

## **Untangling the Influence of Perceived Sustainability Orientation on Value-Co-Creation Behavior in Crowdfunding Process: Investigating a Mediation Model**

**Xiaobei Liang<sup>#</sup>**

School of Economics and Management, Tongji University  
1500, Siping Road, Shanghai 200092, China  
Phone: +86 2165983274  
Email: liangxiaobei@tongji.edu.cn

**Xiaojuan Hu<sup>#</sup>**

School of Economics and Management, Tongji University  
1500, Siping Road, Shanghai 200092, China  
Phone: +86 13127522606  
Email: huxiaojuan@tongji.edu.cn

**Eldon Y. Li\***

College of Management, National Chung Cheng University  
168, Sec.1, University Rd., Minhsiung, Chiayi, Taiwan 621301, R.O.C.  
Phone: +886973819770  
Fax: +886 52721501  
Email: eli@calpoly.edu

**Hu Meng**

College of Biomass Science and Engineering, Sichuan University  
No.24 South Section 1 on Yihuan Road, Chengdu 610065, China  
Phone: +86 18800265323  
Email: menghu@scu.edu.cn

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<sup>#</sup> Both authors are the first authors.

\*Corresponding author.

### **Plain Abstract**

Sustainability-oriented projects are prevalent on crowdfunding platforms nowadays. The relationship between crowdfunding and sustainability has attracted the attention of many scholars. This study explores the effects of perceived sustainability orientation on value-co-creation behavior from the perspective of backers. Existing theories reveal three psychological factors: perceived affective reaction, perceived self-effectiveness, and perceived risk. The study recruits 455 backers to evaluate 100 projects on a crowdfunding platform. The results show that perceived sustainability orientation influences value-co-creation behavior through perceived affective reaction and self-effectiveness. Furthermore, perceived sustainability orientation impacts participation behavior through perceived risk. These findings can provide implications for project creators and help improve the success rate of sustainability-oriented projects.

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## **Abstract**

**Purpose** – Sustainability-oriented projects are prevalent on crowdfunding platforms nowadays. The relationship between crowdfunding and sustainability has attracted the attention of many scholars. This study aims to examine the effects of perceived sustainability orientation on value-co-creation behavior from the perspective of backers and explore the mediation effects of three psychological factors: perceived affective reaction, perceived self-effectiveness, and perceived risk.

**Design/methodology/approach** – The study recruits 455 backers to evaluate 100 projects on a crowdfunding platform. Structural equation modeling based on partial least squares is used to analyze data and test the hypotheses.

**Findings** – The results show that perceived sustainability orientation influences value-co-creation behavior through perceived affective reaction and self-effectiveness. Furthermore, perceived sustainability orientation impacts participation behavior through perceived risk.

**Research limitations/implications** – Our study mainly focuses on sustainability-oriented and reward-based crowdfunding projects. Future research can examine other types of projects and other crowdfunding platforms.

**Practical implications** – These findings can provide implications for project creators to improve the values co-created with backers in future sustainability-oriented projects. Furthermore, the findings can provide implications for backers and help them evaluate crowdfunding projects.

**Originality/value** – The existing studies are mostly concerned with project creators' perspectives. This paper is one of the few to investigate how a project's sustainability orientation influences backers' psychological factors and value-co-creation behavior.

**Keywords:** crowdfunding; sustainability; backer; sustainability orientation; self-effectiveness; affective reaction; risk perception; participation behavior; citizenship behavior; value co-creation behavior.

## 1. Introduction

Crowdfunding has been recognized as a way of providing necessary resources for entrepreneurial undertakings (Thies *et al.*, 2018; Datta *et al.*, 2020; Mollick, 2014). It is conducive to technological innovation and development, thus promoting social change and sustainable development (Vismara, 2019; Hörisch and Tenner, 2020). Furthermore, with the increasing threat of global warming, the issue of sustainability has drawn great attention from investors worldwide, and socially responsible investment has grown significantly during the past two decades (Ortas *et al.*, 2013). An investor's decision often undergoes a social and environmental screening process to select sustainability-oriented projects for investment. In the crowdfunding context, sustainability-oriented projects are those projects with a sustainability orientation, which refers to the goals of pursuing environmental benefits (e.g., saving energy and reducing pollution) or social benefits (e.g., improving education) in addition to economic benefits (e.g., gaining profit) (Calic and Mosakowski, 2016). Because the actual social and environmental impacts of entrepreneurial investments are very difficult to assess in the short term (Hörisch, 2019), socially responsible projects usually face great difficulties in traditional financing. As crowdfunding has successfully provided sustainable financing and development to many enterprises today (Bento *et al.*, 2019; Calic and Mosakowski, 2016), it is a plausible alternative financing method for sustainability-oriented projects. Its success is closely related to backers and requires their active value-co-creation behavior. In crowdfunding, co-creation involves the process in which a creator and a backer jointly work. Value-co-creation behavior includes backers' participation behavior and citizenship behavior. Participation behavior is necessary for a crowdfunding project, such as searching for information about the project; citizenship behavior is voluntary behavior when participating in a crowdfunding project, such as recommending the project to others (Yi and Gong, 2013). Backers' value-co-creation behavior plays a key role in the crowdfunding process of sustainability-oriented projects.

Consequently, it is important and necessary to investigate the impacts of sustainability orientation on value-co-creation behavior to increase these crowdfunding projects' success.

Although crowdfunding has attracted the attention of many scholars (Moysidou and Hausberg, 2019; Kuo *et al.*, 2020; Ryu and Suh, 2020; Madrazo-Lemarroy *et al.*, 2019; Lee and Chiravuri, 2019), the relation between crowdfunding and sustainability has only recently been reported in the literature (Hörisch, 2015; Calic and Mosakowski, 2016; Vismara, 2019; Chan *et al.*, 2021; Bento *et al.*, 2019; Hörisch and Tenner, 2020). A scrutiny of the existing studies on crowdfunding and sustainability (see Table I) reveals three research gaps. First, most studies focused on campaign performance rather than backers' behavior. They investigated the relationship of sustainability orientation (SO) with crowdfunding success instead of value-co-creation behavior. Moreover, Calic and Mosakowski (2016) and Bento *et al.* (2019) found that SO impacts crowdfunding success positively, yet, Hörisch (2015) and Vismara (2019) found this relationship insignificant. Second, the extant studies mainly focused on the projects (the creators' perspective) and used data from crowdfunding platforms to test the relationships. Few sustainable crowdfunding studies investigated backers who invested in the projects and explored their psychological factors within the crowdfunding process. Third, crowdfunding is a special form of co-creation based on the Principal-Agent Theory (Eisenhardt, 1989). Most research into co-creation behaviors in crowdfunding is qualitative interview-based (Chaney, 2019); quantitative studies remain scarce.

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Table I. Summary of literature about crowdfunding and sustainability

Authors	Independent Variables	Dependent Variables	Mediators	Focus	Data (Source)	Data Size	Key Findings
Hörisch (2015)	environmental orientation (0,1)	crowdfunding success (0,1)	No	projects	Secondary data (Indiegogo)	585	There is no positive connection between environmental orientation and crowdfunding success.
Calic and Mosakowski (2016)	sustainability orientation (0,1)	success (0,1), pledge amount	(1) creativity (2) third party endorsements	projects	Secondary data + code data (Kickstarter)	392	(1) Sustainability orientation positively affects funding success. (2) This relationship is partially mediated by project creativity and third-party endorsements.
Cumming <i>et al.</i> (2017)	cleantech (0,1)	pledge amount, number of backers, completion ratio, success (0,1)	No	projects	Secondary data (Indiegogo)	22,786	Cleantech projects are more or less successful than non-cleantech projects.
Moss <i>et al.</i> (2018)	social value orientation, economic value orientation	loan funding time	No	projects	Code data (Kiva)	83,176	(1) Social value orientation negatively affects funding time and positively affects funding performance. (2) Economic value orientation has no significant effects on funding time. (3) Microenterprises expressing a linguistic balance of social value orientation and economic value orientation would be funded more slowly.
Bento <i>et al.</i> (2019)	charity (0,1), gender	success (0,1)	No	projects	Secondary data (Kickstarter)	869	(1) Perceived sustainable mission (charity) positively influences crowdfunding success. (2) Higher percentage of female co-founders improves success chances.

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Vismara (2019)	sustainability orientation (0,1)	success (0,1), number of investors, professional investors (0,1)	No	projects	Secondary data + code data (Crowdcube and Seedrs)	345	Sustainability orientation does not increase the chances of success or engaging professional investors; it attracts many restricted investors.
Hörisch and Tenner (2020)	environmental orientation (-3 to +3), social orientation (-3 to +3)	funding success (actual amount/minimum target)	(1) number of funders (2) average funding amount	projects	Secondary data + code data (Seedmatch, Companisto, First Democracy VC, Start Engine)	318	(1) Higher levels of environmental orientation increase crowdfunding success, while social orientation has no significant influence. (2) This positive influence of environmental orientation is mediated by the number of funders.
Chan <i>et al.</i> (2021)	money saliency, sustainability orientation (0,1)	success (total amount raised, number of backers)	No	projects	Code data (Kickstarter)	81,765	(1) Using “money” saliency in project description reduces funding success as measured by the amount of funds raised and the number of backers. (2) Sustainability orientation positively affects the amount of funds raised and the number of backers. (3) The saliency effect of money is mitigated when the project is prosocial.
This study	perceived sustainability orientation (1 to 5)	value-co-creation behavior	(1) perceived affective reaction (2) perceived self-effectiveness (3) perceived risk	backers	Experimental survey data (JD crowdfunding)	455	Perceived sustainability orientation affects value-co-creation behavior through perceived affective reaction and self-effectiveness.

