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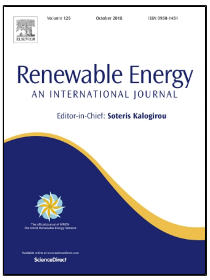

Iranian agriculture advisors' perception and intention toward biofuel: green way toward energy security, rural development and climate change mitigation

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PII:	S0960-1481(18)30733-X
DOI:	10.1016/j.renene.2018.06.081
Reference:	RENE 10237
To appear in:	*Renewable Energy*
Received Date:	31 October 2017
Accepted Date:	20 June 2018

Please cite this article as: Jafar Yaghoubi, Masoud Yazdanpanah, Nadejda Komendantova, Iranian agriculture advisors' perception and intention toward biofuel: green way toward energy security, rural development and climate change mitigation, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.06.081

Iranian agriculture advisors' perception and intention toward biofuel: green way toward energy security, rural development and climate change mitigation

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Abstract

Agricultural professionals play an important role in informing and educating farmers about biofuel through teaching or extension work. One of the questions commonly asked is if they are knowledgeable and possess positive attitude towards renewable energy sources. The aim of this article is to investigate Agricultural professionals' attitude and willingness towards biofuel using a random sample of professionals (n =180) in a survey conducted in Zanjan province in Iran. Structural equation modeling showed that "Outcome efficacy", "problem perception" and "perceived benefits" can significantly predict just about 38% variance of Agricultural professionals' personal norm. In turn, personal norm can predict 35% variance of Agricultural professionals' willingness. The findings yield public policy recommendations for stimulating biofuel extension and deployment among Agricultural professionals.

Key words: Perception**,** biofuel, climate change, rural development, renewable energy.

1. Introduction

Mankind faces a great paradox regarding energy usage. On the one hand, energy is an important component of modern life, it is also essential for growth and development. Also, progress in socio-economic development depends on energy use (Behera & Ali, 2017; Keramitsoglou, 2016). Nowadays, fossil fuel is still enormously important for growth in all part of economic sectors including manufacturing industry, tourism, transport and agriculture (Mehdi and Slim, 2017). Indeed, about 86% of the world energy demand is currently being provided by the mix of fossil fuel such as oil, gas and coal (Abas et al., 2015). On the other hand, current consumption of fossil fuel leads to environmental problems such as climate change and air pollution connected with the greenhouse gas (GHG) emission or negative impacts on people, plants and animals (Al Makky et al., 2017; Panwar et al., 2011). Approximately 80% of greenhouse gases (GHG) emission come from production and consumption of energy (Omer, 2008) and fossil fuel contribute to about 90% of total global CO2 emission in 2011 (Olivier et al., 2012).

Recognizing the need for energy transition, many countries, including developed, developing and transition economies, settled ambitious targets to develop alternative energy sources. These targets will allow achievement of energy security targets as well as to reduce pressure on environment and to reach targets of climate change mitigation (Hammami & Triki, 2016; Hossain et al., 2017; Mobtaker et al., 2016; Moosavian et al., 2013). Renewable energy sources will be alternative to fossil fuel energy sources which will enable the satisfaction of growing energy demand without greenhouse gas emission (Bakhtiyari et al., 2017). Therefore, during the last two decades, many countries are increasingly focusing on deployment of renewable energy sources (Hossain et al., 2017).

Biofuel is one of the most available and abundant renewable energy sources, which also has a limited impact on the environment (Taghizadeh-Alisaraei et al., 2017). This source has the potential to satisfy growing energy demand which includes demand for electricity and for liquid fuel. It can also contribute to agricultural and rural development as well as to economic growth (Skipper et al., 2009). Biofuel has both advantages and disadvantages (Kleinschmidt, 2007). However, their further discussion is beyond the scope of this paper. In this paper, we provide only a brief description of factors which might be important for perceptions of stakeholders. For instance, biofuel could play a role in economic growth and revitalization of rural areas. They can contribute to meeting the rural development goals such as poverty eradication and food security

(Ajanovic, 2011; Groom et al. 2008; Schoneveld et al. 2011; Zapata et al. 2010; Nazari Nooghabi et al., 2017); enhance local agriculture (Groom et al. 2008), create new investment, create job opportunities (Kleinschmidt, 2007), cause less pollution and greenhouse gas emission (Goldemberg 2007). It is "climate-neutral" (Reijnders 2006), enhances soil and water quality (Laird, 2008; De Gorter & Just, 2010; Van de Velde et al., 2010) and increases energy independence both locally and internationally. In response to these potential advantages, several countries (Bakhtiyari et al., 2017) designed energy security and climate change mitigation policy to replace a significant share of fossil fuel.

