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Review Paper

A Comparative Analysis of Behavioral Theories towards Farmers' Water Conservation

Naser Valizadeh [a,], Masoud Bijani [b,*], Dariush Hayati [c]*

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Abstract

According to experts, the inefficient agricultural sector has a dominant role in degrading water resources all over the world. Farmers' conservational behavior is an important aspect of new integrated water management studies. Relevantly, various behavioral theories have been proposed in the field of environmental psychology. The main objective of the present comparative analysis and review study was to explain foundations of the most remarkable water conservation behavioral theories, classify them, and finally, present a critical discussion on the better application of each theory to explain the farmers' Water Conservation Behaviors (WCBs). This study is based on the documentary research method which was accomplished using a systematic literature review. The comparison analysis of existing theories indicates that the "theory selection" should be consistent with the "type of behavior under study". Consequently, it is recommended to adopt the theories like Planned Behavior Theory and Reasoned Action Theory to illustrate the private-sphere WCBs such as farmers' willingness to pay for water conservation because these behaviors are directly associated with the farmers' personal interests. With respect to those conservational behaviors with participatory and collective nature, an individual may ignore his/her short-sighted and immediate benefits to achieve collective and long-term interests. In such a case, the use of moral approach and its relevant theories, including the Value-Belief-Norms Theory and the Norm Activation Theory, seems to be more appropriate. Consequently, agricultural practitioners and researchers are recommended to use rational approach theories to analyze the WCBs of farmers.

Keywords:
Water conservation behavior (WCB), moral theories, rational theories

[a] *Ph.D. Student, Department of Agricultural Extension and Education, School of Agriculture, Shiraz University, Shiraz, Iran*
[b] *Assistant Professor, Department of Agricultural Extension and Education, College of Agriculture, Tarbiat Modares University (TMU), Tehran, Iran*
[c] *Professor, Department of Agricultural Extension and Education, School of Agriculture, Shiraz University, Shiraz, Iran*
** Corresponding author's email: naservalizadeh7@gmail.com, mbijani@modares.ac.ir*

INTRODUCTION

In the present century, water conservation is a key factor in achieving food security (Yang et al., 2003; Azizi Khalkheili et al., 2017) as water is one of the main factors affecting the growth and production of plants (Gerbens-Leenes & Nonhebel, 2004). Nowadays, many countries around the world are suffering from a great problem of supplying water to meet the growing water demand of their nations. This indicates that these countries are struggling with a large number of problems to maintain their agricultural development (as one of the sectors with high water demands) (Afshar & Zarafshani, 2010; Azizi Khalkheili et al., 2012; Valizadeh et al., 2019). Various research studies suggest that above 70 percent of freshwater resources in the world are consumed in the agriculture sector (Yang et al., 2003; Valizadeh et al., 2018b; Valizadeh et al., 2018c). Several factors like recent droughts, water demand growth, population growth, and agricultural development have complicated the situation, resulting in a high shortage of water in different areas (Shiri et al., 2011; Yazdanpanah et al., 2014a). In agricultural communities, however, the excessive use of water and the crisis imposed by its shortage are manifested in economic and social dimensions (Maleksaeidi & Karami, 2013; Keshavarz et al., 2013). Water used for drinking, cooking, hygiene, industry and so on accounted for about 8 % of total water use. For this reason, farmers are at the center of attention in political efforts to save, conserve, and promote water use efficiency (Yazdanpanah et al., 2014b). In line with the critical role of farmers in water conservation policies and water management plans, the United Nations (2005) issued a statement announcing the present decade as the Decade of Education for Sustainable Development (Sarabia-Sánchez et al., 2014). This introduced the role of farmers and their water-relevant behaviors as a major issue.

In various scientific branches, a lot of perspectives, theories, and models have been adopted to understand and describe the individuals' behaviors. Some examples include water conflict behavior (Bijani & Hayati, 2013; Bijani et al., 2017), environmentally significant behaviors (Stern, 2000), ecological behavior, water conservation behaviors (WCBs) (Lam, 1999; Yazdanpanah et al., 2014a), recycling behavior (Nigbur et al., 2010), and the effect of political orientations (Gärling et al., 2003). The diversity of behavioral theories has confused researchers in many respects so that they have failed to pick up an appropriate theory from the existing theories to analyze farmers' WCBs. On the other hand, the studies utilizing a specific behavioral theory in their analysis do not generally provide a rational justification for their selected theory. Hence, the main objective of the present review study was to explain the fundamentals of the most remarkable behavioral theories, classify the theories, and, finally, provide a critical discussion on the applications of each theory in explaining the farmers' WCBs.