Note: Variables with (0,1) are dichotomous variables.

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To address these three gaps, this study collects data from crowdfunding backers and examines the impact of perceived sustainability orientation (PSO) on value-co-creation behavior. First, based on affective events theory, perceived consumer effectiveness concept, and risk perception theory, it identifies three psychological factors of backers: perceived affective reaction (PAR), perceived self-effectiveness (PSE), and perceived risk (PR), respectively. Then, it explores the mediation effects of these mechanisms on value-co-creation behavior. Overall, this study attempts to understand, through a quantitative survey, the psychological process of backers participating in sustainability-oriented crowdfunding projects. As a result, it provides companies with a reference for sustainable financing, attracts more potential backers to participate, and helps improve the success rate of sustainability-oriented projects.

Specifically, the research questions in this study are as follows.

*RQ1: Does a project's sustainability orientation influence a backer's value-co-creation behavior?*

*RQ2: What are the psychological factors affecting a backer's value-co-creation behavior?*

The remainder of this paper is organized as follows. The next two sections introduce the underpinning theories and literature review. Section 4 presents hypotheses and a research model. Section 5 describes the research methodology, followed by the analyses and results in Section 6. Finally, Section 7 concludes the research findings, and section 8 discusses the theoretical contributions, practical implications, and limitations of this study.

## **2. Literature Review**

### **2.1 Value Co-Creation Behavior**

Value co-creation refers to the value created together by the company and consumers

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(Ranjan and Read, 2016; Prahalad and Ramaswamy, 2004), including customer participation and citizenship behaviors. Customer participation behavior is the in-role behavior necessary to co-create values, while customer citizenship behavior is the extra-role voluntary behavior that is not necessary for value co-creation but can provide additional value to the enterprise (Yi and Gong, 2013; Revilla-Camacho *et al.*, 2015; Groth, 2005; Luu, 2019). Studies about value co-creation mainly focus on service areas, such as service production and service delivery (Black and Veloutsou, 2017; Cossío-Silva *et al.*, 2016; Petri and Jacob, 2016; Yim *et al.*, 2012) and brand value co-creation (Merz *et al.*, 2018; Ramaswamy and Ozcan, 2016). Based on *service-dominant logic*, companies and customers exchange values in services instead of products. The product is only a distribution mechanism for providing service; it is a part of the service package. Therefore, suppliers create value with customers by exchanging services during their interactions (Vargo and Lusch, 2015; Vargo *et al.*, 2008).

In the context of crowdfunding, according to principal-agent theory (Eisenhardt, 1989), one party (the backers) provides funds as the principal, and the other party (the entrepreneur) is responsible for execution as the agent. Therefore, there is a principal-agent relationship between the entrepreneur and the backers. Backers collectively choose the products they will fund, and the entrepreneur completely depends on backers. As such, crowdfunding is a new form of value co-creation (Chaney, 2019). In essence, value co-creation is between entrepreneurs and backers. In addition to providing funds, backers can provide suggestions for improvement and help promote the project. Besides backers' value-co-creation behavior, entrepreneurs will update project information and promptly respond to comments. In sustainability-oriented crowdfunding projects, sustainable values in economic, environmental,



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or social dimensions are co-created through the efforts of creators and backers (Mihailova *et al.*, 2022; Buana *et al.*, 2021; Yousaf, 2021).

Currently, value-co-creation behavior in crowdfunding has attracted some scholars' attention, but the research is still scarce. First, the research analyses are mainly qualitative (Laffey *et al.*, 2021). For example, Quero and Ventura (2018) state that crowdfunding can be seen as a service ecosystem; they illustrate value co-creation at different ecosystem levels using a case-study approach. Second, few studies use quantitative methods to explore the factors influencing backers' value co-creation. For instance, Su *et al.* (2021) analyze the antecedents leading to value co-creation intention for technology-dominated and entertainment-dominated projects. The research on backers' value-co-creation behavior toward sustainability remains limited. Although sustainability-oriented crowdfunding projects have unique features of benefiting the environment or society, the antecedents and psychological factors of backers' value-co-creation behavior for these projects are unclear.

## **2.2 Perceived Sustainability Orientation**

Besides profits, enterprises with SO tend to engage in environmental protection and social development for their products (Ruiz-Ortega *et al.*, 2021). The extant studies usually classify crowdfunding projects into sustainability-oriented projects versus non-sustainability-oriented projects (Calic and Mosakowski, 2016; Chan *et al.*, 2021; Bento *et al.*, 2019; Petruzzelli *et al.*, 2019) or public-good projects versus private-good projects (Li and Wang, 2019; Hong *et al.*, 2018). Sustainability-oriented or public-good projects can benefit society and the environment, while non-sustainability-oriented or private-good projects benefit individuals primarily (Calic and Mosakowski, 2016; Hong *et al.*, 2018). PSO is the backer's perception of project

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sustainability orientation.

Extant studies have investigated the influence of sustainability orientation on crowdfunding success or performance, but there are two different research findings. Some studies find a positive relationship between sustainability orientation and crowdfunding success or performance. For example, Calic and Mosakowski (2016) reveal that sustainability orientation positively affects crowdfunding success and enhances the fundraising ability of entrepreneurs. Moreover, Chan *et al.* (2021) confirm that sustainability orientation positively affects both the funding amount raised and the number of backers. Moss *et al.* (2018) examine the influence of social-value orientation, which includes social and environmental dimensions, and they show that it can reduce the project's funding time. Therefore, social-value orientation has positive effects on crowdfunding performance.

Furthermore, Bento *et al.* (2019) point out that the perceived sustainable mission positively influences crowdfunding success. Projects pledging to donate part of profits to charity are easier to raise money. Cumming *et al.* (2017) investigate crowdfunding projects from Indiegogo and show that cleantech projects are more successful than non-cleantech projects. On the opposite side, other scholars find no relationship. For instance, Hörisch (2015) finds no positive relation between environmental orientation and crowdfunding success. Similarly, Vismara (2019) finds no positive link between sustainability orientation and success, but sustainability orientation can attract more investors.

As such, the relationship between sustainability orientation and crowdfunding success is ambiguous. A scrutiny of the existing literature about crowdfunding and sustainability reveals

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that most studies focus on the project view and mainly investigate the direct effects of SO on crowdfunding outcomes, e.g., funding success (Hörisch, 2015; Bento *et al.*, 2019), number of backers (Vismara, 2019; Chan *et al.*, 2021), funding ratio (Cumming *et al.*, 2017; Hörisch and Tenner, 2020), and funding amount (Calic and Mosakowski, 2016). That is, the backer's behavior is critical for crowdfunding outcomes. However, the backers' perspective and how their perceived sustainability orientation influences their behaviors toward the crowdfunding project have not attracted attention.

### **2.3 Motivation to participate**

Existing studies have investigated the motivation and psychological factors for participating in crowdfunding from the perspective of backers (Bagheri *et al.*, 2019; Liu *et al.*, 2018; Macht and Weatherston, 2015). Two common factors may influence a backer's investment motivation: self-interest and altruistic factors. The self-interest factors include rewards (reward-based crowdfunding), monetary funds (lending-based crowdfunding and equity-based crowdfunding), recognition from others, self-image, and lobbying to affect the company to meet individual needs (Bretschneider and Leimeister, 2017; Cholakova and Clarysse, 2015). Altruistic factors such as helping others and supporting the cause are particularly evident in donation-based crowdfunding (Ryu and Kim, 2016).

Crowdfunding motivation may be divided into internal and external (Deci *et al.*, 1994). Internal motivation includes personal "likes" for the project (Bretschneider and Leimeister, 2017), hedonism (Ryu and Kim, 2016), becoming a member of the community (Cholakova and Clarysse, 2015), and establishing a connection with the creator (Ryu and Kim, 2016). Meanwhile, the external motivation may come from the herding effect (Bretschneider and Leimeister, 2017; Jiang *et al.*, 2018; Borst *et al.*, 2018; Chan *et al.*, 2020; Petit and Wirtz, 2022)

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and the bystander effect (Borst *et al.*, 2018). In addition, some studies have analyzed the factors influencing investment motivation from other theoretical perspectives. For example, Zhao *et al.* (2017) examine determinants of backers' funding intention based on social exchange theory (Homans, 1958) and regulatory focus theory (Higgins, 1997). The results show that commitment and PR have positive effects on funding intention. And a recent study (Shneor and Munim, 2019) applies the TPB (Ajzen, 1991) to reward-based crowdfunding and explores the impact of attitude, self-efficacy, perceived behavioral control, subjective norms, and social norms on willingness to invest and willingness to share information. They found that attitude, self-efficacy, and subjective norms positively affect investment willingness, while social norms only have a slight positive effect on the willingness to share information. However, people with a strong sense of behavior control have a lower investment willingness.