2. Background

Currently, biofuel is providing over 11.5% of the world's energy demand (Taghizadeh-Alisaraei et al., 2017). Iran is a rich country for biofuel sources (Hamzeh et al., 2011; Tofigh & Abedian, 2016). In other words, climate and terrain diversity in Iran are the basic factors for the cultivation of various energy crops appropriate for biodiesel production (Hosseini et al., 2013). Agricultural remains, animal waste and municipal solid waste (MSW) can be applied as the major sources of bioenergy in Iran including Zanjan province. In addition, vast amounts of crops can be the major source of bioethanol and biodiesel production in Iran (Hosseini et al., 2013).The future scenario for biofuel in Iran is aimed to reach around 10MWpower (Ghorashi & Rahimi, 2011). In the context of biomass, feasibility studies on biogas production in Saveh city (600 kW power), Mashhad biomass power plant (650 kW) and Shiraz biomass power plant (1060 kW) have been made and it is expected that the construction and operation of these plants will start soon (Fadai et al., 2011).

The process of biofuel production involves several stakeholders including government and policy makers, farmers, agricultural researchers, advisors and consumers. All of these stakeholders play important roles in developing and extending technological innovations connected with biofuel deployment. However, existing evidence still shows low level of awareness among farmers (Bakhtiyari et al., 2017) and energy consumers (Yazdanpanah et al., 2015 ab) in Iran. Considering this situation, other parties can play a pivotal role for developing these innovations. Meanwhile, agricultural advisors have an important role and can potentially have a great impact on deployment of biofuel.

Extensive literature exists on importance of agricultural experts for the deployment of innovations as they can close the gap between farmers in developed and developing countries to highlight the importance of their perception regarding innovations. For example, Wheeler (2008) point out that agricultural agents are important source of information to farmers and they help farmers to adapt to an innovation. Karppinen (2005) also argued that forestry professionals are among the most important promoters, advisors and educators that farmers trust and rely on as a viable source of information. Educational advisors act as gatekeepers (Bakhtiyari et al., 2017; Yazdanpanah et al., 2011) and can facilitate the process of adaptation of an innovation or hinder it. Gautam et al., (2013) argued that perceptions of educational advisors are important because they are shaped by their experience in the forestry sector and good knowledge about local situation, especially in the remote and rural areas.

Taking the success of educational advisors in the forestry sector into consideration, the interest of these stakeholders is also growing in other areas. For instance, there has been a considerable volume of work, looking at the role of educational advisors for the deployment of renewable energy in general, and biofuel in particular. This literature emphasizes the need to understand social acceptance of the renewable energy sources. Liarakou et al., (2009) argued that success of development of renewable sources depends on social acceptance which in turn depends on communication strategies and the reliable sources of information, among other factors. Education plays a crucial role in raising the level of acceptance and can be a catalyst for the development of renewable sources. Therefore, agricultural professionals as educators of renewable energy sources might have significant influence on social acceptance (Liarakou et al., 2009). Furthermore, Gautam et al. (2013) acknowledged that collecting and understanding the professionals' views and perceptions can become a valuable data source for planning effective and efficient bioenergy policies.

In light of existing literatures about the role of educational advisors and agricultural professionals, this paper investigates a hypothesis that agricultural professionals play an important role in informing and educating farmers on biofuel through teaching or extension work (See Yazdanpanah & Feyzabad, 2017). But a question is if they are knowledgeable and have positive attitude towards renewable energy sources. Another question is; if their indispensable

knowledge and values can be properly incorporated into the learning process by providing farmers with appropriate capabilities for involvement into decision-making processes. Therefore, perception and intention of agricultural professionals concerning biofuel need to be understood.

