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Laser land levelling as a strategy for environmental management: the case of Iran

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Abstract: The impact assessment method seeks to bring about a more ecologically, socio-culturally and economically sustainable and equitable environment. Determining the main factors affecting the attitudes of stakeholders is crucial for understanding the impacts of development plans. This approach helps planners and decision makers to identify the values and traits of stakeholders and accelerate the diffusion of innovations through designing proper incentives and removing available obstacles. The purpose of this study is to examine factors affecting laser land levelling project impacts in Fars Province, Iran. The sample included 285 farmers who were selected using multi-stage random sampling. The validity and reliability of the questionnaire were measured and revisions were made to improve measurement scales. The results of structural equation modelling indicated that reduction in water consumption was the most important variable which affected the recognition of impacts among laser land levelling adopters. Furthermore, laser land levelling impacts as dependent variables were influenced by the direct effect of the duration of adoption, attitude towards water and soil conservation, need perception and attitude toward prior projects. Based on the results, practical recommendations have been presented.

Keywords: environmental impact assessment, Iran, Laser land levelling, structural equation modelling.

INTRODUCTION

Agriculture will be dependent upon food security, environmental conservation and market globalization in the future (Jat et al., 2006). Optimizing the use of agricultural inputs and qualitative and quantitative increase in agricultural products are required for food security. Rural economics depends, to a great extent, upon the economic efficiency of resources in villages. The studies have shown weak efficiency and appropriate management systems in water and soil resources in Iran, so that resources are increasingly under destruction (Ghodoosi, 1992). If this is not taken into consideration it may result in many dangers for the agricultural sector. Today sustainable development, as the main goal in the agricultural sector, will be achieved if water and soil resources are conserved within the framework of technical rules and operations in principle.

Various studies showed that agricultural inputs such as water, soil, seeds, chemical fertilizers, agricultural machines and human resources are not used on uneven land in an optimized way (Rickman, 2002; Tajer et al., 2010; Kahlown et al., 2002; Satter et al., 2003; Jat et al., 2006; Asif et al., 2003). Laser land levelling is one of the technologies in water and soil resources

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conservation and optimizes the use of agricultural inputs, which play a significant role in sustainable development and environmental management in agriculture. To this end, land levelling, as one of the most important plans of the Ministry of Agriculture, has consumed a large amount of the agricultural budget. Although the developmental plans are performed for the purpose of development and would result in great benefits, they have direct and indirect negative impacts, as well as positive impacts on environment and local communities (Rezaei-Moghaddam et al., 2005). Large-scale projects always involve a large number of stakeholders, which may consider the environmental and socio-economic impact of such projects (Makarenko, 2012).

To increase the positive impacts and awareness of unintended consequences of project plans, the impacts must be assessed. The goal of the impact assessment is to bring about a more ecologically, socio-culturally and economically sustainable and equitable environment (Esteves and Vanclay, 2009). Environmental Impact Assessment (EIA) entails the examination, analysis and assessment of planned activities with a view to ensuring environmentally sound and sustainable development (Toro et al., 2010). EIA is the whole process of gathering environmental information, describing a development or other project, predicting and describing the environmental effects of the project, defining ways of avoiding, cancelling and reducing or compensating for any adverse effects (Scottish Natural Heritage, 2013). This adopts the aim of ensuring that development only proceeds in an acceptable manner (Jay et al., 2007). EIA is increasingly being positioned within a broader context of sustainability and its original, substantive aim of contributing to more sustainable forms of development is being rediscovered (Jay et al., 2007). One important aspect in EIA is Social Impact Assessment (SIA). SIA is the process of assessing or estimating, in advance, the social consequences that are likely to follow from specific policy actions or project development, particularly in the context of appropriate national, state, or provincial environmental policy legislation (Burdge and Vanclay, 1995). The International Principles for SIA (Vanclay, 2003) defined SIA as the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions and any social change processes invoked by those interventions. The objective of SIA is to identify the intended and unintended social impacts of planned interventions in order to develop sustainable management plans (Barrow, 2000). The SIA will identify and assess a project’s social impacts that are directly related to the project and propose measures to enhance potential positive impacts and strategies to avoid, manage, mitigate or offset the predicted negative project impacts (Department of State Development, Infrastructure and Planning, 2013). Undoubtedly, reinforcement of development management for improving the assessment of the environmental and social impacts of projects is considered as an important factor in sustainable development in Iran. The success of plans depends upon farmers' activities and their decisions and knowledge. Actually, individual behaviours and their negative and positive evaluations of plans and projects relating to environmental conservation are based on their beliefs, thoughts and attitudes. Moreover, the success of these plans to some degree relies on stakeholder perceptions (Zubair and Garforth, 2006). Thus, identifying the factors affecting the formation of attitudes and stakeholder perceptions towards the impacts of developmental plans is essential. It helps planners and decision makers to better recognize stakeholder values and traits (Pisani and Sandham, 2006) and accelerate diffusion of these innovations by designing appropriate incentives and removing available obstacles. Implementing laser land levelling projects throughout the country should be considered. This study aims to examine and recognize factors affecting laser land levelling project impacts in Fars Province, Iran. In a similar vein, the relationship between individual, social, economic, agronomic factors, attitude toward water and soil conservation and laser land levelling satisfaction with impacts of the project were taken into account.