Sustainability-oriented crowdfunding projects are distinctive from other projects because they benefit the environment or society. Backers' motivations also may be different. According to the extant literature, we find that the backers' motivations for engaging in sustainability-oriented crowdfunding projects have not received enough attention. Prior research examines neither the influence of SO on backers' value-co-creation behavior nor the psychological factors of backers. Therefore, this study attempts to understand deeper what drives backers' value-co-creation behavior in sustainability-oriented crowdfunding projects.

### **3. Theoretical Background**

#### **3.1 Theory of Planned Behavior**

Skinner (1965) defines behavior into two types: overt behavior and covert behavior. Overt behavior is apparent and observable, such as running and working, while covert behavior is hidden and unobservable, such as perceiving and thinking. Covert behaviors are mental

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processes causing overt behavior (Shrestha, 2017). Psychology theories explain and predict covert and overt behaviors and define the behavioral process as a dynamic process involving 4 stages: belief, attitude, intention, and behavior (action), as shown in Figure 1 (Ajzen, 1991; Fishbein and Ajzen, 1975). The covert behavior is the intention, and the overt behavior is the actual behavior (i.e., action). In this study, the value-co-creation behavior corresponds to a covert behavior representing the backer's intention to engage in the behaviors.

The Theory of Planned Behavior (TPB) is a psychology theory that explains social behavior (Ajzen, 1985). The TPB explains that the behavioral process in Figure 1 begins with one's beliefs in the behavioral outcome, social norm, and control ability. These beliefs lead to attitudes toward behavior outcomes, subjective norms, and perceived behavioral control. The attitude toward behavior outcome is a feeling of favorableness or unfavorableness towards the behavior outcome (Ajzen, 1991). The subjective norm is the perceived opinions of other people who think that one should or should not perform a behavior (Ajzen, 1991). Moreover, perceived behavioral control refers to one's perceived capability and presence of requisite resources and opportunities to perform a behavior (Ajzen, 1985). Finally, these attitudes lead to covert behavior (intention) and then overt behavior (actual behavior).

In this paper, TPB provides an overall theoretical framework and explains the backers' behavior processes. Under TPB, PSO is the backer's belief about the sustainability orientation of crowdfunding projects. We conceptualize PAR and PR as attitudes toward crowdfunding projects and PSE toward individual backers. Value-co-creation behavior captures the backer's intention to perform value co-creation in the crowdfunding context. Furthermore, PAR, PR, and PSE correspond to the three attitude components toward crowdfunding projects: affective, cognitive, and behavioral (Fishbein and Ajzen, 1975; Ostrom, 1969). All three attitudes serve as mediators between PSO and value-co-creation behavior.

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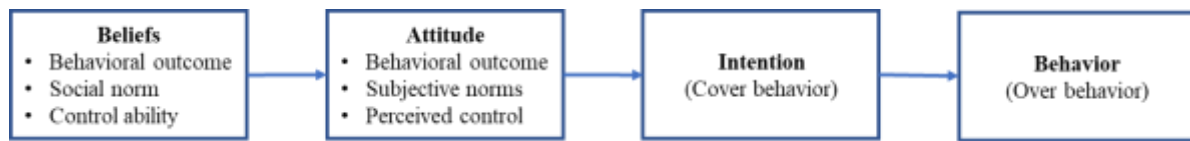


Figure 1. The behavior processes.

### 3.2 Agency Theory and Rational Choice Theory

Agency theory sheds light on the relationship between the principal and the agent. The principal assigns the task to the agent, and the agent performs duties following the agreed contract (Eisenhardt, 1989). According to this theory, the entrepreneur and the backers in crowdfunding have a principal-agent relationship. The principals (the backers) collectively choose the products to participate in funding and co-creation, and the agent (the creator) is responsible for the production and delivery (Chaney, 2019).

The rational choice theory (RCT) argues that people strive to realize optimal utility by taking the best course of action (Fararo, 1993). Following this theory, the principal-agent problems of the agents (i.e., opportunism, information asymmetry, and self-serving) are not likely to happen. Wrong (1997) notes that a rational person will consider others' interests when pursuing self-interests. In crowdfunding, if both the backer and the creator behave rationally, the backer as a principal shall contribute to a project for personal and others' benefits to the best of his/her ability. Reciprocally, the creator, as an agent, shall choose the best way to deliver the expected benefits to the backers. Thus, both would pursue the maximization of total interest, including self-interests, others' interests, and social and environmental interests (Sugden, 1984).

### 3.3 Affective Events Theory

Affective Events Theory (AET) explains that events can cause individuals' affective reactions and influence personal attitudes and behaviors, including affect-driven behaviors and judgment-driven behaviors. Affective experiences can directly influence affect-driven

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behaviors but indirectly influence judgment-driven behaviors through attitude (Weiss and Cropanzano, 1996). Further, affective experiences can engender positive and negative affective reactions. Positive affective reactions refer to the states of pleasure, enthusiasm, and activity, while negative affective reactions reflect fear, depression, anxiety, and tension (Barsade and Gibson, 2007). Events that benefit society or individuals are more likely to lead to positive affective reactions, while harmful events are more likely to cause negative affective reactions (Davis et al., 2017). For example, when browsing crowdfunding projects, the project's introduction and the creator's expression may engender potential backers' different affective reactions. This study defines PAR as the backer's positive affective reactions.

### **3.4 Perceived Self-Effectiveness**

The concept of PSE is adapted from *perceived consumer effectiveness* (PCE) which refers to a subject's judgment on the ability of individual consumers to make a difference in solving environmental or social problems (Ellen *et al.*, 1991; Kinnear *et al.*, 1974; Webster, 1975; Antil, 1978). It is similar to self-efficacy, referring to a subject's belief in completing certain actions successfully (Bandura, 1986). However, PCE focuses on ability outcomes, while self-efficacy focuses on the ability itself (Antonetti and Maklan, 2014). Moreover, PCE is related to the internal locus of control, which is associated with perceived behavioral control in the Theory of Planned Behavior (TPB), which can predict the outcomes of intentions and behaviors (Ajzen, 1991). Furthermore, individuals with an internal locus of control believe that their behaviors can lead to desirable outcomes (Rotter, 1966). According to previous studies, people with a high level of PCE often engage in socially- and environmentally-responsible behaviors (Dermody *et al.*, 2018; Yarimoglu and Binboga, 2019). In this study, the backers consume their financial resources to support a sustainability project and can be regarded as consumers. Therefore, PCE refers to the backer's judgment of other individual backers' abilities to affect

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the sustainability of the environment. In this vein, we retitled PCE as the backer's *perceived self-effectiveness* (PSE).

### **3.5 Risk Perception Theory**

According to Risk Perception Theory (RPT), perceived risk is the perception that decisions under uncertainty may cause negative outcomes (Kim *et al.*, 2008; Stone and Grønhaug, 1993). Such risk includes social, time, financial, physical, performance, and psychological risks (Stone and Grønhaug, 1993). Crowdfunding may involve platform, project, and entrepreneur risks (Martín *et al.*, 2020). This study mainly focuses on project risks in reward-based sustainability-oriented crowdfunding projects, such as delayed rewards delivery risk, capital losses, and fraud risk. RPT has been used in many fields, including online shopping and crowdfunding. In addition, studies have illustrated that individuals' PR could influence their decisions and behaviors (Kim *et al.*, 2008; Kim *et al.*, 2019; Zhao *et al.*, 2017). In this vein, backers' PR about the crowdfunding project may affect their funding and sharing decisions.

## **4. Hypotheses Development**

### **4.1 Perceived Sustainability Orientation in Crowdfunding**

Today's sustainable entrepreneurship focuses on the triple bottom line: economic prosperity, environmental quality, and social justice (Elkington, 1997). Sustainability-oriented enterprises must balance this triple bottom line (Kuckertz and Wagner, 2010). Existing studies have investigated the impact of SO on crowdfunding success. For example, SO has been confirmed to positively affect crowdfunding success (Calic and Mosakowski, 2016; Bento *et al.*, 2019), the amount of money raised (Chan *et al.*, 2021), and the number of backers (Chan *et al.*, 2021; Vismara, 2019). In general, backers who participate in sustainability-oriented



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projects are aware of environmental or social issues as they tend to have strong altruism to support sustainability causes (Petruzzelli *et al.*, 2019). Furthermore, research indicates that environmental or social awareness can trigger proactive behavior, such as purchasing green products and performing citizenship behavior (Chan *et al.*, 2014; Kilbourne and Pickett, 2008; Lee *et al.*, 2014; Dickel and Eckardt, 2020). Therefore, high awareness of sustainability issues will lead to participation and citizenship behaviors for sustainability-oriented projects. Additionally, based on agency theory (Eisenhardt, 1989) and rational choice theory (Fararo, 1993), when perceiving the sustainability orientation of projects, backers often choose to support these projects to obtain rewards, improve reputation and social status, and co-create sustainable values in economic, environmental, or social dimensions. Thus, we posit:

