# Team Contest and Information Feedback: A Field Experiment

Chia-Wen Chen[1]; Josie Chen[2]; Min-Jen Lin[3]

[1]Academia Sinica, [2]National Taipei University, [3]National Taiwan University

## Abstract

- We study the effect of a team contest and whether providing feedback during the contest matters in a field experiment.
- Dorm room residents were randomly grouped into teams to participate in an electricity saving contest during summer peak hours. Teams were randomized to receive different contest/information treatments.
- While the cost of sending messages was only 5% of the total cost of contest prizes, it is effective. Overall, contest participants reduced electricity usage by 10% during the contest compared to the control group participants. However, participants receiving no contest-relevant feedback during the contest did not save electricity.
- We find that the inter-ranking information is more effective for "leading" teams, while intra-ranking information is more effective for "behind" members within their own teams.

## Introduction

Organizations often use contests or relative performance measures to encourage efforts from their agents. In this paper, we consider whether revealing ranking information to players during a team contest helps to increase total efforts. Revealing ranking information during a contest can affect participants' effort decisions through at least three channels: (1) revising participants' prior beliefs on the contest success function (the relationship between a player's efforts and winning probabilities), (2) as a reminder, and (3) by creating a social comparison effect. We perform a randomized control trial that assigns different structure about ranking information to participants in a team contest. The empirical setting is an electricity saving contest in residence halls at a major university in Taiwan. During the four-week contest, we sent weekly feedback to each individual team.
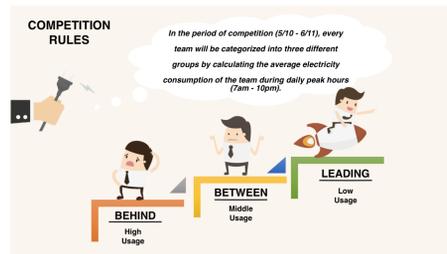


**Figure 1.** Team Construction



**Figure 2.** Competition Winning Rules

## Methods and Materials

- **Background**: The experiment was conducted in the 2017 spring semester at National Taipei University in Taiwan. We collected data from the university's dormitory electricity usage database, which includes real-time meter readings for every 15-minute interval of each individual room throughout the academic year. There are two types of readings: readings from 110 volt outlets (for regular appliances such as lights, computers, hair dryers, etc.) and readings from 220 volt outlets (air conditioners only). We were able to recruit 553 respondents from 216 dorm rooms to complete the baseline survey about their dormitory life.
- **Rule of the contest**: the top one third of teams that used the least electricity per person during the competition period (7:00 to 22:00 from May 10 to June 11) would be the winning teams. The expected amount of payment from winning was NT$150 (US$5) per person. Control group participants (not in the contest) received a lottery ticket with a prize value of NT$150.
- **Randomized control trial**: teams were randomly constructed. Each team consisted of 3 rooms (Figures 1 and 2). We randomly assigned teams to different treatment status: 1 control group that did not participate in the contest and 4 treatment groups with treatment status varying by their information feedback structure: (1) no contest-relevant information, (2) inter-ranking information, (3) intra-ranking information, and (4) both-ranking information. Member identities across rooms were kept anonymous in the contest. At 22:00 every Sunday night during the contest, we sent text messages as well as emails to each of the 553 study participants (control group and treatment groups).
- **Sample messages**:
  - Contest irrelevant messages: please put away the clothes after you finish the laundry as a matter of convenience, and also to avoid them getting rained on!
  - Inter-ranking info: the power saving of your team was "Leading" among all teams last week.
  - Intra-ranking info: the power saving of your room was "Between" within your team last week.
  - Both-ranking info: the power saving of your team was "Leading" among all teams, and your room was "Behind" within your team last week.
- **Method**: a difference-in-differences design under a randomized control trial. Let $y_{it}$ denote the outcome variable for the decision unit $i$ during time $t$.