This topic is a concrete research work, which has little or no work done on it in the past. For instance, there is an extensive study about perceptions of different groups of stakeholders such as lay people, students, consumers and foresters on biofuel (Qu et al., 2011; Cacciatore et al., 2012; Gautam et al., 2013; Skipper et al., 2009). But to our knowledge, no research has been conducted about perceptions of agricultural advisors and intentions towards biofuel. Also, the topic of renewable energy in Iran, until recently, deserves little attention. Considering the existing renewable energy potentials in Iran, it is really surprising how little was written in peer-reviewed science about possibilities for deployment of renewable energy in Iran and the role of human factors such as perceptions. Some evidence on possibilities of renewable energy in Iran exists but only from technical view point; by estimating physical potentials (Saeidi et al., 2011) or from economic view point; by estimating economic potentials of the renewable energy generation (Mostafaeipour et al., 2014). The question about social acceptance of biofuel in Iran has received little attention until now. The aim of this study is to provide empirical data about personal norm and intentions of Iranian agricultural advisors toward biofuel. Such data can further inform the process of improvement of public policy measures with the aim to increase biofuel adoption and production among the Iranian farmers. This research is based on behavioral theory to deliver theoretically concrete, quantitative, standardized and repeatable data (Beedell & Rehman, 1999; Wauters et al., 2010), which could be used by policy-makers in formulation of policies towards biofuel consumption. The center of this research is the behavioral model, which was introduced by Huijts et al., (2012). The model includes non-related factors which influence the intention to accept a policy intervention. In total, as figure 1 indicates, personal norm has an effect on intention. In turn, personal norm is jointly determined by “perceived cost”, “perceived benefits”, “perceived risk”, “perceived outcome efficacy” and “perceived problems”.

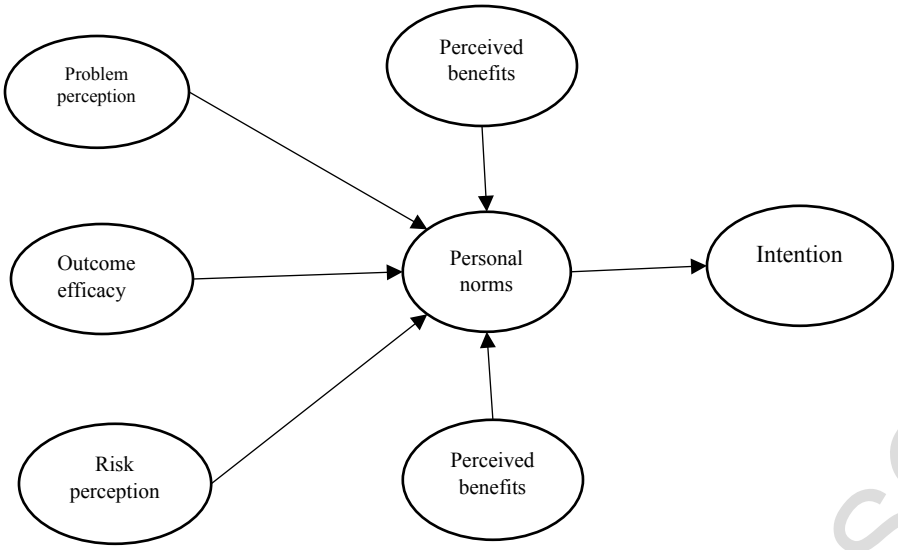

Fig 1: theoretical framework

3. Methodology

The methodology of this research is based on the cross-sectional survey which was conducted among agricultural advisors in the Zanjan province, located in the Western Iran. A total of 180 agricultural advisors participated in the survey, which took place in August 2017. All respondents were granted anonymity and confidentiality. They also had a choice to decline participation in the survey or to refuse answering any question which seemed to be too sensitive or to which they felt uncomfortable. It is important to note that based on the population of advisor (N= 337) and the Table of sampling (Krejcie and Morgan, 1970), our study sample consisted of 180 advisors. The experts' age ranged from 23 to 52 years, with a mean of 37.90 and SD of 8.60. Females accounted for 37.78 % (68) and males for 60.56 % (109) and 1.66 % (3) persons did not answer.

