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Exploring the effects of normative factors and perceived behavioral control on individual's energy-saving intention: An empirical study in eastern China

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ABSTRACT

Previous researches have explored the critical determinants that influence individual's energy-saving intention. However, these researches rarely focus on individual's energy-saving intention in developing countries and limited research has been conducted to explore the combined effects of normative factors and perceived behavioral control. In this study, an extended theory of planned behavior (TPB) model is employed to narrow this gap. The model is empirically tested using questionnaire survey data collected from 450 respondents in eastern China. The findings reveal that perceived behavioral control is the most decisive factor for individual's energy-saving intention. Meanwhile, attitude towards energy-saving and personal moral norm are also important factors. Two interaction terms (i.e., perceived behavioral control and subjective injunctive norm, and perceived behavioral control and subjective descriptive norm) are negatively associated with energy-saving intention, which implies that social norm plays an important role in motivating energy-saving behavior in the Chinese context. Furthermore, social norm increases the energy-saving intention of individuals who exhibit low perceived behavioral control. Based on the results, implications for improving individual's energy-saving intention, limitations of the study and suggestions for further research are discussed.

1. Introduction

Energy conservation is an active effort to reduce human impacts on the environment (Park and Kwon, 2017). In this connection, governments worldwide have launched various schemes to address the issue and promote energy conservation practices among individuals. In this regard, governments around the world have launched various programs to deal with this problem and facilitate individual's energy-saving behavior (Yue et al., 2013; Du et al., 2017). Intervention measures such as commitment, goal setting, information, and modeling would affect energy effectiveness (Abrahamse et al., 2005). A large number of these measures rely on the thinking of transforming energy-saving practices into a more normalized activity and encouraging people to participate in energy-saving practices regularly (Hori et al., 2013). It is essential for scholars and policymakers to get a thorough understanding of individual's intention to save energy in daily life.

Energy-saving has attracted wide attention, and several theoretical frameworks have been used to explore individual's energy-saving intention, such as social cognitive theory, the drivers-needs-actions-systems framework, and the theory of planned behavior (TPB) (D'Oca et al., 2017). Among these theory frameworks, TPB is commonly used

to predict and interpret different pro-environmental behavioral intentions and behaviors, such as energy-saving behavior (Ajzen, 1991; Chen and Knight, 2014; Gao et al., 2017; Sarkis, 2017; D'Oca et al., 2018). Moreover, TPB is more suitable for comprehending consumer energy efficiency behaviors, such as private energy conservation behavior (Sarkis, 2017). TPB comprises attitude, subjective norm, and perceived behavioral control (De Leeuw et al., 2015; Chen et al., 2016). TPB holds that an individual's behavioral intention is determined by positive assessment of behavior (attitude), social pressure advocating behavior (subjective norm) and perceived ease of implementing specific behavior (perceived behavioral control). Several studies have adopted TPB to empirically analyze some pro-environmental behaviors, such as electric vehicles adoption behavior (Shi et al., 2017b), recycling behavior at home (Greaves et al., 2013), general pro-environmental behavior (PEB) in workplace (Blok et al., 2015), energy efficiency behavior of individuals in large organizations (Chen and Knight, 2014), and solar water heaters and alternative fuel vehicles adoption behavior (Chen et al., 2016). However, some studies showed that subjective norm does not always lead to more pro-environmental behavior when considering the different degree of perceived behavioral control (Castanier et al., 2013; Shi et al., 2017b). Donald et al. (2014) suggested that subjective

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norm failed to influence the intention to drive. The relationship between subjective norm and PEB may vary depending on the context and the behavior studied (Donald et al., 2014; Yazdanpanah and Forouzani, 2015).

To improve TPB's predictive power, scholars tried to incorporate additional determinants in the TPB, such as personal moral norms, and divide specific fundamental determinants, for example, divide subjective norms into the subjective injunctive norm and subjective descriptive norm (De Leeuw et al., 2015). In previous studies, personal moral considerations (personal moral norm) and two types of social pressure (subjective injunctive norm and subjective descriptive norm) were confirmed to be critical factors influencing individual's pro-environmental behavioral intentions (Wang et al., 2014; De Leeuw et al., 2015; Shi et al., 2017a). However, previous studies rarely explored individual's energy conservation behavior in the Chinese context and considered the personal moral norm and two types of the social norm. Furthermore, it is still not clear whether there is a difference in energy conservation behavior when considering the varying degrees of normative factors and perceived behavioral control. Thus, it is crucial to develop a more thorough understanding of what motivates Chinese individual's energy conservation behavior, which has significant implications to deal with the increasingly serious energy overuse problems in China.