As stated above, reviewing the literature of pro-environmental behaviors such as WCBs, we face with a wide range of behaviors, each of which has focused on analyzing the effects of human behavior on the environment. The selection of an appropriate behavior meaningfully and positively affecting the environment is the first step in examining and developing behavioral changes (Steg & Vlek, 2009). An important point in examining WCBs, however, is the approach used to explain the behavior. In other words, explaining the differences among various approaches to WCBs would be of benefit in recognizing and prioritizing behaviors that cause the most positive effects on agricultural water resources.

In general, there are two main approaches in the field of environmental behaviors and WCBs (Schultz, 2000): Rational Human Approach or Traditional Economic Approach and Moral Approach (Figure 1). Each approach has its own special advocates who seek justifications to validate the approach and, as a result, its different theories. The rational human approach, for example, consists of theories such as "Planned Behavior Theory (PBT)"

(Ajzen, 1991) and considers human behavior as a situation of rational choice. The moral approach, on the other hand, contains theories such as the "Norm Activation Theory (NAT)" (Schwartz, 1997) and the "Value-Belief-Norm (VBN) Theory" (Stern, 2000), taking human behavior as a moral position. Simply put, these two approaches assume two completely opposing perspectives in confronting with and explaining farmers' WCBs. According to the first approach, the farmers act consciously in terms of WCBs and make attempts to present behaviors bearing them the maximum benefit. The second approach, however, states that farmers do not take the private-sphere considerations into account with respect to water conservation, and may show behaviors bearing them no profit or benefit.

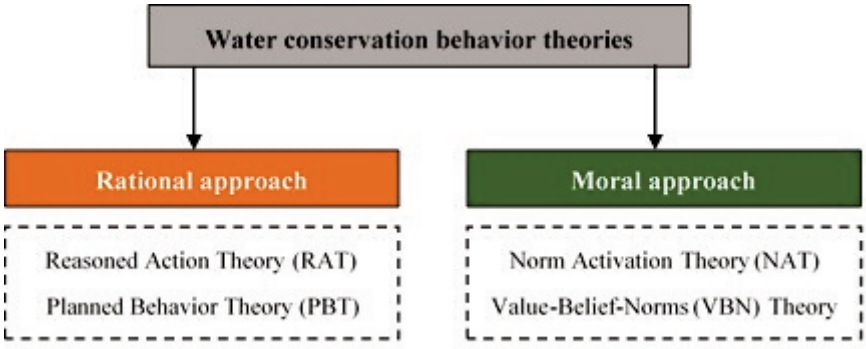

Figure 1. Classification of the theories of water conservation behavior

Moral approach towards water conservation

A situation of rational choice is one in which individuals' actions have consequences for the others' well-being. In this condition, one is aware that the health status of other individuals depends on his/her actions (Schwartz, 1997); hence, he/she has a sense of obligation for one's actions and their consequences. Their actions are assessed on the basis of their consequences for the others' well-being as favorable or unfavorable (Chan & Bishop, 2013). WCB is a particular type of situations of rational choice, where a person's action can be beneficial to the community or the environment (Steg & Vlek, 2009). The farmer's behavior can bring profits to other farmers and mitigate environmental damages to water resources. In such a position, the farmers' attitudes and behaviors are a function of their moral convictions on the appropriateness of a set of actions. Ethical norms are the source of an action assessment (in favorable or unfavorable terms) (Thøgersen, 1996). Contrary to the rational approach, these decisions are made based on the "feeling of moral obligation", not on the impact of the external factors.

As it was mentioned, some environmental actions can be considered as altruistic behaviors (which do not only count the personal interests). This kind of behavior and actions are usually examined by the Norm Activation Theory presented by Schwartz in 1977 (Schwartz, 1977) and followed by others such as Marquart-Pyatt (2004). This theory is one of the first fundamental works in social psychology, which seeks to reveal the mechanism of such behaviors and illustrate the impact of other individuals on the creation and occurrence of the altruistic behaviors. According to Schwartz, the altruistic values lie in value orientations referred to as "self-expectations". These expectations do not generally require an awareness that is of the essence in rational behaviors. The self-expectations come from social interactions and socialization. In other words, they are a feeling of moral obligation, activating value structures and internal norms when one understands the need of others (Schwartz, 1970). That is, the self-expectation

is a personal norm consisting of internalized social characteristics and forms attitudes, behavioral intentions, and individuals' behavioral obligations and expectations.