A set of individual, social, economic, agronomic traits would affect farmers' perceptions of laser land levelling project impacts, including attitude toward water and soil conservation (McFarlane et al., 2006). Individual attitudes toward resources conservation consists of a person's viewpoints and opinions of water and soil conservation (Agrawal and Gibson, 1999). People with a more positive attitude toward water and soil conservation, have a better attitude toward natural resources conservation and pay more attention to the impacts of the environmental plans in this respect. Beckford et al. (2010) also found that environmental attitude has a significant impact on environmental behaviour. Social factors, such as social participation and social capital, are considered as effective factors. The studies revealed that farmers with a higher participation in social activities and stakeholders domiciled in villages with higher social capital have better perceived the impacts of modern technologies (Ahmadvand et al., 2010; Oladele et al., 2006; Leviston et al., 2009). Stakeholders' knowledge of technology, as well as an individual's understanding of innovation, are crucial and can also be effective. Studies have indicated that stakeholders with higher technical knowledge of the plans and individuals who access information regarding a special technology have a more positive attitude toward natural resources conservation and, as a result, they tend to perform environmental management activities with regard to recourses conservation (Ahmadvand et al., 2010; Akkaya Aslan, 2007; Oladele et al., 2006; Rahman, 2003; Negatu and Parikh, 1999). Furthermore, the relationships between need perception to innovation and individual perception of innovation impacts has been emphasized (Leviston et al., 2009). Furthermore, an individual's perception of the benefit of technology and the year of adoption will affect impacts expressed by stakeholders (Oladele et al., 2006; Rahman, 2003; Negatu and Parikh, 1999). The results of studies by Oladele et al. (2006) showed that there was no significant relationship between a farmer's age and perception towards unintended consequences of modern technologies. Akkaya Aslan et al. (2007) stated that the age of farmers indicates their abilities in perceiving agricultural technology and their impacts on farms.

RESEARCH MODEL AND HYPOTHESES

According to the related studies in EIA, the research investigates the following framework to test the effects of the variables on laser land levelling project impacts (Fig. 1). Table 1 presents the research hypothesis.

METHODOLOGY

Sampling

The study was conducted using a survey among farmers who had performed laser land levelling up to the year 2009 in Fars province. Nine counties were randomly selected among 26 counties of Fars Province that had completed laser land levelling. Then 41 villages were randomly selected in each county. In each village a number of farmers were randomly selected and interviewed in accordance with the number of project adopters. In total, nine counties and 41 villages were selected in this research.

Multi-stage random sampling was used to collect data from 285 farmers who were selected from among 4,000 farmers who had carried out laser land levelling based on Cochran formula (Hoseini, 2003).

