape*. For the x-axis to be viewed as time, the *cdf* curves will be shifted to the right so that at period 1, a person will have some learning ability to begin with as shown in Fig 2.

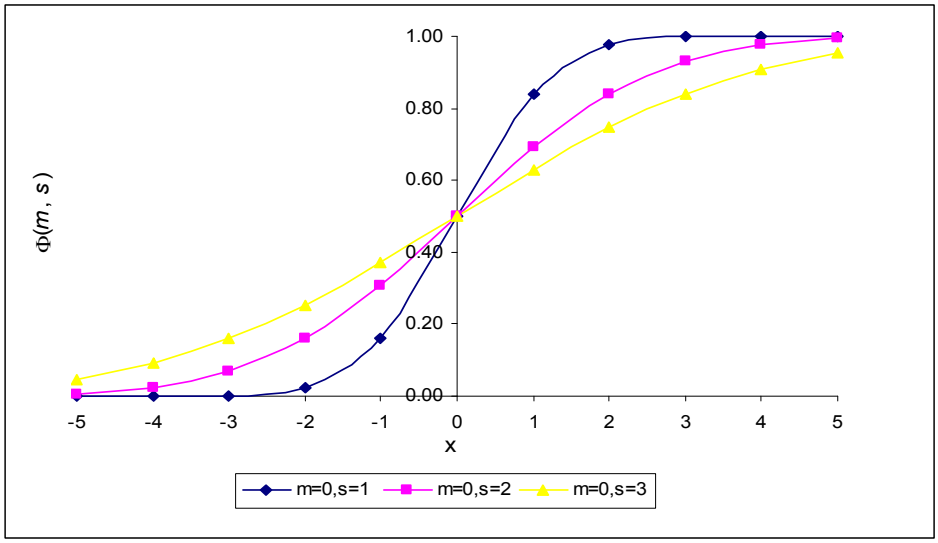

Fig 1. The cumulative distribution function (*cdf*) for normal distributions (m,s)

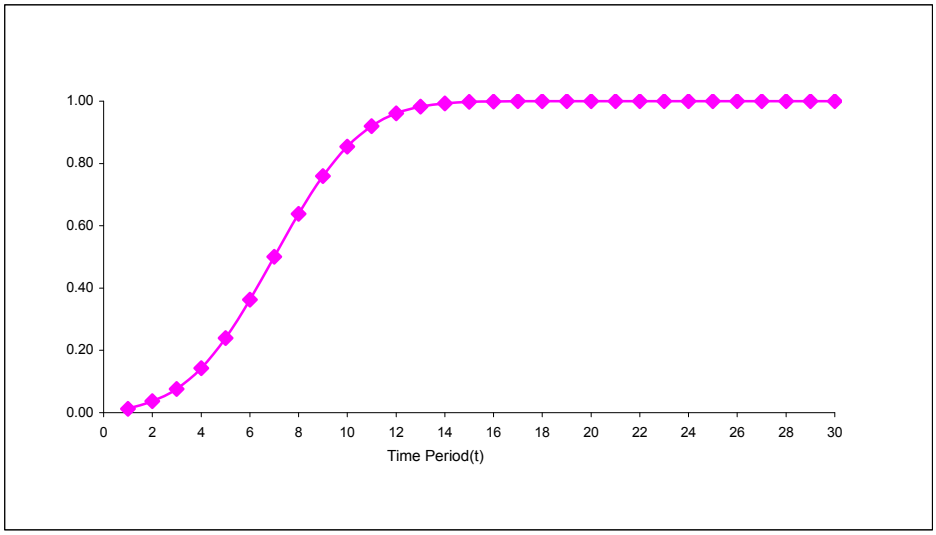

Fig 2. The shifted *cdf* curve of a normal distribution (m=0, s=2) or a person's learning ability curve

His learning ability level at time t, μ_t, obtained from a shifted *cdf* of a normal distribution will be used to find the team performance at each time period by using a *shifted normal distribution* with parameters μ and σ or $SN(\mu,\sigma)$ where $\mu = \mu_t$ and $\sigma = 0$. $SN(\mu,\sigma)$ is modified from an ordinary normal distribution $N(\mu,\sigma)$ so that the team performance obtained from $SN(\mu,\sigma)$ will be a number between 0 and 1 where 0 means poor performance and 1 means good performance. This $SN(\mu,\sigma)$ number can then be compared with a number generated from a uniform distribution in the rotating leadership model in the next section.

The way to generate a number from $SN(\mu,\sigma)$ is explained as follows. First a number x is produced from $N(\mu,\sigma)$ and then an $SN(\mu,\sigma)$ number is the area under the standard normal curve $N(0,1)$ to the left of that number x. In the next section, an idea for computationally representing the other leadership mode is proposed.

3.2 The Rotating Leadership Model

An important assumption of the following rotating leadership model that differentiates it from the previous model is that each team member now takes a turn (thus the word "*rotate*") in leading the team for an equal amount of time. Each member as a leader also has his/her own learning ability curve.

After an arbitrary team member is appointed for the leader position for one period, the leader position is rotated to another member for another period until each and every member has once become a leader. For this reason, it is further assumed that the number of time periods the team has a leader is equal to the number of team members.

Unlike the permanent leadership model, this model uses a uniform distribution for computing the team performance. More precisely, the team performance is generated from a uniform distribution between a lower bound a_t and an upper bound b_t at time period t, notationally, $U(a_t, b_t)$, where a_t and b_t are real numbers between 0 and 1 and $a_t < b_t$.

Nevertheless, the learning ability curve is still an important feature for this model as it is in the previous one. A learning ability level at time t, μ_t, is identified through each team member's personal learning curve. This value of the previous leader (μ_{t-1}) combined the previous team performance (p^{t-1}) determines the lower bound a_t of the current period by

$$a_t = (\mu_{t-1})(p^{t-1}).$$

The team performance of the current period is then produced from $U[a_t,1]$. With this concept, the lower bound is likely to move up and away from the minimum value of 0. This means that the next leader dependent on his/her learning ability has somehow learnt from the previous leader.

Even though each person has a different learning curve, the learning ability of any person still tends to move up as time passes by. The closer the learning ability level of the previous leader approaches 1, the closer a_t of the current period will get to the performance of the previous period. This can imply that the current period's team performance is only allowed to be slightly worse than the last period's for the reason that $p^t \sim U(a_t,1)$. Consequently, comparable to the permanent leadership model, the method for computing team performance here increases the possibility of team performance in reaching 1 over time.

4 Conclusions and Suggestions

In this paper, an empirical research for examining the impacts of permanent and rotating leadership on team performance is presented. A team with a permanent leader refers to the team that has only one team member served as a leader throughout the entire time. On the contrary, a team with rotating leaders refers to the team whose every member take a turn in becoming a leader for an equal amount of time.

The empirical experiment takes place in post-graduate management classes at the University of Technology Sydney, Australia. The performance of a team is measured by both the questionnaire rating and the grading judged by the teacher on the performance of the team's submitted project. The results of the empirical research based on the fourteen-week time limitation indicate that the permanent-leader teams are more effective than the rotating-leader teams.

The ideas of constructing computational models that try to replicate the empirical conditions have been introduced as a complementary to this work. The details of the

models are being carefully verified along with the on-going computer simulation experiments which thus far seem to gain promising and insightful results.

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