

Evolution, Application, and Prospects of the Theory of Planned Behavior: A Case Study of Consumers' Green Consumption Behavior

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Abstract

Against the backdrop of the "dual carbon" goals and green development, the Theory of Planned Behavior (TPB) has emerged as a core framework for analyzing consumers' green consumption behavior. This paper systematically traces the evolutionary trajectory of TPB, from its origins and international development to its localization and application in China. Its core constructs—attitude, subjective norm, and perceived behavioral control—influence green consumption behavior through behavioral intention. The theory has been integrated with other models, such as the Norm Activation Model, and has undergone significant localization. Current research faces challenges including theoretical stagnation, methodological limitations, insufficient exploration of the intention-behavior translation mechanism, and a lack of heterogeneity analysis. Future research should focus on strengthening theoretical synthesis with local contexts, promoting dynamic and diversified methodological approaches, and delving deeper into the behavioral translation mechanisms and heterogeneity to provide theoretical support and practical guidance for cultivating green consumption behavior.

Keywords

Theory of Planned Behavior; green consumption; attitude-behavior gap; theoretical evolution.

1. Introduction

With the increasing severity of global ecological and environmental problems, green development has become a common concern of the international community. Consumers' green consumption behavior, as the micro-level basis for implementing green development, has attracted extensive attention from both academia and practice. Green consumption behavior refers to a behavioral pattern in which consumers, during the purchase, use and disposal of products or services, consider both personal needs and environmental benefits, actively choose environmentally friendly products and services, and reduce resource waste and environmental pollution.

Since China proposed its "dual carbon" goals, namely carbon peaking and carbon neutrality, promoting the cultivation and diffusion of consumers' green consumption behavior has become an important path for environmental governance and sustainable economic and social development. However, the actual implementation of green consumption behavior among Chinese consumers remains insufficient. In particular, problems such as the inconsistency between environmental cognition and actual behavior, and the weak transformation from behavioral intention to actual action, remain prominent [1,2,9].

To explain these phenomena, scholars have introduced various theoretical frameworks. Among them, the Theory of Planned Behavior (TPB), proposed by Ajzen, has become one of the most

widely used theoretical tools for explaining consumers' green consumption behavior because of its clear logical structure and strong explanatory and predictive power [38]. Since its formulation, TPB has not remained unchanged. Instead, it has been continuously extended, revised and integrated with other theories in different behavioral contexts and cultural settings [39,40,45]. Especially in the Chinese context, TPB has shown strong adaptability through localized expansion and contextual modification [5,21].

Therefore, it is of great theoretical and practical significance to systematically review the evolution of TPB, examine its application logic in consumers' green consumption behavior, analyze the limitations of existing studies and propose future research directions. This paper aims to achieve three objectives. First, it reviews the origin and theoretical evolution of TPB from both international and domestic perspectives. Second, it summarizes the application mechanism of TPB in consumers' green consumption behavior. Third, it identifies the limitations of current research and proposes future directions for theoretical development and practical application.

Origin and Evolution of the Theory of Planned Behavior.

2. Origin and Theoretical Evolution of the Theory of Planned Behavior

2.1. Origin and Core Connotations of the Theory of Planned Behavior

The origin of the Theory of Planned Behavior can be traced back to the Theory of Reasoned Action (TRA), proposed by Fishbein and Ajzen. TRA is based on the assumption that individuals are rational actors. It argues that behavioral intention is the direct antecedent of actual behavior, while behavioral intention is jointly determined by attitude and subjective norm. Although TRA provides a clear framework for explaining conscious behavior, it is mainly applicable to behaviors under complete volitional control and has limited explanatory power for behaviors constrained by external conditions or individual ability.

To overcome this limitation, Ajzen introduced perceived behavioral control into TRA and formally proposed the Theory of Planned Behavior [38]. According to TPB, actual behavior is jointly determined by behavioral intention and perceived behavioral control. Behavioral intention refers to an individual's motivation or plan to perform a specific behavior. It is directly influenced by attitude, subjective norm and perceived behavioral control [38].

Attitude refers to an individual's positive or negative evaluation of performing a behavior. Subjective norm refers to the perceived social pressure from important others or reference groups regarding whether one should perform the behavior. Perceived behavioral control refers to the perceived ease or difficulty of performing the behavior, reflecting the individual's perception of the resources, opportunities and ability required to implement the behavior [38,39].