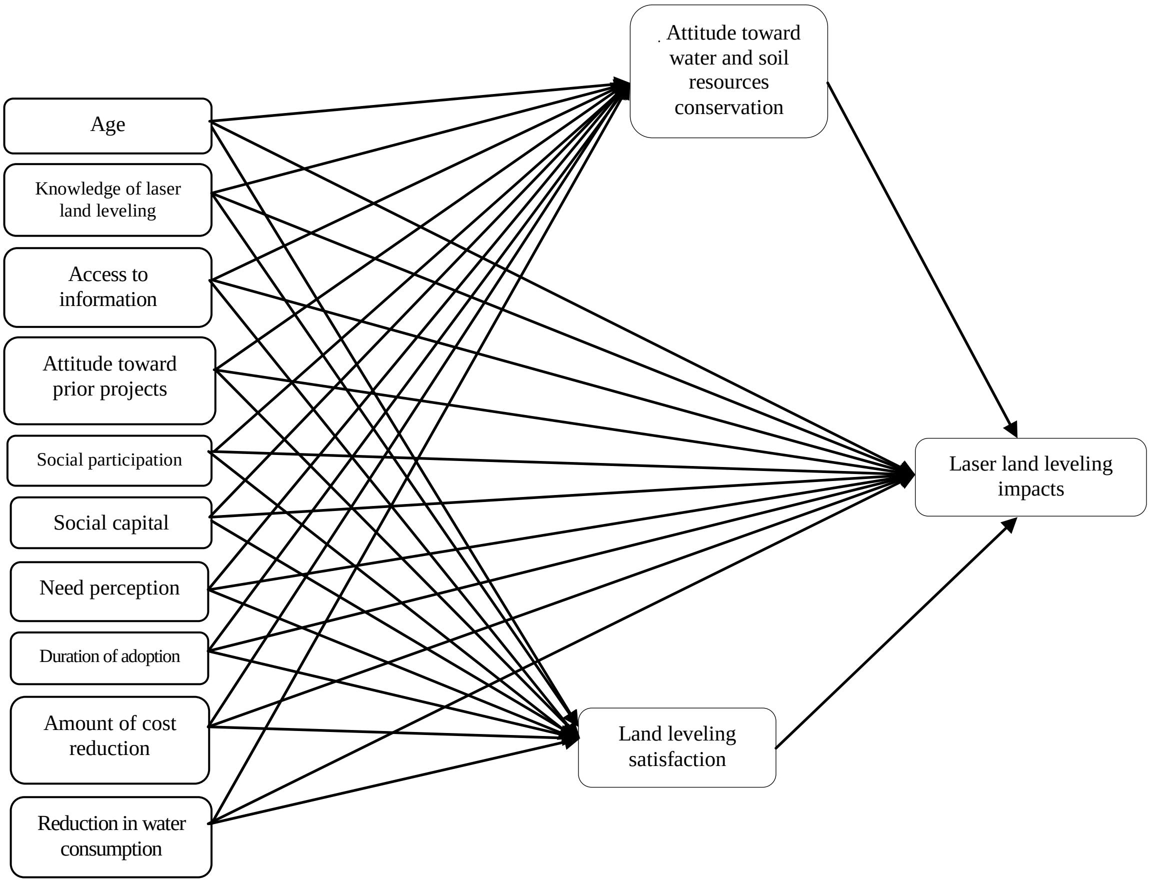

Fig. 1. Theoretical framework of the research

INSTRUMENT OF MEASUREMENT

A questionnaire was used to collect data in this study. One part of the questionnaire measured the determinants of laser land levelling project impacts including age, knowledge (22 items), access to information (eight items), attitude toward prior projects (13 items), social participation (18 items), social capital (14 items), need perception (six items), attitude toward soil and water conservation (16 items), laser land levelling satisfaction (three items), duration of adoption, amount of cost reduction and reduction in water consumption. The second part measured laser land levelling project impacts (79 items).

VARIABLES MEASUREMENT

Knowledge of laser land levelling. This was estimated using items related to farmers' knowledge of activities required to manage the land before and after the laser land levelling implementation.

Access to information of laser land levelling. This variable measures the farmers' access to eight sources of information (contact with experts, extension programs, extension publications, radio and TV programs, etc.) about the project.

Attitude toward prior projects. This was measured using items related to attitude and satisfaction of farmers toward prior development projects that have been implemented in their villages (including monitoring, poverty and income status, amount of participation, etc.).

Attitude toward water and soil conservation. This variable was estimated using items related to farmers' opinions toward the importance of soil and water resources, protecting soil and water resources, water quality and quantity, flood control, etc.