*H<sub>1</sub>: Perceived Sustainability Orientation positively relates to Value-Co-Creation Behavior.*

#### **4.2 The Mediating Role of Perceived Affective Reaction**

The AET (Weiss and Cropanzano, 1996) explains that PAR is triggered by an event that is beneficial or important to the individual and can influence subsequent behavior. Moreover, research findings have proven that a valuable or beneficial event can generate an individual's positive affect and motivation to take favorable actions (Davis *et al.*, 2017; Carmeli *et al.*, 2017; Luu, 2019). In crowdfunding, projects with SO can benefit society or the environment, such as improving education, saving energy, and reducing pollution. When backers read and understand the sustainability attributes described by these projects, they tend to arouse positive emotions/affects. A positive affective state can promote good impression formation of the project. Indeed, backers experiencing positive affects tend to view the project positively. This can also enhance the likelihood that backers will engage in participation and citizenship behaviors to support the project, such as backing, giving feedback, or recommending it to friends. In this discourse, the SO of a crowdfunding project can make backers generate PAR,

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and this reaction may impact their value-co-creation behavior. Therefore, we propose the following:

*H<sub>2</sub>: Perceived Affective Reaction mediates the relationship between Perceived Sustainability Orientation and Value-Co-Creation Behavior.*

*H<sub>2a</sub>: Perceived Sustainability Orientation positively relates to Perceived Affective Reaction.*

*H<sub>2b</sub>: Perceived Affective Reaction positively relates to Value-Co-Creation Behavior.*

### **4.3 The Mediating Role of Perceived Self-Effectiveness**

Scholars stated that consumers' self-effectiveness might be directly affected by knowledge, direct experience, and the experiences of others and that individuals with more environmental knowledge tend to possess a higher level of self-effectiveness (Ellen *et al.*, 1991). For example, a crowdfunding project creator uses the project description to introduce the information and purpose about a sustainable society and the environment, appeal to potential backers, and guide them to support or invest in the project. Furthermore, the backers accumulate sustainability knowledge when browsing the project and increase their belief in their abilities to develop sustainability. That is, the increase in sustainability knowledge affects the backers' PSE. Hence, we predict that PSO increases PSE.

Furthermore, a common behavior in environmental citizenship is to believe that the creator intends to build a sustainable society when the project is perceived as sustainability-oriented (Dobson, 2007). Therefore, the backers may assume that working with the creators and engaging in funding activities can benefit the environment and society and create sustainable values. In addition, existing studies have demonstrated that individuals with higher PSE are more likely to engage in pro-environmental behaviors, such as green purchase behaviors or good citizenship behaviors (Lee *et al.*, 2014; Roberts, 1996; Nguyen *et al.*, 2016;

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Vermeir and Verbeke, 2008; Dang *et al.*, 2020). According to these findings, we believe that high PSE can encourage backers to take positive actions toward projects. Also, we predict that PSE will positively impact value-co-creation behavior. Taken together, we hypothesize as follows:

*H<sub>3</sub>: Perceived Self-Effectiveness mediates the relationship between Perceived Sustainability Orientation and Value-Co-Creation Behavior.*

*H<sub>3a</sub>: Perceived Sustainability Orientation positively relates to Perceived Self-Effectiveness.*

*H<sub>3b</sub>: Perceived Self-Effectiveness positively relates to Value-Co-Creation Behavior.*

#### **4.4 The Mediating Role of Perceived Risk**

For crowdfunding projects, financial risk and performance risk are dominant. Financial risk includes the pledged rewards not delivered on time and the money raised not spent on the measure advertised (Hörisch, 2019; Appio *et al.*, 2020). Performance risk refers to the project not providing benefits as it promised, such as harming the environment and society (Hörisch, 2019). For sustainability-oriented projects, the sustainability attributes of projects are difficult to assess because the backers cannot directly pre-test or experience them, unlike prototyping design or technology projects. For example, the production processes of pesticides, organic vegetables, and other products are complex and opaque; thus, the backers cannot verify the sustainable characteristics of projects (Wehnert *et al.*, 2019). For another example, the period of some public projects is relatively long, making it impossible to verify that the projects are beneficial to the environment or society in the short term (Hörisch, 2019). The information-asymmetry nature of a project's sustainability information often increases the project's uncertainty and the backers' risk perception (Cason and Gangadharan, 2002). According to RPT, perceived risk negatively influences an individual's attitude toward crowdfunding projects and reduces behavioral intention. In sustainability-oriented projects, increasing risk

perception will reduce a backer's value-co-creation behavior. Thus, we postulate:

*H<sub>4</sub>: Perceived Risk mediates the relationship between Perceived Sustainability Orientation and Value-Co-Creation Behavior.*

*H<sub>4a</sub>: Perceived Sustainability Orientation positively relates to Perceived Risk.*

*H<sub>4b</sub>: Perceived Risk negatively relates to Value-Co-Creation Behavior.*

The above discourse can be summarized into a research model, as shown in Figure 2. This model examines how the three psychological factors (PAR, PSE, and PR) mediate the relationship between PSO and the backer's value-co-creation behavior. Specifically, in hypothesis testing, the value-co-creation behavior is divided into two second-order reflective constructs of participation and citizenship behaviors.

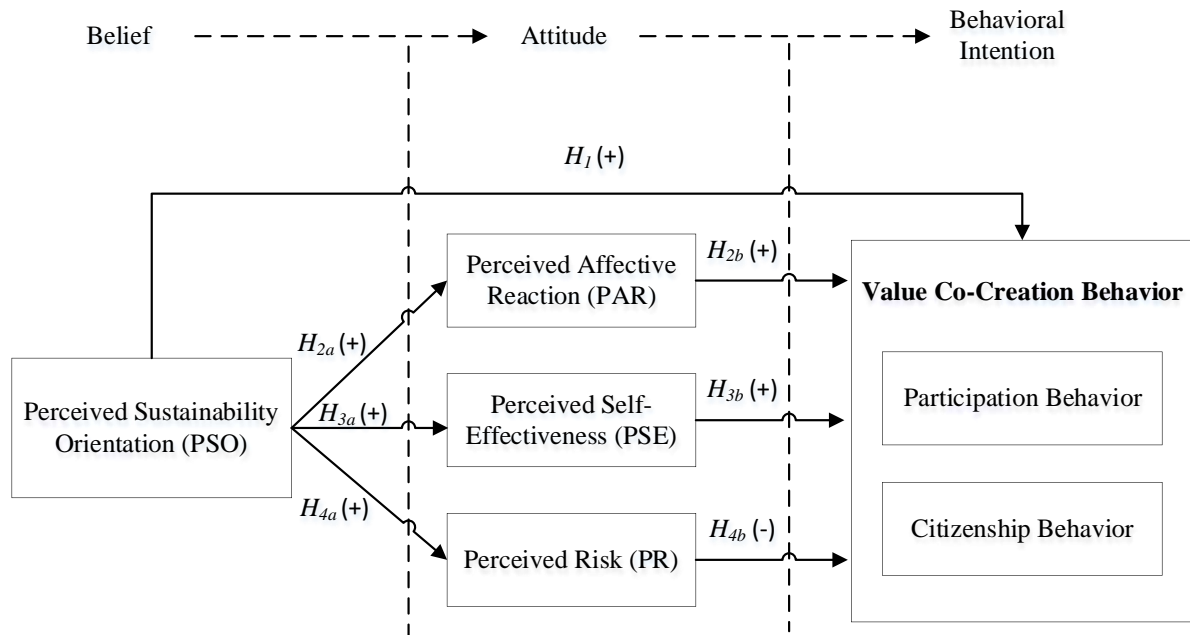


Figure 2. Research model

## 5. Methodology

### 5.1 Data Collection

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To test our research model, we conducted a purposive online survey. First, we created a set of words and phrases associated with sustainability based on six prior studies (Butticè *et al.*, 2019; Chan *et al.*, 2021; Vismara, 2019; Bento *et al.*, 2019; Cumming *et al.*, 2017; Moss *et al.*, 2018) and used it to identify the sustainability-oriented projects. The set included 178 words and phrases: sustainable, environmental, organic, recycled, green, health, renewable, and cleantech, among others. Next, we selected relevant projects from the Jingdong (JD) website (<https://z.jd.com/>), one of China's largest reward-based crowdfunding websites. A project is considered suitable for our study if its description or title contains one or more words or phrases in the pre-defined set of 178 sustainability-oriented terms. Finally, we performed text analysis to select reward-based projects based on these words and phrases because such projects were frequently studied. Thus, the results could be compared to foster a comprehensive understanding of reward-based crowdfunding.