TPB further assumes that these three variables are determined by corresponding belief structures. Attitude is determined by behavioral beliefs and outcome evaluations; subjective norm is determined by normative beliefs and motivation to comply; and perceived behavioral control is determined by control beliefs and perceived power of facilitating or inhibiting factors [38,45]. By introducing perceived behavioral control, TPB breaks through the limitation of TRA's assumption of complete behavioral control and greatly expands its scope of application.

2.2. International Development and Evolution

Early international studies mainly focused on clarifying the definitions of TPB constructs and verifying the generalizability of its core paths. Ajzen further clarified that perceived behavioral control includes two related but distinguishable components: self-efficacy and controllability [39]. Self-efficacy refers to an individual's belief in his or her capability to perform a behavior, while controllability refers to the perceived influence of external conditions on behavioral performance. This clarification improved the operational consistency of TPB and reduced measurement ambiguity.

A large number of empirical studies and meta-analyses have confirmed the predictive validity of TPB. Armitage and Conner conducted a meta-analysis of 185 independent studies and found that TPB explained 39% of the variance in behavioral intention and 27% of the variance in actual behavior [41]. Godin and Kok also confirmed that TPB had strong explanatory power in health-related behaviors, including smoking, diet and physical activity [47]. Hagger et al. further verified the effectiveness of TRA and TPB in physical activity behavior through meta-analysis [51].

However, as TPB was increasingly applied to complex behavioral contexts, researchers found that the intention-behavior gap remained an important theoretical challenge [46,60,61]. Individuals may have positive attitudes and strong intentions, but fail to translate intentions into actual behavior due to habits, situational constraints, impulsivity or lack of implementation planning [54,55,64]. Therefore, scholars have extended TPB mainly from three aspects: adding moderating variables, introducing mediating mechanisms and integrating TPB with other theories.

First, moderating variables have been introduced to explain the boundary conditions of TPB. For example, impulsivity has been found to moderate the relationship between intention and behavior. Individuals with lower impulsivity are more likely to transform intentions into actions, while highly impulsive individuals are more likely to be influenced by immediate rewards and thus show a weaker intention-behavior relationship [55]. Perceived behavioral control has also been found to play a moderating role in the transformation from intention to behavior [53]. Cultural factors are another important moderator. In collectivist cultures, subjective norm tends to exert stronger influence on behavioral intention [30,58].

Second, mediating variables such as planning and implementation intention have been incorporated into TPB. Gollwitzer emphasized the role of goal intention and implementation intention in achieving behavioral goals [48]. Sheeran and Orbell found that implementation intention can significantly improve the predictive validity of TPB, especially for repeated behaviors [62]. Luszczynska et al. further distinguished between action planning and coping planning, showing that planning and self-efficacy jointly influence the transformation from intention to actual behavior [57].

Third, TPB has been integrated with other theoretical frameworks. In environmental behavior research, Bamberg and Möser confirmed that TPB can effectively predict pro-environmental behavior, while moral norms and social norms are also important determinants [42]. In technology acceptance research, Venkatesh et al. integrated TPB with the Technology Acceptance Model and proposed the Unified Theory of Acceptance and Use of Technology, which improved the explanatory power for technology adoption behavior [63]. In health behavior research, TPB has also been combined with other psychological models to explain adolescent alcohol consumption, social distancing and vaccination willingness [44,46,49,50]. These studies show that TPB has strong flexibility, extensibility and interdisciplinary applicability.

2.3. Introduction and Localization of the Theory of Planned Behavior in China

Since TPB was introduced into China in the 1990s, it has experienced a development process characterized by theoretical introduction, empirical verification, cross-domain application and localized innovation. Early Chinese studies mainly focused on testing the applicability of TPB in the Chinese context. Li compared the predictive power of the Theory of Reasoned Action, the Theory of Planned Behavior and Social Cognitive Theory in explaining physical exercise behavior, and confirmed the applicability of TPB in China [14]. Duan and Jiang systematically reviewed the theoretical connotations, measurement methods and research progress of TPB, pointing out that early domestic studies were largely confirmatory and lacked localized theoretical innovation [5].