Social participation. This variable was measured using items related to participation in rural institutions and associations and participation in implementation and the decision making of the projects.

Social capital. Social capital is defined as the information, trust and norms of reciprocity inherent in one's social networks (Woolcock, 1998). This was estimated using social trust, institutional trust, information flow and social norms dimensions in the study areas.

Need perception. This factor was estimated using questions such as overwhelming agricultural activities, amount of water waste, amount of nutrient waste, soil erosion, etc. before laser land levelling implementation.

Laser land levelling satisfaction. This was measured by the amount of accuracy of levelling, amount of monitoring on project implementation process and amount of satisfaction of farmers.

Laser land levelling project impacts. To measure laser land levelling impacts, 79 questions were asked in the field of technical, social, economic and environmental impacts. Four-part scale from nothing to high, ranging from 0 to 3 was used to measure the impacts.

The age of farmers, duration of adoption, amount of cost reduction and reduction in water consumption were measured using four questions.

Table 1. Research hypotheses

Hypotheses
$H_{1.}$ Age has a direct effect on attitude toward water and soil conservation.
H_2. Knowledge of laser land levelling has a direct effect on attitude toward water and soil conservation.
$H_{3.}$ Access to information of laser land levelling has a direct effect on attitude toward water and soil conservation.
$H_{4.}$ Attitude toward prior projects has a direct effect on attitude toward water and soil conservation.
$H_{5.}$ Social participation has a direct effect on attitude toward water and soil conservation.
$H_{6.}$ Social capital has a direct effect on attitude toward water and soil conservation.
$H_{7.}$ Need perception to laser land levelling has a direct effect on attitude toward water and soil conservation.
$H_{8.}$ Duration of adoption has a direct effect on attitude toward water and soil conservation.
$H_{9.}$ Amount of cost has a direct effect on attitude toward water and soil conservation.
$H_{10.}$ Reduction in water consumption has a direct effect on attitude toward water and soil conservation.
$H_{11.}$ Age has a direct effect on laser land levelling satisfaction.
$H_{12.}$ Knowledge of laser land levelling has a direct effect on laser land levelling satisfaction.
$H_{13.}$ Access to information has a direct effect on laser land levelling satisfaction.
$H_{14.}$ Attitude toward prior projects has a direct effect on laser land levelling satisfaction.
$H_{15.}$ Social participation has a direct effect on laser land levelling satisfaction.
$H_{16.}$ Social capital has a direct effect on laser land levelling satisfaction.
$H_{17.}$ Need perception to laser land levelling implementation has a direct effect on laser land levelling satisfaction.
$H_{18.}$ Duration of adoption has a direct effect on laser land levelling satisfaction.
$H_{19.}$ Amount of cost reduction has a direct effect on laser land levelling satisfaction.
H_{20}. Reduction in water consumption has a direct effect on laser land levelling satisfaction.
$H_{21.}$ Age has a direct effect on laser land levelling project impacts.
$H_{22.}$ Knowledge of laser land levelling has a direct effect on laser land levelling project impacts.
H_{23}. Access to information of laser land levelling has a direct effect on laser land levelling project impacts.
$H_{24.}$ Attitude toward prior projects has a direct effect on laser land levelling project impacts.
$H_{25.}$ Social participation has a direct effect on laser land levelling project impacts.
$H_{26.}$ Social capital has a direct effect on laser land levelling project impacts.
$H_{27.}$ Need perception to laser land levelling implementation has a direct effect on laser land levelling impacts.
$H_{28.}$ Duration of adoption has a direct effect on laser land levelling project impacts.
$H_{29.}$ Amount of cost reduction has a direct effect on laser land levelling project impacts.
$H_{30.}$ Reduction in water consumption has a direct effect on laser land levelling project impacts.
$H_{31.}$ Attitude toward water and soil resources conservation has a direct effect on laser land levelling project impacts.
$H_{32.}$ Laser land levelling satisfaction has a direct effect on laser land levelling project impacts.