The survey was based on the structured questionnaire, which was developed after in-depth literature review (see Yazdanpanah et al., 2014a). The questionnaires were returned to the researchers directly after completion without the use of intermediaries. All questionnaires were checked to make sure that responses were complete. The questionnaire included variables emphasized in the behavioral model such as "perceived benefits", "perceived problems",

171 "perceived outcome efficacy", "perceived risks" and "perceived costs". Further on, these
172 variables formed "personal norms" and "behavioral intentions".

173 Based on methodological recommendations of Ajzen's (1985), scales containing multiple items
174 were developed to measure each of the variables. The respondents were asked to indicate the
175 extent to which they agreed or disagreed with the statements presented to measure each variable
176 according to the 5-point Likert scale (from very low=1 to very high=5). This scale was used to
177 reduce the statistical problem of extreme skewness (Fornell, 1992). It is essential to note that for
178 assessing research' variables, we used items that strongly follow the measurement of the
179 constructs used in past studies on biofuel, renewable and other related domains.

180 Table 1 shows some examples of the survey statements contained in the questionnaire. The
181 validity of the questionnaire was subsequently approved by a panel of experts. Furthermore, the
182 Cronbach alpha reliability coefficients for all scales indicated a reliability of -excellent, generally
183 0.78 to 0.92(Table 1). As Table 1 shows the α coefficient of our study.

184 Table 1: Survey questions and reliability coefficients

	Risk perception (α=0.78)	***references***
1	I think expansion of biofuels is associated with investment risks	(Bakhtiyari et al., 2017)
2	I think expansion of biofuels is associated with social risks	
3	I think expansion of biofuels is associated with environmental risks	
4	I think expansion of biofuels is associated with cost risks	
	Perceived costs (α=0.89)	
1	There are insufficient water resources for biofuel production in Iran.	(Bakhtiyari et al., 2017)
2	Biofuels will have negative environmental impacts	
3	Biofuel production will threaten plants and wildlife	
4	Biofuel production will lead to an increase in the price of food	
5	Biofuels will increase fuel costs	
6	Growing biofuel plants will reduce the quality of life in local communities	
7	Recent increases in biofuel production have contributed to world hunger	
8	Developing biofuels takes resources away from other renewable energy solutions, such as wind and solar	
9	Government mandates to use more biofuels put unfair restrictions on Iranian industry	
	Personal norms (α=0.91)	
1	I feel I should do something positive for biofuels	(Yazdanpanah et al.,2014ab; 2015b; 2016); Yazdanpanah and Forouzani, 2015
2	I feel an obligation to expanding biofuels	
3	If I expanding biofuels, it makes me feel like a better person	
4	If I expanding biofuels, I feel as if I am making a personal contribution to something better	
	Perceived benefits (α=0.92)	
1	Increasing the share of biofuels can reduce CO2 emissions.	(Bakhtiyari et al.,
2	Biofuel production will create more jobs	