With the deepening of research, TPB has been widely applied in health behavior, consumption behavior, environmental behavior, tourism behavior, public management and other fields. In health and medical behavior research, scholars have used TPB to analyze vaccination decisions for children with special health conditions [3], AIDS prevention behavior among elderly women [17], medical delay behavior among lung cancer patients [18], and physical activity intention among high school students [6]. These studies generally show that attitude, subjective norm and perceived behavioral control can significantly influence behavioral intention, while behavioral intention further affects actual behavior.

In consumer and market behavior research, TPB has been used to explain ethical consumption, moral consumption, green hotel selection and other consumption decisions. Liu et al. examined moral consumption behavior among Generation Z and analyzed the causes of the attitude-behavior gap [20]. Xie studied customers' behavioral intention to stay in green hotels from the perspective of TPB and confirmed the explanatory power of attitude, subjective norm and perceived behavioral control [32,33]. These studies demonstrate that TPB can effectively explain consumption decisions involving both personal benefits and social values.

In environmental and ecological behavior research, TPB has been widely used to explain green lifestyle formation, waste sorting, green travel, low-carbon consumption and ecological protection intention. Gao and Wei explored the dual interaction effect in the formation of green lifestyles based on TPB [7]. Liao et al. examined the influence of community integration on household waste sorting behavior and verified the mediating role of TPB variables [16]. Li et al. constructed a TPB-TAM integrated model to analyze the influencing factors of residents' green travel behavior under intelligent transportation technology [13]. Zhang analyzed rural residents' low-carbon consumption intention based on TPB [36]. Zheng et al. studied the influencing factors of urban residents' low-carbon lifestyle behavior by taking Nanjing as an example [37].

In public governance and rural development research, TPB has also shown strong explanatory power. Gan et al. analyzed the influence of farmers' cognition on farmland transfer willingness based on TPB [8]. Jian et al. examined conformity behavior in farmers' homestead withdrawal decisions and found that social identity and subjective norm played important roles [10]. Li et al. analyzed rural women's willingness to participate in rural living environment governance from the perspective of TPB [12]. Liu et al. localized TPB to explain the financial behavior of local operators in rural tourism accommodation [19].

Localized innovation is an important feature of TPB research in China. Chinese scholars have introduced variables closely related to Chinese social culture and institutional context, such as collectivist culture, face consciousness, social identity, policy cognition, community integration, family support and institutional trust [10,16,19,21,30]. These variables enrich the explanatory framework of TPB and improve its applicability to Chinese social realities. In addition, Chinese scholars have increasingly integrated TPB with the Norm Activation Model (NAM), Technology Acceptance Model (TAM) and other theories. For example, Qin et al. constructed a TPB-NAM integrated framework to explain pro-environmental behavioral intention among marine aquaculture enterprises [25]. Tang et al. applied TPB and NAM to examine public willingness to participate as informal river chiefs [27]. Cui et al. used the TPB-NAM framework to analyze farmers' pesticide reduction behavior [4]. Li et al. examined ecological protection willingness based on a TPB-TAM framework [15]. These studies reveal the dual mechanism of rational decision-making and moral motivation, further expanding the explanatory boundaries of TPB.

3. Application of the Theory of Planned Behavior to Consumers' Green Consumption Behavior

Under the background of China's "dual carbon" goals, green consumption has become a key component of sustainable development. TPB provides a systematic analytical framework for

understanding the formation mechanism of consumers' green consumption behavior. Its core variables, namely attitude, subjective norm, perceived behavioral control and behavioral intention, jointly explain why consumers are willing or unwilling to engage in green consumption.

3.1. Behavioral Attitude and Green Consumption

Behavioral attitude refers to consumers' positive or negative evaluation of green consumption behavior. In green consumption contexts, attitude is mainly formed through consumers' cognition of environmental benefits, product value, personal utility and social responsibility. When consumers believe that green consumption can reduce environmental pollution, save resources and contribute to sustainable development, they are more likely to form positive attitudes and generate green purchase intention.

Existing studies show that positive green consumption attitude significantly promotes green consumption intention. Sheng et al. found that green product experience enhances consumers' perception of environmental attributes, thereby promoting positive attitudes and green purchase intention [26]. Lao and Wu explored the influencing mechanism of green consumption behavior based on Ajzen's TPB and confirmed that attitude is an important antecedent of green consumption intention [11]. Zhang showed that environmental concern can influence green product consumption behavior through consumers' attitudes and intentions [35]. Ural Shaersaikai and Zeng further found that environmental cognition can indirectly promote green consumption behavior by shaping green consumption attitude [28].

