Structural effects of participation propensity in online collective actions: Based on big data and Delphi methods

Peng Lu

Department of Sociology, Central South University, China

HIGHLIGHTS

- The Propensity has three structural factors such as Interest, Rule, and Moral.
- The Energy model aggregating Interest, Rule, and Moral factors can be built.
- Interest, Rule, Moral scores of online collective actions are obtained via Delphi.
- Structural factors have positive effects, and explain the most part of propensity.
- Energy, deemed as the kernel, explains the most proportion of propensity.

ARTICLE INFO

ABSTRACT

The probability or propensity of participation or Internet users (individuals) shapes the evolutionary dynamics and final outcomes of online collective actions. This paper investigates the structural factors and the aggregate kernel that may influence or determine the propensity of participation for cyber collective actions. For structural factors such as Interest (I), Rule (R), and Moral (M), a structural model is built to explain the participate propensity and macro processes of online cases. The variable Energy is the aggregation of structural factors (Energy= Interest + Rule + Moral). We have 310 online collective actions with the numbers of participation and witness, based on which their participation propensity or percentage can be obtained. For each online collective action, three researchers (PJ, NS, and WZ) are invited to score the structural factors independently. Therefore, separate (from PJ, NS, and WZ) and averaged Interest (I), Rule (R), and Moral (M) scores can be obtained for each online collective action. Hence, the linkage between structural factors and observed propensity is built. The statistical analysis shows that Interest, Rule, and Moral have positive and significant effects on the propensity. Their joint explanatory power is much higher (adjusted R^2 around 90%) for propensity and even closed to 100% for its logarithm (adjusted R^2 around 95%). Energy aggregates the structural factors and avoids possible collinearities between Interest, Rule, and Moral scores. The single variable of Energy explains the most part of propensity (adjusted R^2 around 90%) and even more part of it (adjusted R^2 round 95%), which is why Energy is deemed as the kernel of online collective actions that determines the participation propensity.

© 2018 Elsevier B.V. All rights reserved.

1. Introduction

Online collective actions have produced great societal influences and political powers to governments both in China and the world [1,2], such as the Arab Spring [3–5] and Occupy Wall Street [6–8], which has been paid more and more

attention by scholars and researchers [1–9]. Online collective actions refer to the phenomena of online hot discussions of individuals [9–11]. Internet users interact with each other online [3,5,12], which attracts more individuals to participate and leads to concerns or intervene of related governments or other public agencies. Furthermore, online collective actions may lead to sequent offline collective actions, with a certain transition probability [13–15]. Therefore, online collective actions have the power or potential to influence, change, modify, and even reverse the public policies and public administrations made by the governments [16–18]. Among the research interests, this paper investigates the issue of participation propensity [4,9,13,14,18], and explores the structural factors or effects on this propensity.

The parameters are the cornerstone of predicting collective actions. The participation propensity (P_{BP}) is one of fundamental parameters of cyber or online collective actions. The participation propensity (P_{BP}) of online collective actions refers to the percentage/probability of participants (P) out of online witnesses or information browsers (B). Measuring the transitional probability, the participation percentage, or mobilization efficiency [4,9,13–15,18], P_{BP} is macroscopically a key macro-indicator of online collective actions on the big picture. Besides, P_{BP} also microscopically depicts the participation propensity of the typical individuals or Internet users. The participation propensity may be determined or shaped by different reasons or attributions of them. Online collective actions are commonly caused by a great deal of reasons or stimulants, such as rights protection [19–21], social welfare [20,21], human-flesh searches [22,23], moral concerns [23,24], environmental issues [12,23,24], public policies [16–18,23], people in poverty [25,26], demolition and resettlement [17], online donations [27–29], funny materials [23], disasters and emergencies [23,30], etc. All of these reasons or factors may influence the participation propensity, based on which a theoretical model is built to explain the participation propensity. In Fig. 1, three structural factors capture possible reasons and reflect the structural effects, which are the Interest [19–21,25,26], Rule [16–18,23,25], and Moral [22,23,31,32] orientations. Big data of 310 online collective actions are collected on the Internet (www.tianya.cn) to calculate the participation propensities of online collective actions. The total Energy in Fig. 1 (Energy Circle) that certain online collective action contains has the three-dimension structure of Interest (I), Rule (R), and Moral (M). In other words, the Energy is somehow the summation of structural scores of Interest, Rule, and Moral.

Each online collective action has three structural scores of interest (I), rule (R), and moral (M), which will be measured and estimated via the Delphi Method [33,34,25]. The Delphi method is applied to score three structural factors (orientations): three researchers (PJ, NS, and WZ) score them independently; the overall scores (mean) are therefore obtained. We compare the outcomes of the Overall scores and independent scores from PJ, NS, and WZ to check the reliability of Delphi methods [33,34]. The statistical analysis is applied to evaluate the structural effects of interest (I), rule (R), and moral (M). Then, the interest, rule, and moral scores are summarized to reflect the total Energy for each online collective action and Energy's effects on the participation propensity for the Overall, PJ, NS, and WZ. Estimating the factors of the propensity will certainly facilitate the real-time prediction of online collective actions.

2. Methods

2.1. Structural model of participation propensity

Based on reasons, catalyzers, and mechanisms of online collective actions, a theoretical model about participation propensity is built to evaluate the structural factors. Each online collective action has three structural factors: (A) Interest scores (I). Interest is the common reason or catalyzer of online discussions and interactions [17,23–29]. Many online collective actions are launched to pursuit or protect the interest of individuals, such as protect basic rights [19,23,24,26], helping people in poverty [25,26], online donations [27–29], more subsides of demolition [17], contests and competitions [23], etc. The interest score (I) measures the degree of how much the online collective action is Interest-oriented. The I is within the unit interval, i.e. $I \in [0, 1]$; (B) Rule scores (R). Rule is the generalized concept of rules and regularities that govern or influence the interest of pubic [16–18,20–24,35]. Lots of online collective actions are launched to fight unfair policies and reckless decisions made by governments, not for individuals but for the general public, such as Social welfare [20,21,23], public policies [16–18,23], environmental issues [12,23,24], regimes [3,4,22,35], etc. The Rule score (R) measures the degree of how much the online collective action is Rule-oriented, and $R \in [0, 1]$; (C) Moral scores (M). In cyber collective actions, the feature of public sphere is obvious [35–37]. The building and practice of public sphere facilitates the expression of moral (justice) concerns, which is the foundation of (online) collective actions [15,17,23,31,32]. Collective actions with moral concerns have more powerful influences and societal impacts, and they are spread on the Internet overwhelmingly. The Moral score (M) measures how much the online collective action is Moral-oriented, and $M \in [0, 1]$. For each collective action, the vector (I, R, M) is deemed as the structural vector, which captures the core feature and structure of them. And the core aim of this paper is to investigate the effects of structural factors on the participation propensity P_{BP}.

2.2. Big data collection and the Delphi methods

The Delphi method is widely applied to provide robust subject scorings of experts or researchers [33,34,38]. So we apply Delphi methods to score structural factors in Fig. 1. Big data of 310 online collective actions are collected from the portal website (www.tianya.cn), a famous BBS in China. For each case, the number of online browse and actual participation can be obtained, based on which we calculate the ratio P_{BP} in Eq. (1). For each case, three researchers (PJ, NS, and WZ) are invited to independently score its structural factors or orientations, following the procedure: (a) Case Search. Each researcher searches