Generally, the main assumption of the Norm Activation Theory is that the farmers feel a sense of obligation towards others' water supply demands and can be encouraged and motivated through altruistic attitudes toward not harming others. In contrast to the external sense of obligation, these norms have been internalized in the form of personal norms serving as a personal criterion and standard to evaluate the consequences of a specific attitude or behavior. When personal norms toward water conservation are activated, they will lead to a defined action. The action taken in this case is based on two supplementary processes, including awareness of the consequences of that action for others as well as the ascription of responsibility to the action (Marquart-Pyatt, 2004). The Value-Belief-Norm Theory is the completed version of the Norm Activation Theory (Stern, 2000), which explains the principles of the Norm Activation Theory under conditions that are not altruistic necessarily.

The Value-Belief-Norm Theory assumes that the personal moral norms towards water conservation are activated when individuals are aware of the negative consequences of water shortage (i.e., awareness of consequences). At the time, the farmer feels being responsible for mitigating negative consequences and having proper use of agricultural water resources (i.e., the ascription of responsibility) (Stern, 2000). The Value-Belief-Norm Theory integrates the Norm Activation Theory, the New-Environmental Paradigm (NEP), and the Theory of Personal Values (Stern, 2000; Phipps et al., 2013). Furthermore, the VBN is connected with the NAT through the theory of values (Phips et al., 2013). The VBN theory assumes that the biospheric, altruistic, and egoistic values form the basis of beliefs affecting WBCs (Stern, 2000; Raymond et al., 2011). Thus, the values would affect the farmers in shaping beliefs about the consequences for themselves, other farmers, and other species or ecosystems. Egoist farmers evaluate water based on its resulting benefits. These individuals will oppose the water conservation action if they find that water conservation is costly to them (Bijani & Hayati, 2013). However, farmers with egoistic values may also exhibit WCBs. It can be mentioned that the altruists are individuals who judge agricultural water based on its benefits and costs for a group of human beings (e.g., other farmers) or humanity in general. Farmers who hold biospheric values judge water resources based on the benefits and costs they offer to the ecosystem. Farmers who value ecosystems and other species are more likely to be aware of the negative consequences of a water crisis threatening the ecosystem. Likewise, those farmers who value other individuals are also more aware of the consequences of water shortages that threaten other persons.

Rational approach towards water conservation

In some cases, farmers' WCBs are researched from a rational perspective. In other words, farmers' behaviors in this approach are considered "the situations of rational choice." Thus, individuals evaluate the water conservation benefits and its negative consequences and select an option that brings them the maximum personal benefits (Harland et al., 2007). In the rational approach, a rational individual is a person who acts based on his/her internal drivers, which result from his/her perception of the consequences of behaviors. In other words, in the Traditional Economic Approach, "rationality" is an indicator of an "economic man". The theory assumes that an economic man has the required knowledge to solve a problem, and possesses fixed and organized preferences and cognitive potential to select a set of measures. These economic man's potentials can best help to achieve his objectives (Simon, 1995; Valizadeh et al., 2016). However, the cost-benefit analysis (i.e., the evaluation of benefits and negative

consequences) does not exclusively refer to money. The amount of effort and social acceptability is also important considerations in this regard. The rational choice approach is underpinned by an assumption indicating that "individuals ultimately act rationally" because they use their available information logically and are not under the control of unconscious motives or super-instinctual desires, and their behavior is not without thinking (Ajzen & Fishbein, 1980).

It can be inferred from a review of the literature on social psychology that the rational action theory was first widely used by Ajzen and Fishbein in 1980 to predict and explain the role of individuals' intentions in revealing behaviors like job orientations, consumption behavior, and family planning. This theory posits that human beings are rational and reasoned creatures that systematically have the potentials to use and process their in-hand information. That is, farmers' water-relevant behaviors seem to be the result of beliefs that underlie this behavior. On this basis, it can be inferred that the rational action theory is conceptually developed to address the relationship among the following series of variables (Hsu, 2003):

1. Relationship between "water conservation intention" and "water conservation behavior";
2. Relationship between "attitude towards water conservation" and "water conservation intention";
3. Relationship between "subjective norms of water conservation" and "water conservation intention";
4. Relationship between "a person's beliefs towards consequences of his/her action" and "attitude towards water conservation"; and
5. Relationship between "a person's beliefs toward failure to perform a specific action with respect to the thoughts of individuals of a particular group" and "subjective norms of water conservation".