However, the effect of attitude is not always stable. Green consumption often has positive externalities, which means that environmental benefits are shared by society while costs may be borne by individual consumers. Therefore, some consumers may recognize the environmental value of green products but still fail to purchase them because of higher prices, lower perceived personal benefits or limited availability [2,11]. This phenomenon reflects the attitude-behavior gap in green consumption and has become an important issue in TPB-based research.

3.2. Subjective Norm and Green Consumption

Subjective norm refers to consumers' perceived social pressure from family members, friends, colleagues, communities, public opinion and policy advocacy. In the Chinese cultural context, subjective norm often plays a particularly important role because Chinese society is strongly influenced by collectivist values and interpersonal relationships [21,30].

Liu pointed out that Chinese consumers' green consumption behavior is significantly influenced by subjective norm, especially by the expectations and behaviors of important reference groups [21]. An argued that under the "dual carbon" goals, social publicity, policy guidance and group demonstration can strengthen residents' green consumption intention [1]. Chen and Zhao further indicated that reference group influence may affect the transformation from green consumption attitude to actual behavior [2]. When green consumption becomes a socially recognized and encouraged behavior, individuals are more likely to conform to group expectations and form green consumption intention.

Subjective norm may also promote the diffusion of green consumption behavior through social interaction and behavioral spillover. For example, when family members, friends or community residents frequently practice green consumption, individuals may perceive stronger social pressure and imitate these behaviors. Therefore, subjective norm not only affects individual intention, but also contributes to the collective diffusion of green consumption practices.

3.3. Perceived Behavioral Control and Green Consumption

Perceived behavioral control reflects consumers' perception of the ease or difficulty of engaging in green consumption. It includes consumers' perceived economic ability, information

availability, product accessibility, purchase convenience and trust in green certification. In green consumption contexts, perceived behavioral control is particularly important because consumers often face practical constraints such as high prices, insufficient product supply, limited information and uncertain product quality.

Pan and Guo found that perceived ease of use and economic feasibility significantly influence consumers' acceptance of green packaging [24]. Wu and Liao showed that perceived behavioral control plays a mediating role between environmental cognition and purchase intention for new energy vehicles [29]. Xiao confirmed that hotel customers' green consumption behavior is affected by self-efficacy, perceived behavioral control and behavioral intention [31]. These studies suggest that improving product accessibility, reducing purchase cost and increasing information transparency can enhance consumers' perceived behavioral control and promote green consumption behavior.

In the digital economy, e-commerce platforms, online reviews, green labels and smart recommendation systems may reduce consumers' search costs and increase perceived convenience. Therefore, perceived behavioral control is not only an individual psychological variable, but also closely related to market supply, institutional environment and technological conditions.

3.4. Behavioral Intention and the Intention-Behavior Gap

Behavioral intention is the most direct antecedent of green consumption behavior in TPB. Consumers with stronger green consumption intention are more likely to purchase green products, choose low-carbon services and reduce environmentally harmful consumption. Many studies have confirmed the mediating role of behavioral intention between TPB antecedents and actual behavior [23,31,35].

However, the intention-behavior gap remains a significant problem. Consumers may express strong willingness to buy green products, but their actual behavior may be constrained by price sensitivity, habits, lack of trust, limited channels, inconvenience and weak policy incentives [2,20,34]. International research also shows that habit, implementation intention, perceived behavioral control and self-efficacy are important factors influencing the transformation from intention to behavior [53,54,57,62,64].

Therefore, future green consumption studies should not only examine whether consumers have green consumption intention, but also explain how such intention can be transformed into actual behavior. Variables such as action planning, implementation intention, habit, emotional experience, policy incentives and digital platform support should be incorporated into extended TPB models.

4. Limitations of Existing Research

Although TPB has been widely applied in green consumption research and has shown strong explanatory power, existing studies still have several limitations.