RELIABILITY AND VALIDITY OF THE INSTRUMENT

Face validity of the questionnaire was measured through the professors of Shiraz University and expert opinions. A draft questionnaire was pilot-tested using a sample of 32 farmers in a village outside the study area and Cronbach's alpha coefficients confirmed the reliability of variables (Table 2). Data were analysed using SPSS and LISREL statistical software, versions 16 and 8.54, respectively. The methodology flowchart is shown in Figure 2.

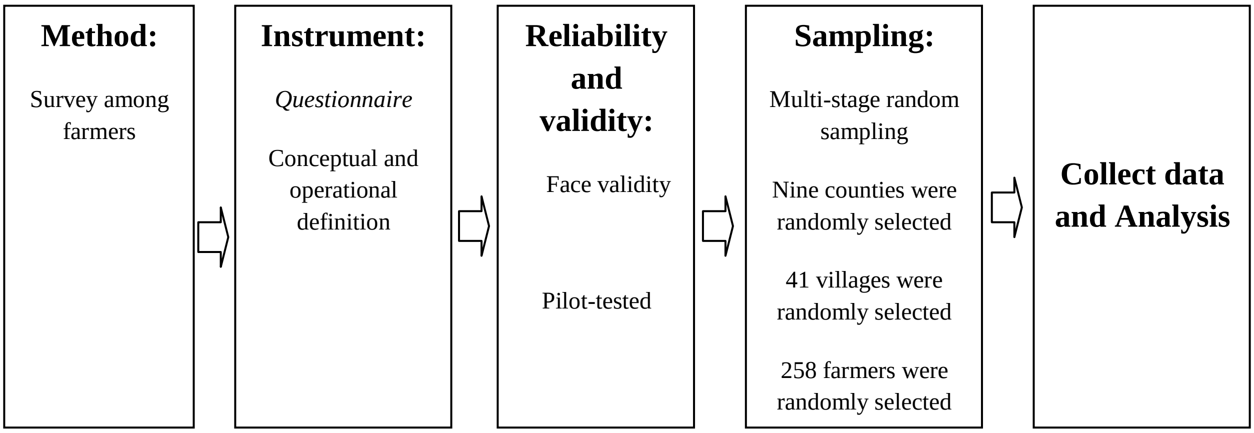

Fig. 2. Flowchart of methodology

Table 2. Cronbach's alpha coefficients for research variables

Variables	Cronbach's alpha coefficients
Knowledge of laser land levelling	0.70
Access to information of laser land levelling	0.70
Attitude toward prior projects	0.80
Attitude toward water and soil conservation	0.72
Social participation	0.80
Social capital	0.74
Need perception	0.92
Laser land levelling satisfaction	0.78
Laser land levelling project impacts	0.95

RESULTS AND DISCUSSION

Structural equation model results

This section investigates the structural equation model to identify the effective factors on laser land levelling impacts in two separate sections, the results of correlation coefficients between variables and measurement model evaluation.

Relationships between variables

Table 3 provides correlation coefficients between variables. The correlation coefficients between knowledge of laser land levelling with need perception, duration of adoption and attitude toward water and soil resources conservation were computed 0.33, 0.35, and 0.49, respectively. The coefficients were significant at the level of significance 0.01. The knowledge of laser land levelling had significant correlation with impacts (r=0.35). The investigation of the positive relationship between knowledge and laser land levelling project impacts is in accordance with Akkaya Aslan et al. (2007) and Negatu and Parikh (1999).

Table 3 demonstrates the significant relationship between attitude toward prior projects with attitude toward water and soil conservation (r=0.33), and laser land levelling project impacts (r=0.40). Coefficients revealed that there was a significant and positive relationship between need perception and laser land levelling project impacts (r=0.40). Pearson correlation coefficients showed a significant and positive relationship between duration of adoption and attitude toward water and soil resources conservation (r=0.31, P=0.01) and laser land levelling project impacts (r=0.40, P= 0.01). What is more, there was a significant relationship between the amount of reduction in water consumption and laser land levelling project impacts (r=0.23, P= 0.01).

Table 3 indicates the significant relationship between attitude toward water and soil resources conservation and laser land levelling project impacts (r=0.46, P=0.01), as well as the significant relationship between laser land levelling satisfaction with laser land levelling project impacts (r=0.50) in the level of significance 0.01.