Furthermore, because projects with a funding goal of less than US\$5000 can easily receive funds from friends and family (Mollick, 2014), we set US\$5000 as the threshold to randomly select 100 sustainability-oriented projects from JD.com. Using these 100 projects, we recruited 574 backers experienced in JD's crowdfunding projects to participate in our survey. Each participant was randomly assigned to one of the 100 projects. Only the project introduction was presented to each participant. Although other project information items were available on the website, e.g., the number of backers and the funding amount currently raised, we purposely omitted them in the project description. A sample project description is shown in Appendix A. After reading the introduction of the project, the participants were asked to complete the survey. The online survey system used two screening questions to disqualify a careless respondent immediately after completing the survey, and the same project description was used for the next participant. In addition, we ensured that at least one participant rated each project, and

each participant rated a project only once. Eventually, the process disqualified 119 participants, leaving 455 valid responses. The sample comprises 227 females (49.9%) and 228 males (50.1%). Approximately 80% of the participants are between 23 and 40 years old. Only a few (10%) have more than US\$3750 monthly income, and many (32%) have less than US\$1250. These characteristics of backers are consistent with those reported in prior studies (Martín *et al.*, 2020; Kim *et al.*, 2019; Shneor and Munim, 2019).

## 5.2 Measures

All latent constructs were measured by multiple items adapted from previous studies and conceptually tailored to the crowdfunding context. All the items were measured using a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely). Value-co-creation behavior was divided into two second-order reflective constructs of participation and citizenship behaviors. In particular, participation behavior consists of four dimensions: information seeking, information sharing, responsible behavior, and personal interaction. Citizenship behavior contains three dimensions: altruism, advocacy, and tolerance. Table II shows all latent constructs' measurement items, factor loadings, and item sources. Past studies have proven that the backers' characteristics could affect value-co-creation behavior, such as age (Lee and Kim, 2018; Clauss *et al.*, 2019), gender (Lee and Kim, 2018), and monthly income (Clauss *et al.*, 2019). Therefore, we control for these variables with gender coded as “male”=1 and “female”=2, while age and income are coded as categorical variables.

Table II. Description and sources of questionnaire items.

Construct	Items	Loadings	Sources
Perceived sustainability orientation (PSO)	1. Environmental: To what extent do you think the project benefits the environment-nature and the Earth's life support system (e.g., saves trees, plants, bees, whales, the ecosystem, reduces pollution, makes recycling easier)?	0.828	Calic and Mosakowski (2016)
	2. Social: To what extent do you think the project benefits people (e.g., improves education, fights discrimination, donates to the needy)?	0.769	
	3. Economic: To what extent do you think the project benefits	0.777	

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the enterprise (e.g., gains profit, increases assets)			
Perceived affective reaction (PAR)	After viewing the project description, to what extent do you feel this way?		Watson <i>et al.</i> (1988)
	1. Enthusiastic	0.777	
	2. Interested	0.754	
	3. Determined	0.742	
	4. Excited	0.783	
	5. Inspired	0.636	
	6. Active	0.804	
	7. Strong	0.780	
	8. Proud	0.806	
	9. Attentive	0.788	
Perceived self-effectiveness (PSE)	1. It is worthless for me to do anything about pollution. (Reversely coded)	0.770	Roberts (1996)
	2. When I invest in projects, I consider how they affect the environment and other people when I use the projects' products.	0.813	
	3. Since one person cannot affect pollution and natural resource problems, it doesn't make any difference in what I do. (Reversely coded)	0.705	
	4. Each individual's behavior can positively affect society by purchasing/supporting products sold by socially responsible companies.	0.699	
Perceived risk (PR)	1. I worry that I cannot receive the pledged reward on time.	0.694	Hörisch (2019)
	2. I worry that the money raised is not spent on the advertised measures.	0.837	
	3. I worry that the project cannot provide its promised benefits.	0.814	
	4. I worry that the project may harm the environment and society.	0.643	
Value Co-Creation Behavior - Participation Behavior (PB)	<i>When I participate in this crowdfunding project, I will .....</i>		Yi and Gong (2013)
	<b>Information seeking (ISE):</b>		
	1. ask others for information on what the project offers.	0.809	
	2. search for information on where the project is located.	0.820	
	3. pay attention to how others behave to use the project well.	0.818	
	<b>Information sharing (ISH):</b>		
	4. clearly explain what I want the creator to do.	0.807	
	5. give the creator proper information.	0.823	
	6. answer all the creator's service-related questions.	0.814	
	<b>Responsible behavior (RB):</b>		
	7. perform all the required tasks and all the expected behaviors.	0.813	
	8. follow the creator's directives or orders.	0.853	
9. provide necessary information to the creator for performing his or her duties.	0.827		
<b>Personal interaction (PI):</b>			
10. be friendly and kind to the creator.	0.810		
11. be courteous to the creator.	0.816		
12. not act rudely to the creator.	0.798		
Value Co-Creation Behavior - Citizenship	<i>When I participate in this crowdfunding project, I will .....</i>		Yi and Gong (2013)
	<b>Altruism (AL):</b>		
1. let the creator know if I have a useful idea for improving service.	0.779		

<i>Behavior (CB)</i>	2. comment about the quality of service I receive from the creator.	0.759
	3. let the creator know about any problem I experience.	0.743
	4. assist other backers if they seem to have problems or need my help.	0.752
	5. teach other backers to use the service correctly and advise other backers.	0.758
	<b>Advocacy (AD):</b>	
	6. refer to others with positive things about the project and the creator.	0.772
	7. recommend the project and the creator to others.	0.869
	8. encourage friends and relatives to back the project.	0.855
	<b>Tolerance (TO):</b>	
	9. put up with the creator's service that is not delivered as expected.	0.818
	10. remain patient if the creator makes a mistake during service delivery.	0.824
11. adapt to waiting longer than I normally expected to receive the creator's service.	0.841	

### 5.3 Analysis Tool

To test the hypotheses, we use structural equation modeling with partial least squares (PLS-SEM) to estimate the path coefficients. First, it can handle higher-order constructs. It is appropriate for testing our complex model with one independent variable, three mediators, and two second-order dependent variables. Second, this method can simultaneously evaluate the measurement model and structural model. The measurement model is used to assess the reliability and validity of the constructs' measures. The structural model simultaneously reflects the direct and indirect relationships. Third, this method allows multi-group analysis. Furthermore, it is robust when the sample size is small (Sarstedt *et al.*, 2022). It has been frequently applied to many prior studies to investigate the direct and mediating effects (Datta *et al.*, 2020; Singh *et al.*, 2020). Therefore, we use SmartPLS 3.2.9 software to examine the measurement and structural models.

## 6. Results

### 6.1 Measurement Model



To validate the measurement model, we evaluate reliability, convergence validity, and discriminant validity. First, Table III shows the descriptive statistics for the variables, and Table IV shows the correlations between variables. The tables reveal that Cronbach's  $\alpha$  values of all variables are larger than 0.7, indicating acceptable internal consistency. Next, convergence validity is evaluated by factor loadings, average variance extracted (AVE), and composite reliability. Table II shows that all loadings are above the threshold of 0.5 (Wixom and Watson, 2001), and most are above 0.7. In addition, Table III shows that AVE values are all larger than 0.5 (Sarstedt *et al.*, 2022; Fornell and Larcker, 1981), and all composite reliabilities exceed 0.7 (Nunnally, 1978). Based on these findings, the convergence validity is acceptable.

Table III. Descriptive statistics

Variables	Mean	SD	$\alpha$	CR	AVE
1. Perceived Sustainability Orientation (PSO)	3.96	0.69	0.702	0.834	0.627
2. Perceived Affective Reaction (PAR)	3.86	0.69	0.911	0.927	0.585
3. Perceived Self-Effectiveness (PSE)	4.15	0.56	0.748	0.835	0.560
4. Perceived Risk (PR)	3.63	0.72	0.748	0.837	0.564
5. Information Seeking (ISE)	4.00	0.61	0.749	0.857	0.666
6. Information Sharing (ISH)	3.98	0.61	0.747	0.855	0.664
7. Responsible Behavior (RB)	4.02	0.58	0.776	0.870	0.691
8. Personal Interaction (PI)	4.05	0.58	0.734	0.850	0.653
9. Altruism (AL)	4.03	0.54	0.815	0.871	0.575
10. Advocacy (AD)	3.86	0.71	0.778	0.871	0.694
11. Tolerance (TO)	3.84	0.67	0.771	0.867	0.686

Finally, discriminant validity can be confirmed if all cross-loadings are less than factor loadings (see Table IV) and all constructs' AVE square-root values are higher than the corresponding constructs' correlations with the other constructs (see Table V) (Fornell and Larcker, 1981). The values in Table IV and Table V confirm the discriminant validity.