Meanwhile, the variable behavioral intention is the closest variable to WCB. Further, the relationships between "attitude towards WCB" and "water conservation intention," and "subjective norms of water conservation" and "water conservation intention" also indicate the relative significance of consideration and attention to each of the attitudinal and subjective norm variables.

It should be noted, however, that the rational action theory has also been criticized in some cases by various researchers. For example, it may not deterministically distinguish individual attitudes from social norms towards water conservation. In addition, water conservation intention alone cannot be the only driver of behavior (e.g., beliefs can have both direct and indirect effects). The critics argue that water conservation beliefs can have both indirect and direct effects on WCBs. Consequently, these critics led to the development and formation of a new theory, called "Planned Behavior Theory", as the second most important theory in the rational approach (Marquart-Pyatt, 2004).

The Planned Behavior Theory is the modified version of the Reasoned Action Theory (Yazdanpanah et al., 2014a). The Reasoned Action Theory is based on the assumption suggesting that the behaviors are under individuals' autonomic control. However, there are also behaviors over which individuals have little control. The Planned Behavior Theory tackles the limitations of the Reasoned Action Theory by introducing the criteria of behavioral control (Marquart- Pyatt, 2004). The main feature of the Planned Behavior Theory with regard to the Reasoned Action Theory is the "intention" to behave (Yazdanpanah et al., 2014a). Water conservation intention is the approximate determinant of WCB and is defined as the farmers' interests in developing WCBs. Intention, as a psychological construct, refers to individuals' motives to perform an act. Strong intention towards behavior leads to a real function of a behavior. Nevertheless, factors such as opportunities and resources can constrain the link between behavior and intention. These factors present real control over a behavior and can act as constraints for behavioral function (Ajzen, 1991).

In the Planned Behavior Theory, perceiving constraints on the occurrence of WCBs is a critical determinant. Perceived behavioral control over water conservation reflects individuals' perception of the difficulty or ease of behavioral function. In addition, the concept of "perceived behavioral control" distinguishes the Planned Behavior Theory from the Reasoned Action Theory (Marquart-Pyatt, 2004). Perceived behavioral control has impacts on WCBs from two perspectives: first, the effect on WCB through its effect on intentions, and second, the direct effect on WCB. Depending on whether or not individuals believe in their own control, they form their intentions towards specific behaviors. The degree of the transformation of intention to behavior also depends on an individual's control over his/her behavior (Mok & Lee, 2013). In addition to the perceived behavioral control, the variable "water conservation intention" is affected by the attitude towards WCB and subjective norms of water conservation. The attitude towards WCB points to the farmer's evaluation of water conservation rationality or irrationality. Subjective norms of water conservation are defined as "perceptions of social pressure over conservation or non-conservation of agricultural water resources". Farmers will probably be more committed if they understand the importance of verifying that behavior by others.

In spite of the extensive support from the rational approach in various studies (Corbett, 2002; Kaiser et al., 2005; Han et al., 2010), the approach suffers from some limitations, which should be taken into account to analyze the farmers' WCB. One of the most remarkable limitations is that farmers' cognition and behavior cannot always be rational, and the rational approach cannot always be the representative of the farmers' WCB. In other words, as Steg & Vlek (2009) pointed out, the rational approach considers human behavior as a situation of rational choice (Valizadeh et al., 2016; Valizadeh et al., 2018d), even though human behavior is often regarded as moral situations where individual and personal interests are in contradiction with the others' interests (Kaiser et al., 2005). The fundamental value assumption of the Planned Behavior Theory indicates that farmers act according to their own benefits; however, altruistic values are also critical in their decisions. Additionally, the Planned Behavior Theory does not consider value bases of motives for obligations to the occurrence of WCB. Despite the fact that the behavioral beliefs and the evaluation of the outcomes have a priority over the attitudes, this theory overlooks the fundamental biospheric, altruistic, and egoistic values, which might have impacts on these beliefs and WCB.

METHODOLOGY

This study is based on the documentary research method which was carried out by using a systematic literature review and/or studying printed and electronic resources. The literature review for this study was carried out in three fields: environmental psychology, behavioral theories, and water conservation. Generally, more than 15 keywords were used to find the related documents in Scopus and Google Scholar search engines. In this process, we first reviewed the documents on environmental psychology and then concluded that there are two main approaches towards investigating behaviors. The main approaches were moral approach and rational approach (both explained in details in previous sections). In the second step, we reviewed the most popular and most cited behavioral theories and concluded that VBN, NAT, PBT, and RAT are the most powerful theories in the field of environmental psychology. It is worth mentioning that we made a relation between the first step and second step by dividing behavioral theories into moral theories and rational theories. In the third and/or final step, we reviewed documents on water conservation and then tried to justify farmers' water conservation using behavioral theories and moral/rational approaches.