First, theoretical innovation remains insufficient. Many studies still rely on the traditional TPB framework consisting of attitude, subjective norm and perceived behavioral control, and mainly test their direct effects on behavioral intention. Although some studies have introduced additional variables, such extensions are often fragmented and lack systematic theoretical integration [5,45]. Future studies should pay more attention to the internal logic among variables and construct more coherent extended models.

Second, research methods are relatively homogeneous. Current studies are mainly based on cross-sectional questionnaire surveys and structural equation modeling. Although these methods can test relationships among variables, they are limited in capturing the dynamic evolution of cognition, intention and behavior. Longitudinal research has become increasingly

important in TPB studies because behavioral intention and actual behavior may change over time [52]. Experimental methods, behavioral tracking data and mixed-method designs should be further adopted.

Third, the intention-behavior transformation mechanism has not been sufficiently explored. The attitude-behavior gap and intention-behavior gap are particularly prominent in green consumption contexts [2,20,46]. Many consumers express positive environmental attitudes but do not consistently engage in green consumption. Existing studies have not fully explained how individual intention interacts with external conditions, habits and policy environments.

Fourth, insufficient attention has been paid to consumer heterogeneity. Consumers differ in age, income, education, environmental values, digital literacy, regional culture and social network characteristics. These differences may lead to variations in the formation of green consumption intention and the transformation from intention to behavior. For example, Generation Z consumers may be more sensitive to moral marketing and social media influence [20,59], while rural residents may be more influenced by community norms and policy accessibility [36].

5. Future Research Directions

Future research on TPB and green consumption behavior can be advanced in the following directions.

First, theoretical systematization and localized integration should be strengthened. Researchers should not simply add variables to the TPB framework, but should clarify the theoretical logic among added variables and core constructs. In the Chinese context, variables such as collectivist culture, face consciousness, policy cognition, social identity, community integration and institutional trust can be incorporated into TPB to improve localized explanatory power [10,16,19,21,30].

Second, dynamic and diversified research methods should be promoted. Future studies should adopt longitudinal designs, field experiments, mixed-method research, big data analysis and behavioral tracking methods. These methods can better reveal the dynamic transformation from cognition to intention and from intention to actual behavior [52,54]. For example, digital platform data can be used to compare stated green purchase intention with actual green product purchase behavior.

Third, future research should focus more on the intention-behavior transformation mechanism. Variables such as action planning, coping planning, implementation intention, self-efficacy and habit should be introduced to explain how green consumption intention becomes actual behavior [48,57,62,64]. At the same time, external factors such as product availability, price subsidy, green certification, policy incentives and social media influence should also be considered [1,24,59].

Fourth, more attention should be paid to heterogeneous groups and differentiated mechanisms. Future studies can compare consumers from different generations, income groups, regions and cultural backgrounds. In particular, the green consumption behavior of Generation Z, rural residents, urban middle-class consumers and digital platform users deserves further investigation [20,36,59]. Such comparative studies can provide more targeted implications for policy design and enterprise marketing.

Fifth, TPB should be further integrated with other theories. Since green consumption involves rational evaluation, moral responsibility, social identity, technological acceptance and habitual behavior, a single theoretical model may not fully explain its complexity. Future studies may integrate TPB with NAM, TAM, self-determination theory, social identity theory and habit theory to construct more comprehensive explanatory frameworks [4,13,22,25,27,63].

6. Conclusion

This study systematically reviews the origin, evolution and application of the Theory of Planned Behavior (TPB) in consumers' green consumption behavior. The findings show that TPB provides a clear and widely applicable framework for explaining the formation of green consumption intention through attitude, subjective norm and perceived behavioral control. In the context of the "dual carbon" goals and green development, TPB remains a useful theoretical tool for understanding how consumers form green consumption intentions and for providing practical implications for promoting sustainable consumption.

At the same time, this review indicates that the explanatory power of TPB is constrained when it is applied to complex green consumption contexts. In particular, the transformation from behavioral intention to actual behavior is often affected by contextual conditions, consumption habits and individual differences, which may weaken the predictive effect of intention on behavior. Therefore, future applications of TPB should pay greater attention to the behavioral translation process and the specific contexts in which green consumption occurs.

Overall, TPB continues to serve as an important theoretical foundation for green consumption research. Its value lies not only in explaining consumers' behavioral intentions, but also in providing a basis for further theoretical extension and empirical exploration of green consumption behavior.

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