Table IV. Cross loadings

	PSO	PAR	PSE	PR	ISE	ISH	RB	PI	AL	AD	TO
PSO1	<b>0.828</b>	0.625	0.440	0.232	0.299	0.408	0.380	0.374	0.409	0.429	0.456
PSO2	<b>0.769</b>	0.561	0.402	0.091	0.332	0.418	0.365	0.334	0.335	0.354	0.378
PSO3	<b>0.777</b>	0.531	0.389	0.149	0.277	0.302	0.337	0.285	0.385	0.351	0.391
PAR1	0.598	<b>0.777</b>	0.458	0.190	0.299	0.378	0.365	0.308	0.399	0.446	0.399
PAR2	0.605	<b>0.754</b>	0.563	0.149	0.385	0.409	0.449	0.400	0.417	0.464	0.434
PAR3	0.560	<b>0.742</b>	0.388	0.105	0.220	0.353	0.244	0.269	0.301	0.401	0.376

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PAR4	0.555	<b>0.783</b>	0.416	0.178	0.284	0.440	0.344	0.323	0.361	0.433	0.395
PAR5	0.409	<b>0.636</b>	0.488	0.222	0.353	0.361	0.372	0.358	0.404	0.396	0.378
PAR6	0.541	<b>0.804</b>	0.483	0.190	0.327	0.433	0.382	0.373	0.426	0.460	0.480
PAR7	0.554	<b>0.780</b>	0.457	0.230	0.342	0.439	0.355	0.334	0.413	0.489	0.442
PAR8	0.590	<b>0.806</b>	0.490	0.151	0.356	0.460	0.395	0.385	0.427	0.460	0.490
PAR9	0.563	<b>0.788</b>	0.529	0.196	0.396	0.440	0.439	0.383	0.454	0.485	0.466
PSE1	0.487	0.580	<b>0.770</b>	0.256	0.381	0.467	0.409	0.393	0.473	0.485	0.405
PSE2	0.504	0.586	<b>0.813</b>	0.180	0.430	0.424	0.449	0.408	0.456	0.439	0.364
PSE3	0.248	0.296	<b>0.705</b>	0.110	0.335	0.291	0.353	0.337	0.357	0.286	0.238
PSE4	0.211	0.292	<b>0.699</b>	0.086	0.351	0.259	0.366	0.310	0.287	0.265	0.203
PR1	0.140	0.148	0.062	<b>0.694</b>	0.176	0.211	0.091	0.052	0.138	0.146	0.095
PR2	0.220	0.206	0.244	<b>0.837</b>	0.286	0.195	0.292	0.159	0.217	0.170	0.151
PR3	0.146	0.197	0.233	<b>0.814</b>	0.298	0.205	0.218	0.180	0.237	0.237	0.159
PR4	0.070	0.135	0.069	<b>0.643</b>	0.115	0.130	0.014	0.063	0.153	0.215	0.133
ISE1	0.290	0.352	0.395	0.315	<b>0.809</b>	0.572	0.533	0.447	0.568	0.471	0.405
ISE2	0.346	0.349	0.414	0.183	<b>0.820</b>	0.511	0.579	0.503	0.542	0.433	0.431
ISE3	0.299	0.359	0.423	0.263	<b>0.818</b>	0.522	0.616	0.534	0.587	0.506	0.450
ISH1	0.345	0.362	0.374	0.199	0.555	<b>0.807</b>	0.525	0.564	0.545	0.460	0.469
ISH2	0.406	0.456	0.437	0.203	0.493	<b>0.823</b>	0.555	0.546	0.549	0.522	0.521
ISH3	0.414	0.503	0.417	0.203	0.551	<b>0.814</b>	0.583	0.586	0.542	0.547	0.486
RB1	0.396	0.431	0.482	0.224	0.571	0.575	<b>0.813</b>	0.555	0.547	0.544	0.469
RB2	0.385	0.404	0.414	0.189	0.605	0.600	<b>0.853</b>	0.640	0.595	0.470	0.461
RB3	0.355	0.385	0.430	0.180	0.584	0.519	<b>0.827</b>	0.553	0.575	0.445	0.477
PI1	0.351	0.385	0.430	0.136	0.501	0.562	0.570	<b>0.810</b>	0.574	0.469	0.499
PI2	0.327	0.362	0.354	0.120	0.496	0.585	0.567	<b>0.816</b>	0.529	0.502	0.490
PI3	0.341	0.361	0.405	0.148	0.475	0.536	0.568	<b>0.798</b>	0.529	0.468	0.459
AL1	0.340	0.373	0.411	0.263	0.521	0.482	0.478	0.486	<b>0.779</b>	0.575	0.481
AL2	0.314	0.346	0.443	0.142	0.556	0.510	0.594	0.541	<b>0.759</b>	0.498	0.477
AL3	0.288	0.347	0.366	0.161	0.500	0.484	0.513	0.504	<b>0.743</b>	0.498	0.512
AL4	0.475	0.498	0.399	0.258	0.498	0.512	0.480	0.483	<b>0.752</b>	0.587	0.586
AL5	0.380	0.420	0.437	0.136	0.558	0.553	0.553	0.542	<b>0.758</b>	0.538	0.467
AD1	0.367	0.427	0.456	0.203	0.478	0.526	0.523	0.508	0.577	<b>0.772</b>	0.482
AD2	0.402	0.489	0.404	0.231	0.474	0.545	0.457	0.522	0.612	<b>0.869</b>	0.582
AD3	0.429	0.548	0.434	0.194	0.490	0.496	0.487	0.456	0.593	<b>0.855</b>	0.590
TO1	0.477	0.503	0.337	0.102	0.433	0.495	0.469	0.477	0.554	0.583	<b>0.818</b>
TO2	0.358	0.443	0.351	0.234	0.463	0.493	0.461	0.500	0.533	0.530	<b>0.824</b>
TO3	0.447	0.453	0.367	0.116	0.411	0.512	0.469	0.508	0.569	0.536	<b>0.841</b>

Note: PSO (Perceived Sustainability Orientation), PAR (Perceived Affective Reaction), PSE (Perceived Self-Effectiveness), PR (Perceived Risk), ISE (Information Seeking), ISH (Information Sharing), RB (Responsible Behavior), PI (Personal Interaction), AL (Altruism), AD (Advocacy), TO (Tolerance). The bold values are the factor loadings of the items for their corresponding constructs.

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Table V. Correlations and the square roots of the AVE

Variables	1	2	3	4	5	6	7	8	9	10	11
1.Perceived Sustainability Orientation	<b>0.792</b>										
2.Perceived Affective Reaction	0.725	<b>0.765</b>									
3.Perceived Self-Effectiveness	0.520	0.623	<b>0.748</b>								
4.Perceived Risk	0.203	0.234	0.227	<b>0.751</b>							
5.Information Seeking	0.382	0.433	0.504	0.311	<b>0.816</b>						
6.Information Sharing	0.477	0.541	0.502	0.248	0.655	<b>0.815</b>					
7.Responsible Behavior	0.456	0.489	0.531	0.238	0.707	0.681	<b>0.831</b>				
8.Personal Interaction	0.420	0.457	0.490	0.166	0.607	0.695	0.703	<b>0.808</b>			
9.Altruism	0.476	0.525	0.542	0.256	0.694	0.670	0.689	0.673	<b>0.758</b>		
10.Advocacy	0.480	0.588	0.516	0.251	0.577	0.627	0.585	0.594	0.713	<b>0.833</b>	
11.Tolerance	0.518	0.563	0.425	0.181	0.526	0.604	0.564	0.598	0.667	0.664	<b>0.828</b>

Note: The square root values of AVE are shown on the diagonal; correlations appear below the diagonal.

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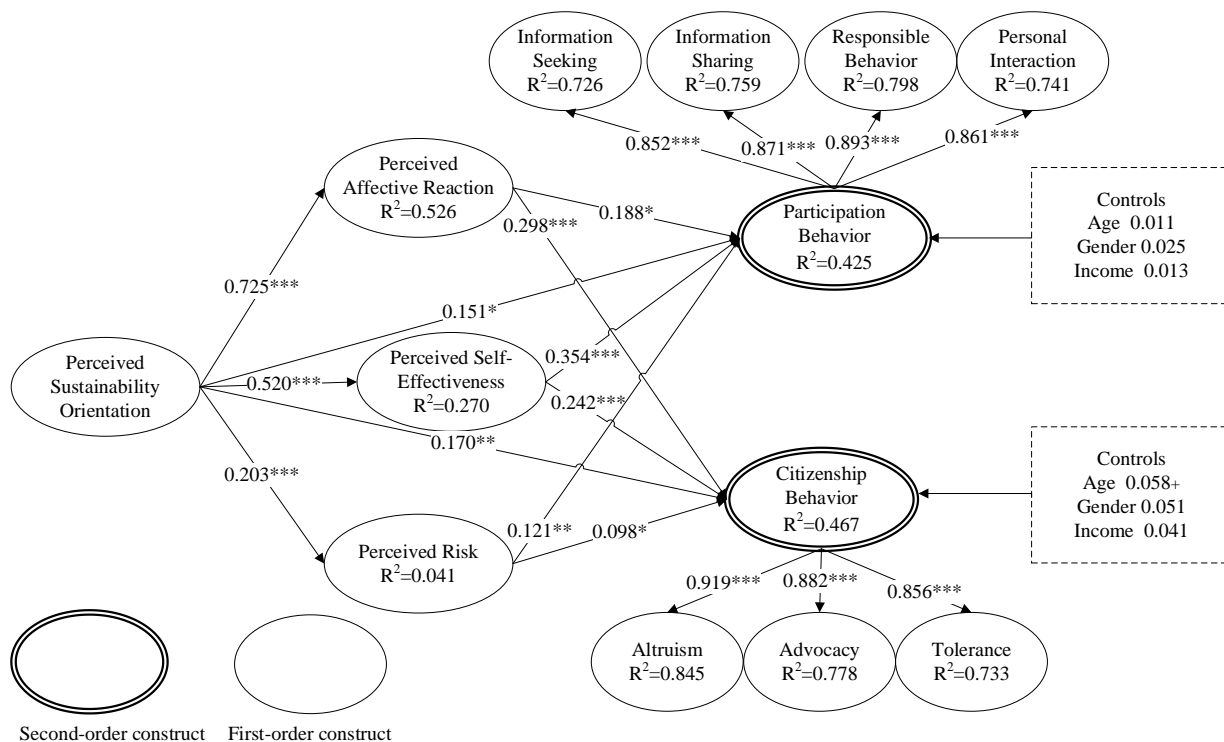
Next, the variance inflation factor values (1.326 to 2.256) for all the independent variables are less than 3.0, much less than the multicollinearity detection value of 10.0. Additionally, all the correlations are lower than the cut-off of 0.80 (Mason and Perreault, 1991) (see Table V). Hence, multicollinearity is not a significant issue. According to Podsakoff *et al.* (2003), we use procedural design and statistical analysis to control common method bias. For procedural design, our survey is developed based on previous studies and is modified through pre-survey interviews. This can ensure that the items are simple, clear, concise, and specific to the crowdfunding context.