Table 3. Correlation coefficients matrix between variables

Variables	**Age**	**Knowledge of laser land levelling**	**Access to information of laser levelling**	**Attitude toward prior projects**	**Social participation**	**Social capital**	**Need perception**	**Duration of adoption**	**Amount of cost reduction**	**Reduction in water consumption**	**Attitude toward water and soil conservation**	**Laser land levelling satisfaction**	**Laser levelling project impacts**
Age	1												
Knowledge of laser land leveling	0.04	1											
Access to information of laser leveling	0.001	0.18**	1										
Attitude toward prior projects	0.10	0.21**	0.26**	1									
Social participation	0.39**	0.25**	0.35**	0.21**	1								
Social capital	0.20**	0.23**	0.14*	0.44**	0.18**	1							
Need perception	-0.00	0.33**	0.20**	0.23**	0.10	0.21**	1						
Duration of adoption	0.12*	0.35**	0.03	0.24**	0.11	0.21**	0.19**	1					
Amount of cost reduction	0.18*	0.28**	0.25**	0.19**	0.27**	0.24**	0.34**	0.20**	1				
Reduction in water consumption	0.00	0.10	0.03	0.03	0.16**	0.08	0.11	0.17*	0.32**	1			
Attitude toward water and soil conservation	0.19**	0.49**	0.17**	0.33**	0.28**	0.28**	0.23**	0.31**	0.39**	0.10	1		
Laser land leveling satisfaction	0.24**	0.08	0.30**	0.34**	0.22**	0.32**	0.28**	0.04	0.22**	0.09	0.16*	1	
Laser leveling project impacts	0.24**	0.38**	0.23**	0.40**	0.30**	0.42**	0.40**	0.40**	0.55**	0.23**	0.46**	0.25**	1

*significant in P<0.05 , **significant in P<0.01

Measurement model evaluation

LISREL software was used to compute the causal effects between variables of the model including age, knowledge of laser land levelling, access to information of laser land levelling, attitude toward prior projects, social participation, social capital, need perception, duration of adoption, amount of cost reduction, reduction in water consumption, attitude toward water and soil resources conservation, laser land levelling satisfaction and laser land levelling project impacts. The results have been presented in two sections. The first section is dedicated to the measurement model evaluation, which includes the model goodness-of-fit test. The structural equation model has been presented in the second section.

On the required criteria for measurement model evaluation is Chi–Square/Degree of Freedom, which should be less than three. This value is 0.65 regarding laser land levelling adopters. The next item used to evaluate the model is p-value, which should be more than 0.05, in Table 4 it is seen as equal to 0.84. Computing Goodness–of–Fit, Adjust Goodness-of-Fit, Normed Fit Index, Non-normed Fit Index, and Comparative Fit Index are required for model fit in such a way that their values become higher than 0.90. Moreover, Root Mean Square Residual and Root Mean Square Error of Approximation should be less than 0.05 and 0.10, respectively. According to the results, the mentioned indices were higher than 0.9. Root Mean Square Error of Approximation for measurement model and Root Mean Square Residual were computed 0.03 and 0.0001, respectively. In fact, research variables including attitude toward water and soil resources conservation, laser land levelling satisfaction, laser land levelling project impacts, and external variables consisting of age, knowledge of laser land levelling, access to information of laser land levelling, attitude toward prior projects, social participation, social capital, need perception, duration of adoption, amount of cost reduction and reduction in water consumption provided an appropriate model to determine the laser land levelling project impacts.

Table 4. Model evaluation overall fit measurements

Goodness of fit measure	Recommended criterion	obtained results in this research
Chi-square/degree of freedom (X^2/df)	≤3	0.65
p-value	≥0.05	0.84
Normed Fit Index (NFI)	≥0.90	0.97
Non-Normed Fit Index (NNFI)	≥0.90	1.08
Comparative Fit Index (CFI)	≥0.90	1.00
Goodness-of-Fit Index (GFI)	≥0.90	0.97
Adjust Goodness-of-Fit Index (AGFI)	≥0.90	0.94
Root Mean Square Residual (RMSR)	≤0.05	0.03
Root Mean Square Error of Approximation (RMSEA)	≤0.1	0.0001