RESULT AND CONCLUSION

The assumptions of rational and moral approaches provide different understandings of the farmers' WCB. The rational approach is based on the assumption that individuals act in an autonomic manner; however, the moral approach assumes moral motives in farmers' decision making (Kaiser et al., 2005; Valizadeh et al., 2016). Theoretical variables included in these approaches have received an extensive empirical support (Gärling et al., 2003; Bamberg & Möser, 2007; Bijani & Hayati, 2013; Valizadeh et al. 2016; Valizadeh et al., 2018a). The Planned Behavior Theory has presented a useful framework in explaining farmers' private-sphere behaviors towards water conservation (Trumbo & O'Keefe, 2005). Both the VBN and NAT are suitable predictors for public-sphere behaviors such as reduction of car use, participatory behaviors towards water conservation, and acceptability of energy policies.

Few studies have compared Planned Behavior Theory, Reasoned Action Theory, Norm Activation Theory, and Value-Belief-Norms Theory. One of such studies was conducted by Kaiser et al. (2005). After comparing the explanatory power of Planned Behavior Theory and Value-Belief-Norms Theory for individuals' behavior, the researchers concluded that the PBT and VBN Theory can account for 95 percent and 64 percent of the variations in behavior, respectively. Steg & Vlek (2009) state that the VBN theory has a more vigorous model compared to the Planned Behavior Theory since the relationships among the variables in the VBN theory are defined more comprehensively and better. The Planned Behavior Theory, though, possesses a more vigorous model to predict conservation and private-sphere behaviors such as WCB. Chan & Bishop (2013) examined the recycling behavior. According to their findings, the overall model fitness and predictability of the PBT were more accepted than those of the VBN theory. Their findings also showed that the variables of the Planned Behavior Theory are good predictors of WCB. Contrary to that study, other comparative studies have been in favor of the variables in VBN theory and Norm Activation Theory. For instance, Andersson et al. (2005) argue that VBN theory has a plausible explanatory power for behavior. Moreover, Valizadeh et al. (2016) supported the use of VBN theory and Moral Approach in explaining the farmers' participatory behavior towards conservation of water resources.

The above studies highlight the plausibility of both moral and rational approaches in explaining WCBs. The comparative findings indicate that the "selected theory" should be proportionate to the "type of conservational behavior under the study". In other words, as it was mentioned before, it is recommended to use rational approach and theories such as Planned Behavior Theory for private-sphere behaviors like WCB and willingness to pay for water conservation. As such behaviors are directly associated with the farmers' personal interests, farmers may behave in a rational (and not moral) manner in such situations to maximize their share from water resources. Regarding behaviors that are more participatory and collective, however, one may ignore his short-sighted and immediate benefits in favor of collective and long-term interests. In such cases, the use of moral approach and its related theories, including Value-Belief-Norms Theory and the Norm Activation Theory seems to be more appropriate.

To sum up, considering the features mentioned for each of the theories, and since the farmers' WCB is considered to be a private-sphere behavior, it can be argued that rational approach theories such as Planned Behavior Theory and Reasoned Action Theory seem plausible to analyze farmers' WCB. Planned Behavior Theory eliminates some shortcomings in the moral approach theories, such as Stern and Schwartz's theory (these beliefs assume the occurrence of behavior chain to be extremely long). Because this theory tailors the occurrence of behavior chain, such a framework seems more consistent with reality. Consequently, agricultural practitioners and

researchers are recommended to use rational approach theories to analyze farmers' WCBs. In the end, it is worth mentioning that this study raises some limitations whose recognition can help future researchers interested in applying behavioral theories to analyze farmers' conservative behaviors. The first limitation is that in this study we only used environmental psychology and its related theories to analyze farmers' WCBs. However, there are other behavioral theories in other fields (like human ecology, sociology, adoption, etc.) that can also be used for WCBs. Future research can focus on integrating the theories of these fields with moral and rational theories. The second limitation is that the comparison of the theories and their applicability for farmers' water conservation only was carried out from a theoretical point of view in this study. But, future research can try comparing these theories using a survey and/or experimental research. This can give more reliable results about appropriateness / inappropriateness of each theory in the field of water conservation.

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