## Contact

**Chia-Wen Chen**
Research Center for Humanities and Social Sciences, Academia Sinica, Taiwan

**Email:** cwzchen@gate.sinica.edu.tw
**Website:** http://idv.sinica.edu.tw/cwzchen/

## Results

- The estimated coefficients of the contest (without ranking information) are all small and insignificant in columns (1)-(4) in Table 1. We can reject the hypothesis that the contest itself helped participants to save electricity.
- The estimated coefficients for groups receiving inter ranking or both types of ranking information tend to be larger and significant, while those receiving intra ranking information did not behave statistically different from the control group participants.
- Estimated coefficients are larger when the average temperatures are higher and some efforts are required to suppress the urge to turn on air conditioners.
- The p-values associated with the hypothesis that both-ranking information is irrelevant in terms of total electricity usage and air conditioner usage are 0.097 and 0.106 for the full sample, and 0.034 and 0.041 for the restricted sample (hot days).
- Columns (5)-(10) provide estimation results by each room's position at the end of the first week (before receiving any information). We find that the inter-ranking information is more effective for "Leading" teams, while intra-ranking information is more effective for "Behind" rooms within their own teams (p-values of irrelevant information treatment are below 0.1).

$$y_{it} = \alpha_i + \alpha_t + \beta_0 1(\text{Week1})_t \times 1(\text{InContest})_i + \beta_1 (\text{InfoWeeks})_t \times 1(\text{No ranking})_i + \beta_2 (\text{InfoWeeks})_t \times 1(\text{Inter ranking})_i +$$

$$\beta_3 1(\text{InfoWeeks})_t \times 1(\text{Intra ranking})_i + \beta_4 1(\text{InfoWeeks})_t \times 1(\text{Both rankings})_i + \epsilon_{it}$$

**Table 1.** Effect of Ranking Information on Electricity Usage

| | All days | | Hot days | | 220V in hot days by position at the end of the first week | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) All Usage | (2) 220V | (3) All Usage | (4) 220V | (5) A | (6) B | (7) C | (8) a | (9) b | (10) c |
| 1(Week 1)×1(In Contest) | -0.009 (0.025) | -0.013 (0.025) | -0.000 (0.022) | -0.012 (0.022) | -0.065** (0.022) | -0.017 (0.027) | 0.046 (0.027) | -0.084** (0.020) | -0.003 (0.025) | 0.050+ (0.029) |
| 1(InfoWeeks)×1(No ranking) | -0.016 (0.026) | -0.016 (0.026) | -0.006 (0.027) | -0.012 (0.027) | -0.062* (0.024) | -0.001 (0.053) | 0.048 (0.038) | -0.133** (0.026) | 0.001 (0.035) | 0.096** (0.036) |
| 1(InfoWeeks)×1(Inter ranking) | -0.047+ (0.026) | -0.041 (0.026) | -0.041 (0.026) | -0.043+ (0.025) | -0.108** (0.024) | -0.016 (0.028) | -0.004 (0.044) | -0.136** (0.026) | -0.012 (0.036) | 0.019 (0.039) |
| 1(InfoWeeks)×1(Intra ranking) | -0.035 (0.026) | -0.034 (0.027) | -0.034 (0.027) | -0.041 (0.027) | -0.073+ (0.043) | -0.077** (0.022) | 0.029 (0.043) | -0.104** (0.029) | -0.018 (0.043) | -0.000 (0.031) |
| 1(InfoWeeks)×1(Both rankings) | -0.056* (0.027) | -0.056* (0.028) | -0.061* (0.027) | -0.066* (0.028) | -0.135** (0.024) | -0.094* (0.043) | -0.005 (0.034) | -0.136** (0.030) | -0.053 (0.036) | -0.009 (0.034) |
| p-value $H_0$: inter-ranking info irrelevant | 0.180 | 0.262 | 0.151 | 0.203 | 0.027 | 0.777 | 0.294 | 0.915 | 0.763 | 0.070 |
| p-value $H_0$: intra-ranking info irrelevant | 0.416 | 0.427 | 0.273 | 0.273 | 0.780 | 0.116 | 0.703 | 0.297 | 0.689 | 0.006 |
| p-value $H_0$: both-ranking info irrelevant | 0.097 | 0.106 | 0.034 | 0.041 | 0.000 | 0.135 | 0.201 | 0.919 | 0.184 | 0.007 |
| Observations | 141255 | 141255 | 65790 | 65790 | 30906 | 30906 | 30906 | 30906 | 30906 | 30906 |