3	Developing domestic biofuels will help strengthen the Iranian economy	2017;Yazdanpanah et al., 2015 a, b, c)
4	Developing biofuels will help rural development	
5	Biofuels will enable us to turn agricultural waste into energy	
6	Biofuels can generate additional income for rural people in Iran	
7	Biofuels will enable us to turn agricultural waste into energy	
8	Use of biofuels can make local people in Iran self-reliant in energy terms in Iran	
9	By investing in biofuels, the Iranian government can join international efforts against global warming	
10	Increasing the share of biofuels can reduce CO2 emissions	
11	Developing domestic biofuels will help strengthen the Iranian economy	
12	The development of biofuels can reduce Iran's reliance on exported oil	
	Outcome efficacy (α=0.85)	
1	It is pointless to use biofuel to prevent the climate change impacts	Steg & Groot, 2010
2	Expanding biofuel to prevent the environment problem will be a waste of time and not be effective	
3	I think I can contribute to the extension of biofuel	
4	I believe that I am co-responsible for the reduction of fossil fuel used in agriculture	
5	I think it is effective to educate farmers to aware about biofuel	
	Problem perception (α=0.84)	
1	I worry about economic problems caused by use of fossil fuel	Steg & Groot, 2010; Onwezen et al., 2013
2	I think reliance on fossil fuel is a serious problem	
3	I think fossil fuels will be phased out soon	
4	Problem rise by use of fossil fuel is not a serious problem (reverse coded)	
5	Climate change due of fossil fuel seriously harms the farmers' well beings	
6	Fossil fuel use is an important cause of environmental problems such as climate change and air pollution	
	Intention (α=0.92)	
1	I intend to engage in expanding biofuels activities	(Bakhtiyari et al., 2017;Yazdanpanah et al., 2011; 2015a, d)
2	Do you think you will engage in expanding biofuels activities in the future?	
3	I intend to encourage other advisor to engage in expanding biofuels activities	
4	As an expert, I would like to be involved in conducting research and extension activities on biofuels	
5	If biofuel are safer than fossil fuels, I will buy them	
6	I would be happy to educate and encourage farmers to gain more knowledge about biofuels	
7	Supporting the development of biofuels is justified	
8	I would like to drive a car in the future that runs on biofuel	
9	I would like to visit a biofuel plant in my region	

4. Results

The Pearson correlation test was used to investigate the relationship between all variables (Table 2). The results revealed a significant relationship between "intention towards biofuel" and other variables, including "outcome efficacy", "problem perception", "perceived benefits", "risk perception" and "personal norms". The "perceived costs" were not significantly correlated with willingness to use biofuels and personal norm (Table 2). Although we expected that "perceived cost" has a negative relationship with intention and "personal norm", the result however revealed that there is no significant relationship between them. This may be attributed to the rise of fossil

194 fuel prices in Iran as the increasing fossil fuel pricing policies are implemented directly by the
195 government through a targeted subsidies plan in Iran.
196

Table 2. The Pearson correlation test between all variables.

Variables	Outcome efficacy	Problem perception	Perceived benefits	Risk perception	Perceived costs	Personal norms	Intention
Outcome efficacy	1						
Problem perception	0.486** (0.0001)	1					
Perceived benefits	0.410** (0.0001)	0.417** (0.0001)	1				
Risk perception	0.169* (0.023)	0.384** (0.0001)	0.438** (0.0001)	1			
Perceived Costs	0.037 (0.627)	-0.013 (0.860)	0.144 (0.055)	0.257** (0.0001)	1		
Personal Norms	0.433** (0.0001)	0.406** (0.0001)	0.490** (0.0001)	0.263** (0.0001)	0.057 (0.450)	1	
Intention	0.350** (0.0001)	0.363** (0.0001)	0.490** (0.0001)	0.263** (0.0001)	0.097 (0.198)	0.595** (0.0001)	1

*p< 0.05.

**p< 0.01.

197 The data analysis to test the hypotheses was carried out by means of structural equation
198 modelling (SEM) using AMOS 20. The willingness to use was determine by personal norm,
199 while personal norm was jointly determine by "outcome efficacy", "problem perception",
200 "perceived benefits", "risk perception", "perceived costs", and "personal norms" as independent
201 variables and entered into the Structural equation modeling (SEM) (Figure 2). The test of the
202 SEM included an estimation of the model fit and the path coefficients. Using the maximum
203 likelihood method, the model gives the following estimates:

204 i) The measurement model should demonstrate robustness for the empirical data and meet
205 the requirements of certain indexes; for example; chi-square normalized by degrees of freedom
206 (λ/df) should be less than five (Bentler, 1989). In our study, it was 2.66.

207 ii) The comparative fit index (CFI) should exceed 0.9. Here, it was 0.94.

iii) The root mean square error (RMSEA) should be less than 0.10 (Henry & Stone, 1994). In our study, it was 0.076. This suggests an adequate model fit for the empirical data.

In summary, the indices show that the model, which is a representation of the framework, can be accepted from an empirical point of view as being robust (for more details, see Hu & Bentler, 1999; Kaiser & Scheuthle, 2003). In the next step, study framework was tested consecutively.