Furthermore, we distributed independent, mediating, and dependent variables across different parts of the questionnaire, which can counterbalance the question order. Finally, we ensure that the respondents' answers are anonymous and that there are no right or wrong answers. In statistical analysis, we test the common method bias using Harman's single-factor test. The 43 questionnaire items result in six factors with eigenvalues greater than 1, and the first factor explains 35.642% variance, which is less than the threshold of 50% (Podsakoff *et al.*, 2003). Therefore, common method bias is not a serious concern in this study.

## 6.2 Structural Model

To test the hypotheses, the path coefficients and significance of the structural model are estimated using bootstrapping analysis (5,000 subsamples). The results are shown in Table VI and summarized in Figure 3. Specifically, PSO positively affects participation behavior ( $b=0.151, p<0.05$ ) and citizenship behavior ( $b=0.170, p<0.01$ ). Thus,  $H_1$  is supported. For mediation effects, PSO positively affects PAR ( $b=0.725, p<0.001$ ), PSE ( $b=0.520, p<0.001$ ), and PR ( $b=0.203, p<0.001$ ) respectively. Thus,  $H_{2a}$ ,  $H_{3a}$ , and  $H_{4a}$  are supported, respectively.

Furthermore, PAR has positive and significant impacts on participation behavior ( $b=0.188$ ,  $p<0.05$ ) and citizenship behavior ( $b=0.298$ ,  $p<0.001$ ), supporting  $H_{2b}$ . And PSE has positive and significant impacts on participation behavior ( $b=0.354$ ,  $p<0.001$ ) and citizenship behavior ( $b=0.242$ ,  $p<0.001$ ), supporting  $H_{3b}$ . However, PR positively and significantly affects participation behavior ( $b=0.121$ ,  $p<0.01$ ) and citizenship behavior ( $b=0.098$ ,  $p<0.05$ ).  $H_{4b}$  is not supported. These results reveal that PAR ( $b=0.137$ ,  $p<0.05$ ), PSE ( $b=0.184$ ,  $p<0.001$ ) and PR ( $b=0.025$ ,  $p<0.05$ ) mediate the relationship between PSO and participation behavior. What's more, PAR ( $b=0.216$ ,  $p<0.001$ ) and PSE ( $b=0.126$ ,  $p<0.001$ ) also mediate the relationship between PSO and citizenship behavior. Thus,  $H_2$  and  $H_3$  are fully supported. However, PR does not significantly mediate the relationship between PSO and citizenship behavior ( $b=0.020$ ,  $ns$ ). Thus,  $H_4$  is not supported.



Note: +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

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Figure 3. Structural model analysis results

Table VI. Structural model analysis results

Paths	Complete sample (N=455)		Low-level funding ratio group (N=227)		High-level funding ratio group (N=228)		Male group (N=228)		Female group (N=227)	
	<i>b</i> coefficient	<i>p</i>	<i>b</i> coefficient	<i>p</i>	<i>b</i> coefficient	<i>p</i>	<i>b</i> coefficient	<i>p</i>	<i>b</i> coefficient	<i>p</i>
<b>Direct effects</b>										
PSO → PB	0.151*	0.022	0.115	0.313	0.178 <sup>+</sup>	0.055	0.166 <sup>+</sup>	0.087	0.137	0.150
PSO → CB	0.170**	0.005	0.246**	0.007	0.092	0.266	0.213*	0.018	0.138	0.102
PSO → PAR	0.725***	0.000	0.738***	0.000	0.712***	0.000	0.712***	0.000	0.741**	0.000
PSO → PSE	0.520***	0.000	0.534***	0.000	0.505***	0.000	0.589***	0.000	0.456***	0.000
PSO → PR	0.203***	0.000	0.206**	0.005	0.187*	0.014	0.204**	0.007	0.217**	0.004
PAR → PB	0.188*	0.024	0.224 <sup>+</sup>	0.065	0.163	0.179	0.165	0.153	0.212 <sup>+</sup>	0.067
PAR → CB	0.298***	0.000	0.266**	0.004	0.341**	0.001	0.388***	0.000	0.251*	0.017
PSE → PB	0.354***	0.000	0.351***	0.000	0.347***	0.000	0.318***	0.000	0.386***	0.000
PSE → CB	0.242***	0.000	0.257***	0.000	0.253**	0.001	0.144 <sup>+</sup>	0.057	0.280***	0.000
PR → PB	0.121**	0.004	0.161**	0.005	0.096 <sup>+</sup>	0.098	0.114 <sup>+</sup>	0.070	0.130*	0.019
PR → CB	0.098*	0.014	0.124*	0.027	0.069	0.197	0.038	0.482	0.157*	0.009
<b>Indirect effects (A→B→C)</b>	<i>b</i> <sub>A→B</sub> × <i>b</i> <sub>B→C</sub>	<i>p</i>	<i>b</i> <sub>A→B</sub> × <i>b</i> <sub>B→C</sub>	<i>p</i>	<i>b</i> <sub>A→B</sub> × <i>b</i> <sub>B→C</sub>	<i>p</i>	<i>b</i> <sub>A→B</sub> × <i>b</i> <sub>B→C</sub>	<i>p</i>	<i>b</i> <sub>A→B</sub> × <i>b</i> <sub>B→C</sub>	<i>p</i>
PSO → PAR → PB	0.137*	0.029	0.166 <sup>+</sup>	0.090	0.116	0.192	0.117	0.179	0.157 <sup>+</sup>	0.074
PSO → PAR → CB	0.216***	0.000	0.196*	0.013	0.243**	0.001	0.276**	0.001	0.186*	0.020
PSO → PSE → PB	0.184***	0.000	0.187***	0.000	0.175***	0.000	0.187***	0.000	0.176***	0.000
PSO → PSE → CB	0.126***	0.000	0.137***	0.000	0.128**	0.001	0.085 <sup>+</sup>	0.058	0.128**	0.001
PSO → PR → PB	0.025*	0.040	0.033 <sup>+</sup>	0.076	0.018	0.261	0.023	0.207	0.028	0.102
PSO → PR → CB	0.020 <sup>+</sup>	0.058	0.025	0.122	0.013	0.339	0.008	0.564	0.034 <sup>+</sup>	0.075

Note: +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; PSO (Perceived Sustainability Orientation), PAR (Perceived Affective Reaction), PSE (Perceived Self-Effectiveness), PR (Perceived Risk), PB (Participation Behavior), CB (Citizenship Behavior).

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### 6.3. Multi-Group Analysis for Robustness

A multi-group analysis is conducted to check whether the hypothesized relationships are invariant across the projects and backers. As the funding ratio is measured by the ratio of money raised and the funding goal has been regarded as the level of crowdfunding success (James *et al.*, 2021; Frydrych *et al.*, 2014), we divide the dataset into two groups as evenly as possible according to the funding-ratio sequence. The low-level group (N=227) has a funding ratio below 1.457, while the high-level group (N=228) is above 1.457. As indicated in Table VI, despite the significant levels of some path coefficients being different, most of the paths are consistently significant. In addition, Table VII shows no significant difference in any path coefficient between the low-level and the high-level groups. Furthermore, Table VII also exhibits no significant difference in any path coefficient between the male group (N=228) and the female group (N=227). Thus, our analysis results support the robustness of the research model.