*Notes*: The unit of electricity usage is kilowatt hours (kWh). 220V: usage from the 220 volt outlet. A: ahead across teams; B: in the middle across teams; C: behind across teams; a: ahead within the team; b: in the middle within the team; c: behind within the team. All regressions include room and hour-of-sample fixed effects. All standard errors are clustered at the team level. $^+ p < 0.10$, $^* p < 0.05$, $^{**} p < 0.01$

## Discussion

- Why does providing ranking information work? We look at participants' beliefs about their positions without ranking information from their self-report position in the endline survey. Tables 2 and 3 provide the relationship between a participant's actual inter-team and intra-team positions and those self-reported from the endline survey.
- It seems that without ranking information, participants tend to believe that their teams are in the middle across teams, regardless of the actual team positions (Table 2).
- We also find that without ranking information, those who contribute less within the team (behind within the team) tend to be over-confident about their contribution compared to their teammates (Table 3).
- We argue that our information treatment corrects these biases in beliefs, causing winning teams to keep exerting efforts and low-level contributors within the team to catch up.

**Table 2.** Beliefs about Inter-team Position and Actual Position

| | Actual position: A | Actual position: B | Actual position: C |
|---|---|---|---|
| No-ranking information | | | |
| Self-report position: A | 0.22 | 0.26 | 0.17 |
| Self-report position: B | 0.61 | 0.56 | 0.67 |
| Self-report position: C | 0.17 | 0.18 | 0.17 |
| Inter-ranking information | | | |
| Self-report position: A | 0.54 | 0.17 | 0.00 |
| Self-report position: B | 0.46 | 0.83 | 0.10 |
| Self-report position: C | 0.00 | 0.00 | 0.90 |
| Intra-ranking information | | | |
| Self-report position: A | 0.26 | 0.39 | 0.17 |
| Self-report position: B | 0.59 | 0.48 | 0.40 |
| Self-report position: C | 0.15 | 0.13 | 0.43 |
| Both-ranking information | | | |
| Self-report position: A | 0.76 | 0.25 | 0.00 |
| Self-report position: B | 0.24 | 0.60 | 0.21 |
| Self-report position: C | 0.00 | 0.15 | 0.79 |

*Notes*: This table reports the relationship between a participant's actual inter-team position in the contest and his/her self report position in the contest from the endline survey. A: ahead across teams; B: in the middle across teams; C: behind across teams.

**Table 3.** Beliefs about Intra-team Position and Actual Position

| | Actual position: a | Actual position: b | Actual position: c |
|---|---|---|---|
| No-ranking information | | | |
| Self-report position: a | 0.61 | 0.24 | 0.05 |
| Self-report position: b | 0.29 | 0.36 | 0.65 |
| Self-report position: c | 0.10 | 0.40 | 0.30 |
| Inter-ranking information | | | |
| Self-report position: a | 0.57 | 0.40 | 0.25 |
| Self-report position: b | 0.29 | 0.32 | 0.50 |
| Self-report position: c | 0.14 | 0.28 | 0.25 |
| Intra-ranking information | | | |
| Self-report position: a | 0.87 | 0.08 | 0.04 |
| Self-report position: b | 0.13 | 0.76 | 0.20 |
| Self-report position: c | 0.00 | 0.16 | 0.76 |
| Both-ranking information | | | |
| Self-report position: a | 0.97 | 0.00 | 0.00 |
| Self-report position: b | 0.03 | 0.81 | 0.05 |
| Self-report position: c | 0.00 | 0.19 | 0.95 |

*Notes*: This table reports the relationship between a participant's actual intra-team position in the contest and his/her self report position in the contest from the endline survey. a: ahead within the team; b: in the middle within the team; c: behind within the team.

## Conclusions

- Participants without information feedback may have wrong beliefs about their positions in a team contest. Feedback about ranking information is effective in helping participants correct their beliefs. Intra-ranking information helps heavy users within the team exert more effort. Inter-ranking information helps leading teams exert more effort.

## References

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