The results of the SEM revealed that the (standardized) path coefficients indicated the strength of the relationships between the variables. The separation of direct and indirect causal effects of the components can be found in the Figure 2, as well as in the Table 3.

Regarding the direct and indirect effects (table 3), the following observations can be made. Path relationships revealed that the "outcome efficacy", "problem perception", "perceived benefits", are significant predictors of the "personal norm". These variables predicted about 38% of the variance in professionals' personal norm. "Personal norm", in turn, significantly predict willingness toward biofuel. This variable predicted about 35% of the variance in professionals' willingness. As it can be seen in table 2 and fig 2, "Outcome efficacy" appear to contribute most to the model ($\beta = 0.35$, $p < 0.0001$), followed by "perceived benefits" ($\beta = 0.21$, $p < 0.0001$) and "problem perception" ($\beta = 0.20$, $p < 0.005$). Paths from other variables to "personal norm" were not significant. Regarding indirect effect, SEM analysis revealed that "perceived benefits" (0.158) and "problem perception" (0.246) have indirect effect on willingness through "personal norm". In general, the fit statistics support the criterion validity and explanatory power of the model.

Table 3: Variable effects of study framework

	Problem perception	Outcome efficacy	Perceived benefits	Perceived costs	Perceived risk	Personal norms
Standardized direct Effects						
Personal norms	0.196	0.347	0.211	0.021	-0.114	—
intention	—	—	—	—	—	0.595
Standardized Indirect Effects						
intention	0.246	-0.052	0.158	0.017	0.150	—
Standardized Total Effects						
Personal norms	0.196	0.347	0.211	0.021	-0.114	—