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Table VII. The difference in the path coefficients between groups

Paths	Difference between the low-level funding ratio and high-level funding ratio groups ( $b_{high} - b_{low}$ )		Difference between the male and female groups ( $b_{male} - b_{female}$ )	
<b>Direct effects</b>	<b><i>b</i> coefficient difference</b>	<b><i>p</i></b>	<b><i>b</i> coefficient difference</b>	<b><i>p</i></b>
PSO → PB	0.063	0.669	0.029	0.835
PSO → CB	-0.154	0.211	0.075	0.531
PSO → PAR	-0.026	0.724	-0.029	0.710
PSO → PSE	-0.029	0.737	0.133	0.119
PSO → PR	-0.019	0.855	-0.014	0.891
PAR → PB	-0.062	0.721	-0.048	0.756
PAR → CB	0.075	0.585	0.137	0.329
PSE → PB	-0.004	0.969	-0.068	0.546
PSE → CB	-0.004	0.969	-0.136	0.194
PR → PB	-0.065	0.441	-0.016	0.848
PR → CB	-0.054	0.492	-0.120	0.135
<b>Indirect effects (A→B→C)</b>	<b><math>b_{A→B} \times b_{B→C}</math></b>	<b><i>p</i></b>	<b><math>b_{A→B} \times b_{B→C}</math></b>	<b><i>p</i></b>
PSO → PAR → PB	-0.050	0.718	-0.040	0.728
PSO → PAR → CB	0.047	0.644	0.090	0.433
PSO → PSE → PB	-0.012	0.833	0.011	0.855
PSO → PSE → CB	-0.009	0.865	-0.043	0.467
PSO → PR → PB	-0.015	0.513	-0.005	0.807
PSO → PR → CB	-0.013	0.542	-0.026	0.215

Note: +  $p < 0.10$ , \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; PSO (Perceived Sustainability Orientation), PAR (Perceived Affective Reaction), PSE (Perceived Self-Effectiveness), PR (Perceived Risk), PB (Participation Behavior), CB (Citizenship Behavior).

## 7. Conclusions

This study investigates how PSO affects value-co-creation behavior manifested by participation and citizenship behaviors. Based on three theories (AET, PCE, and RPT), it identifies three psychological factors of backers: PAR, PSE, and PR. Finally, we test hypotheses and draw the following conclusions through an online survey of respondents recruited from the JD.com crowdfunding website.

First, projects with SO can benefit the environment or society and induce backers to generate affective reactions and display positive behaviors based on AET. This study confirms that PSO positively influences PAR, while PAR positively impacts value-co-creation behavior. This finding is consistent with previous studies about employee behavior (Carmeli *et al.*, 2017).

Second, based on the self-effectiveness concept, a project with SO can help educate backers and make them think they can contribute to the environment and society, motivating them to support the project. Hence, PSO influences value-co-creation behavior through PSE. This study confirms that PSO positively drives PSE, and PSE positively impacts value-co-creation behavior. This finding is consistent with studies about sustainable consumption behavior (Schutte and Bhullar, 2017).

Third, according to RPT, PSO in this study can increase the risk perception of backers because of the uncertainty of the sustainability-oriented project. Interestingly, PR also positively affects participation and citizenship behaviors, contrary to the expected direction. A possible explanation is that it is associated with the preference of backers and the high return of the project. Backers with a high tolerance for risk will still support the project to achieve the desired return, even when they are aware of the potential risks. However, this study does not confirm that PSO influences citizenship behavior through PR. It compares the psychological factors and finds that the mediating effect of PSE on participation behavior is stronger than

PAR and PR. The mediating effect of PAR on citizenship behavior is stronger than PSE.

## 8. Discussion

### 8.1 Theoretical Contributions

Our research contributes theoretically to the literature in two aspects. Firstly, this research is one of the first to examine the influences of SO on backers' value-co-creation behavior from the perspective of backers. Crowdfunding and sustainability are emerging issues, but research that combines crowdfunding with sustainability is still scarce. The existing research into the direct influences of SO on different crowdfunding outcomes invariably from the perspective of projects (Hörisch, 2015; Vismara, 2019; Chan *et al.*, 2021). This study changes the perspective from projects to backers and examines the impacts of PSO and three different psychological factors on the value-co-creation behavior of the backers. The results indicate that PSO influences value-co-creation behavior through two mechanisms, PAR and PSE, but not PR. In addition, we compare the strength of these mechanisms to understand clearly the psychological process of backers' participation in value co-creation activities. This study applies the RCT, AET, PCE, and RPT to the crowdfunding process and provides empirical support for the SO effects on value-co-creation behavior. The current research extends the use of AET, PCE, and RPT to examine the psychological process of backers. Our results also shed new light on crowdfunding research.

Secondly, we present a complete value-co-creation process of backers in a crowdfunding project based on TPB. Most research into the value-co-creation process in crowdfunding is qualitative (Chaney, 2019; Laffey *et al.*, 2021). We empirically illustrate the process sequentially from belief to attitude and intention. Specifically, the process starts with the backer's belief in the project's SO, which influences the attitude manifested by the psychological factors of PAR, PSE, and PR. Finally, the mechanisms trigger the value-co-

creation behavior. It advances our understanding of the underlying psychological process, leading to the backers' value-co-creation behavior. It extends the application of TPB in the crowdfunding context. It also enriches the literature regarding value co-creation within the context of crowdfunding.

## **8.2 Practical Implications**

This study helps creators better understand the psychological factors of backers in crowdfunding and provides backers with guidance on participating effectively in value co-creation activities. Specifically, the study offers several practical implications for creators and backers.

### ***Implications for Creators***

First, our study suggests the positive effects of PSO on backers' participation and citizenship behaviors. Therefore, the creator should attach importance to the description of the project's characteristics regarding sustainability. The creator is advised to take the time to prepare the project presentation and emphasize the environmental or social benefits of the project. Second, this work verifies the mediating impacts of PAR. When launching a sustainability-oriented project, the creator should focus on arousing the backers' PAR. For example, in the project description, the creator should use some sustainability words and phrases (e.g., rechargeable, organic, wellbeing, health). It is recommended that the creator describes specific benefits for the environment or society to stimulate the positive emotions of backers and motivate them to participate in the project. Third, our study demonstrates the mediating influences of PSE.

Thus, to encourage backers' PSE, the creator should also illustrate how backers can impact the environment or society via a project description. This can increase their confidence in contributing to sustainable development, thus attracting more backers to invest or support the project and increasing the crowdfunding success rate. Finally, this research illustrates that PSO

increases PR. Therefore, it is important to eliminate information asymmetry between creators and backers. The creator should update project information timely through the update function, deliver rewards on time, disclose funds usage, and frequently interact with backers. This can increase backers' trust, increasing the backer's value-co-creation behavior with the creator.

### ***Implications for Backers***

First, backers should carefully evaluate the sustainability orientation of a crowdfunding project. Backers should assess whether the project provides environmental or social benefits by integrating multiple sources of information, such as project descriptions, creator's updates of project information, and other backers' comments. Second, backers should look at the timeline, budget plan, and updated information in the project to assess whether the money will be spent on the measure advertised and reduce the risk of fraud. Third, new backers should master the knowledge about crowdfunding and sustainability. This knowledge can benefit their investment decision-making and help them evaluate crowdfunding projects' sustainable attributes. Finally, backers should follow the guidelines regarding sustainability claims recommended by the Netherlands Authority for Consumers and Markets (ACM, 2021b; ACM, 2021a) to assess the backers. These include whether the backer makes clear what sustainability-related benefits the product offers; whether the sustainability claims are substantiated with up-to-date facts; whether comparisons with other products or services are fair; whether they are specific and honest about their companies' sustainability efforts; and whether the products' visual claims and labels are certified by credible third parties. These guidelines could be applied to creators. With such shared practices between both parties, the success of future sustainability-oriented crowdfunding projects shall be achieved.

### **8.3 Limitations and Future Research**

Like most survey research, this study has some limitations. First, our study mainly focused

on sustainability-oriented and reward-based crowdfunding projects. Other types of projects, such as equity-based and patronage-based crowdfunding projects, could be explored and contrasted in the future. Second, we selected projects and invited users from only one reward-based crowdfunding platform, JD.com. It limits the generalizability of our results. Thus, future research is needed to examine the projects on various crowdfunding platforms and compare their differences. Third, this study conducted an online survey in China in which the collectivist culture might influence the results. Therefore, a cross-cultural comparative analysis is suggested for future research. Fourth, we selected actual projects from JD's crowdfunding website as project scenarios. The characteristics of these scenarios could influence a participant's attitude and behavior, such as picture color, writing style, and readability. Future studies should collect and analyze more characteristics to gain deeper insights into crowdfunding success. Finally, the current research model only explains the first three stages of the crowdfunding behavioral process. Future research could extend the model with two more stages: participants' actual co-creation behaviors and the values delivered to creators and backers. This extended model can be adopted as the crowdfunding success model and guide future crowdfunding projects. Further research is also needed to explore other types of psychological factors.

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### Appendix A. Example of sustainability-oriented project description

**OMNI | 锂电池·锂想家**

## 锂想家USB快充锂电池

USB fast-charge lithium battery

充电方便 使用安全 可循环500次使用  
Easy to charge. Safe to use.  
It can be reused for 500 times.

USB直充    1小时充满    1.5恒压    500次循环

大容量    无记忆效应    低自放电    绿色环保  
Green Environmental Protection

## 安全可靠绿色环保

Safe, Reliable, Green, Environmental Protection.

锂电池不含镉、铅、汞等对环境有污染的元素，绿色环保  
Lithium battery does not contain cadmium, lead, mercury and other elements that pollute the environment. It is green and environmentally friendly.