The rest of this paper is organized as follows. We will first review the previous literature and outline the research hypotheses in Section 2. In Section 3, the data and research methodology are presented. Data analysis and results are introduced based on structural equation analysis in Section 4, followed by the discussion and implication in Section 5. In the final section, the findings and policy implications for motivating individual's energy-saving intention, limitations of the study and suggestions for further research are discussed.

2. Literature review and research hypotheses

Individual's energy-saving intention refers to the individual's self-commitment to participate in energy-saving behaviors (Yang et al., 2016). Literature has analyzed individual's energy-saving intention by extracting variables and conceptualizing models from social psychology. The theory of planned behavior (TPB) is preferred for understanding individual's energy-saving intention and behavior (Wang et al., 2016). According to this theory, individual's behavioral intention is decided by the attitude towards this behavior, subjective norm and perceived behavioral control. Attitude refers to individual's negative or positive evaluation to conduct the particular behavior (Ajzen, 1991; Wang et al., 2016). Subjective norm refers to the perception of social pressure from essential others (Ajzen, 1991; Abrahamse and Steg, 2013). Perceived behavioral control refers to the individual's assessment of self-efficacy and perceived control ability in accomplishing the behavior (Ajzen, 1991; Shi et al., 2017b).

Although TPB is widely used, there is a problem with its incompleteness (Wang et al., 2016). Thus, some studies supported to incorporate additional factors into TPB to improve its validity, such as personal moral norm (Wang et al., 2016; Shi et al., 2017a) and subjective descriptive norm (De Leeuw et al., 2015). Furthermore, executive functions can also improve the predictive power of TPB in the field of conventional implementation of behavioral intentions (Allan et al., 2011, Hall et al., 2008, Corradi et al., 2013).

2.1. Attitude

Attitude is a critical determinant to influence behavioral intention in TPB. If an individual likes a specific behavior, then the intention to conduct such behavior will be high (Yang et al., 2016). Several studies, such as Greaves et al. (2013), Blok et al. (2015), Yazdanpanah and Forouzani (2015) and Yadav and Pathak (2017) noted the significance of attitude in predicting individual's pro-environmental behavior in

various contexts, such as recycling behavior at work, general PEB in workplace, and green products purchasing behavior. Similarity, in the context of energy-saving behavior, it can be assumed that if an individual believes that energy-saving is relevant and helpful to reduce carbon emissions and improve the environment, he will maintain a positive attitude and may form an energy-saving behavioral intention. Thus, it is hypothesized that:

H1. Attitude towards energy-saving positively affects individual's intention to save energy.

2.2. Subjective norm

Subjective norm is defined initially as individual's perception that most people who are essential to him consider he should or should not perform a behavior (Ajzen, 1991). Fishbein and Ajzen (2011) argued that subjective norm should consist of two components: subjective injunctive norm (SIN) and subjective descriptive norm (SDN). Subjective injunctive norm refers to behaviors commonly approved or disapproved, which is equivalent to the subjective norm in TPB. Subjective descriptive norm refers to behaviors demonstrated by essential referents in a given social environment (Wang et al., 2016). Individual likes to comply with the expectations and behaviors of significant others. Blok et al. (2015) indicated that the demonstrative behaviors of managers could motivate employee's PEB in Netherland. The stronger expectations and behaviors perceived by the significant others, the more likely of the individual to engage in behavior (Greaves et al., 2013; Shi et al., 2017a). In other words, with the higher SIN and SDN perceived, individuals would be more likely to conduct the behavior (De Leeuw et al., 2015). This situation is also suitable for energy-saving behavior. If individuals realize that essential referents (e.g., family members, great friends, celebrities) think he ought to save energy in daily life, or essential referents conduct energy-saving behavior as a role model, he will perceive pressures and intend to save energy. Thus, it is hypothesized that:

H2. Subjective injunctive norm positively affects individual's energy-saving intention.

H3. Subjective descriptive norm positively affects individual's energy-saving intention.

2.3. Perceived behavioral control

It is widely believed that perceived behavioral control is a crucial determinant of behavioral intention in many studies (De Leeuw et al., 2015; Botetzagias et al., 2015; Lizin et al., 2017). Some external conditions, such as facility availability, time, cost, knowledge of the behavior and skills, may be free from personal control, and thus affect their intention to participate in a specific practice. If individuals have a more significant control over themselves, they will have a stronger intention to accomplish a particular behavior (Webb et al., 2013). This phenomenon is also suitable for individual energy-saving behavior (Wang et al., 2014). If individuals feel easy and have relevant knowledge and skills to save energy in daily life, they will be more likely to form the intention to save energy (Donald et al., 2014). So we come to the next hypothesis:

H4. Perceived behavioral control positively affects individual's energy-saving intention.

2.4. Personal moral norm

To examine the effectiveness of TPB, many studies have expanded TPB by incorporating additional factors, such as personal moral norm (Wang et al., 2016; Shi et al., 2017a). Personal moral norm refers to the

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