intention	0.117	0.207	0.126	0.012	-0.068	0.595

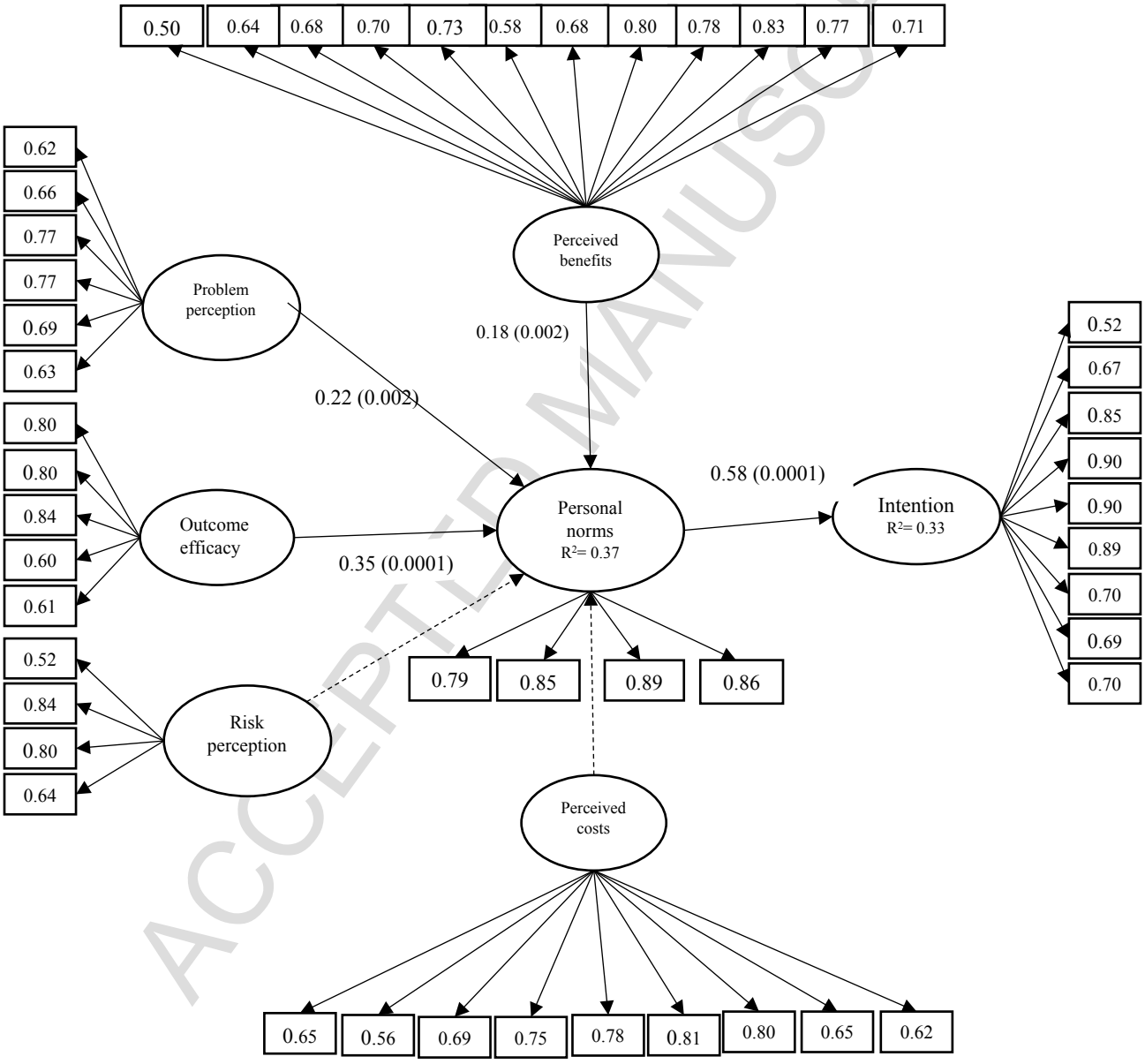

Fig 2: the SEM analysis

5. Discussion

The goal of this research is to investigate "personal norms" and intention of agricultural professionals toward the use of biofuels in Zanjan province, Iran. To our knowledge, until now only limited studies applied psychological model to examine individual readiness to use renewable energy in Iran (Yazdanpanah et al. 2015c). The findings of this paper thus contributes to a growing body of literature, which previously used psychological model to study environmental issues (see, Huijts et al., 2012).

Our results discovered that the model can predict 35% of the variance in the willingness of agricultural professionals toward the use of renewable energy and 38% of the variance in the professional 'personal norm' toward the use of renewable energy. "Intention" was positively influenced by personal (moral) norm. In turn, personal norm was determined by perceived benefit, problem perception and outcome efficacy.

These findings showed that the model was fairly good at explaining willingness and personal norm. The explained variance of the model is comparable to the variance explained by the theory of planned behavior (TPB), the theory of reasoned action (TRA) (Ajzen, 1991), health belief model (HBM) (Janz and Becker, 1984) and social cognitive model (SCM) (Bandura, 1986). In a meta-analysis, Armitage and Conner (2001) found that the average explained variance of intention using these two theories was about 39%. However, the explained variance is observed to be similar to that in TRA/TPB models.

Personal norm is the predictor of intention. It refers to the individual perception about what is right or wrong (in terms of action) (Simsekoglu & Lajunen, 2008). Personal norms are internal moral rules or values motivated by anticipated self-administered rewards or punishments (Arvola et al., 2009). When experts realizes that the use of fossil fuel pose threats to other people, species of plants and animals, or the biosphere at large, and that actions they initiate could avert those consequences they will result to use biofuel which has minimal consequences. The existing studies (Arvola et al., 2008; Bissonnette and Contento, 2001; Kaiser, 2006) provided important

264 results which are consistent with those found in this study and which imply that personal norm
265 has a significant contribution to intention.

266 According to the finding which showed that personal norm significantly predicts intention, this
267 study suggests that the more a person feels his/her behavior is a personal norm to use biofuel the
268 greater his/her intention to use biofuel. Our study shows that in the field of biofuel, it may be
269 helpful to think positive, self-rewarding feelings in order to encourage individual to use it.

270 Outcome efficacy was the most predicting factor of personal norm. This variable is one of the
271 key factors in the norm activation model and the value belief norm theory. It refers to one's
272 evaluation of the perceived effectiveness of participating in a recommended behavior for
273 preventing a threat. Or, it can be defined as the belief that a recommended coping response will
274 be effective in protecting themselves or others from a threat and the anticipated effectiveness of
275 the action in reducing the threat (Bandura, 1977). Outcome efficacy relates to the efficacy of an
276 adaptive response to reduce or avoid the existing risks (Floyd et al., 2000; Milne et al., 2000). In
277 the context of this research, it refers to the efficacy of biofuel application to diminish the
278 negative consequences of fossil fuel. Our finding is consistent and confirmed with past studies.
279 For example, Cass et al. (2010) found that expectations and positive evaluation of benefits from
280 renewable energy sources is the main determinant of support for renewable energy sources
281 developments.
282
283 Perceived benefit is the other effective predicting factor of personal norm. It refers to an
284 individual's belief in relative effectiveness of an action to reduce a disease threat (Ng et al.,
285 2009). In this study, it refers to a professional's belief about the perceived effectiveness of
286 biofuel for her/his own health, benefits for society (socially and economically) and for protection
287 of the environment. This result may be explained by the energy consumption decisions,
288 environmental problems and global warming which are associated with each other. This has led
289 to recurrent drought and recent warming in Iran (Hayati et al., 2010; Yazdanpanah et al.,
290 2013a,c; Zobeidi et al., 2016; Raeisi et al., 2018; Azadi et al., 2018) and taking into
291 consideration the need to pay attention to environmental variables in decisions regarding energy
292 use.

In other words, stakeholders are interested in the environmental issues and are more willing to use renewable energy because they think that renewable energy is safer and cleaner for society, environment and future generations than conventional sources. Therefore, higher perceived benefits are likely to lead to greater personal norm toward use of biofuel. This finding is correct for agricultural expert, because recently due to different social, environmental and economical crisis in Iran (global warming, high level of fossil fuels and other resources consumption, severe drought and water shortage) (See Yazdanpanah et al., 2013 b,d) the awareness of people generally and expert particularly regarding alternative energy options increased. Problem perception is another predictor of professionals' personal norm. In our study, problem perception refers to the significance of the different problems related with the use of fossil fuel, such as global warming, energy dependency and its effects on health of citizens. From the perspective of agricultural professionals the problems related with fossil fuel creates a serious threat to their environment, society and themselves.

Our results also revealed the important role of outcome efficacy, perceived benefits and problem perception, on personal norm toward biofuel. As the outcome efficacy was the strongest predictor of intention, government agencies and environmental organizations should aim at increasing knowledge about the economic and environmental benefits of biofuels with fossil fuels harms. The perceived benefits of biofuel were the second strongest predictor of personal norm along with Problem perception. Policy programs must focus on educating professionals about the harm of fossil fuels hand emphasize the benefits of biofuel, as a result, professionals recognize the need for renovation toward biofuel and their own responsibilities in the change process. Furthermore, policy programs must be carried out to teach professionals on the advantages of biofuel for the community, economic and environment.

5. Conclusion

Our study has two main goals. The first and foremast goal is to illustrate factors that determine the intentions of agricultural professionals towards biofuels while the second goal is to analyze the efficacy of the theoretical framework. Our result revealed that main elements of the NAM and TPB such as personal norm, attitude and PBC are the determinants of professionals' intention toward biofuel use. Based on this, personal norm was observed to be the greatest predicting factor of intention. Furthermore, a perceived benefit of biofuel is an important predicting factor of attitude and MN and it has positive effect. OE is

another important predicting factor of attitude and MN respectively. It is important to note that OE has negative effect in result the result obtained. But PP has no significant effect on attitude and MN respectively. Concerning the second goal, the explained variance in the framework of intention to use biofuel was basically high due to the mixing of the TPB variables and NAM variable with the additional variables such as PA, PB and OE. Finally based on our finding we can suggest that the ability of the model to predict behaviors in the pro-environmental domain in a country is appropriate however.

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Highlights:

- We propose psychological model for measuring advisor' intention toward biofuel
- Theoretical model and experimental test of intention toward biofuel
- Benefit perception and problem perception were predictors of personal norms.
- Risk perception and cost perception were not predictive of personal norms