The analysis of causal effects (Fig. 3) indicated that knowledge of laser land levelling had significant and positive casual effect on attitude toward water and soil resources conservation (λ=0.28, P<%1), which was consistent with H_2. To interpret this finding it can be stated that if the farmers have more information of activities required for soil and laser levelling conservation, they will have a better attitude toward resources conservation. Social participation (λ=0.13, P<%5) and age (λ=0.34, P<%1) are external variables that had a significant and direct effect on water and soil resources conservation. The results showed that whenever farmers are older and have higher social participation they have a more positive attitude toward water and soil resources conservation. The findings confirm hypotheses H_5 and H_1. In total, these variables accounted for 40 percent of changes in attitude toward water and soil resources conservation (SMC=0.40).

The results of the study regarding the effects of independent variables on laser land levelling satisfaction showed that direct effects of age (λ=0.41, P<%1), access to information of laser land levelling (λ=0.17, P<%5), attitude toward prior executive projects (λ=0.22, P<%1) and amount of cost reduction (λ=0.17, P<%5) on laser land levelling satisfaction were significant and positive. The results are consistent with H_{11}, $H_{13,}$ H_{14} and $H_{19.}$ A direct effect of access to information of laser land levelling on laser land levelling satisfaction revealed whenever farmers accessed more information on the project, they would be better satisfied with the project. Furthermore, more positive attitude towards prior projects among farmers and greater reduction cost resulting from land levelling affected farmers increased satisfaction with the implemented project. The variables defined 47 percent of changes in laser land levelling satisfaction (SMC=0.47).

Results in the causal relationships between independent variables including age, knowledge of laser land levelling, access to information of laser land levelling, attitude toward prior projects, social participation, social capital, need perception, duration of adoption, amount of cost reduction and reduction in water consumption and moderator variables, attitude toward water and soil resources conservation and laser land levelling satisfaction with dependent variable and laser land levelling project impacts, were analysed. The model showed that a reduction in the water consumption variable had the most direct effect on laser land levelling project impacts. The findings confirmed the importance of laser land levelling in water consumption reduction. The causal effect of the variable was 0.31 in the level of significance 0.01 (λ=0.31, P<%1). The finding is in accordance with $H_{30.}$ After reduction in water consumption, need perception of laser land levelling implantation had the greatest effect and the causal effect was significant at the level of 0.01 (λ=0.24, P<%1). Actually, if farmers consider levelling and smoothing necessary before implanting land levelling they will better define the impacts of project implementation, which was consistent with $H_{27.}$

Analysis of results demonstrated that attitude toward prior projects had a direct, significant and positive effect on laser land levelling project impacts (λ=0.21, P<%1). Attitude toward water and soil resources conservation had a significant and direct effect on laser land levelling project impacts, which was significant at the level of 0.1 (β =0.21, P<%1). The findings confirmed $H_{31.}$ According to the findings, farmers with a higher attitude toward water and soil resources conservation perceived laser land levelling project impacts more. The result is consistent with that of McFarlane et al. (2006). Duration of adoption of laser land levelling affected laser land levelling project impacts (λ=0.20, P<%1). This result is comparable to the findings reported by Rahman (2003). The result was consistent with H_{28}.

The next effective factor to estimate laser land levelling project impacts was individual satisfaction of laser land levelling. It had a causal, significant and positive effect on the dependent variable (β =0.15, P<%5). The finding is in agreement with $H_{32.}$ The amount of cost reduction (λ=0.14, P<%5) was another effective variable on laser land levelling impacts, which was consistent with hypothesis $H_{29.}$ Based on the results, knowledge of land levelling and social participation variables had indirect effects on laser land levelling impacts through the water and soil resources conservation variable. Age had an indirect effect through the water and soil resources conservation and laser land levelling satisfaction variables. Access to information, attitude toward prior projects and amount of cost reduction had an indirect effect on project impacts through laser land levelling satisfaction. The results indicated that not only was access to information of laser land levelling not sufficient to perceive the impacts, but also farmers should be satisfied with laser levelling implemented on their lands. The above-mentioned external variables can anticipate 62 percent of the effects of laser land levelling impacts (SMC=0.62).

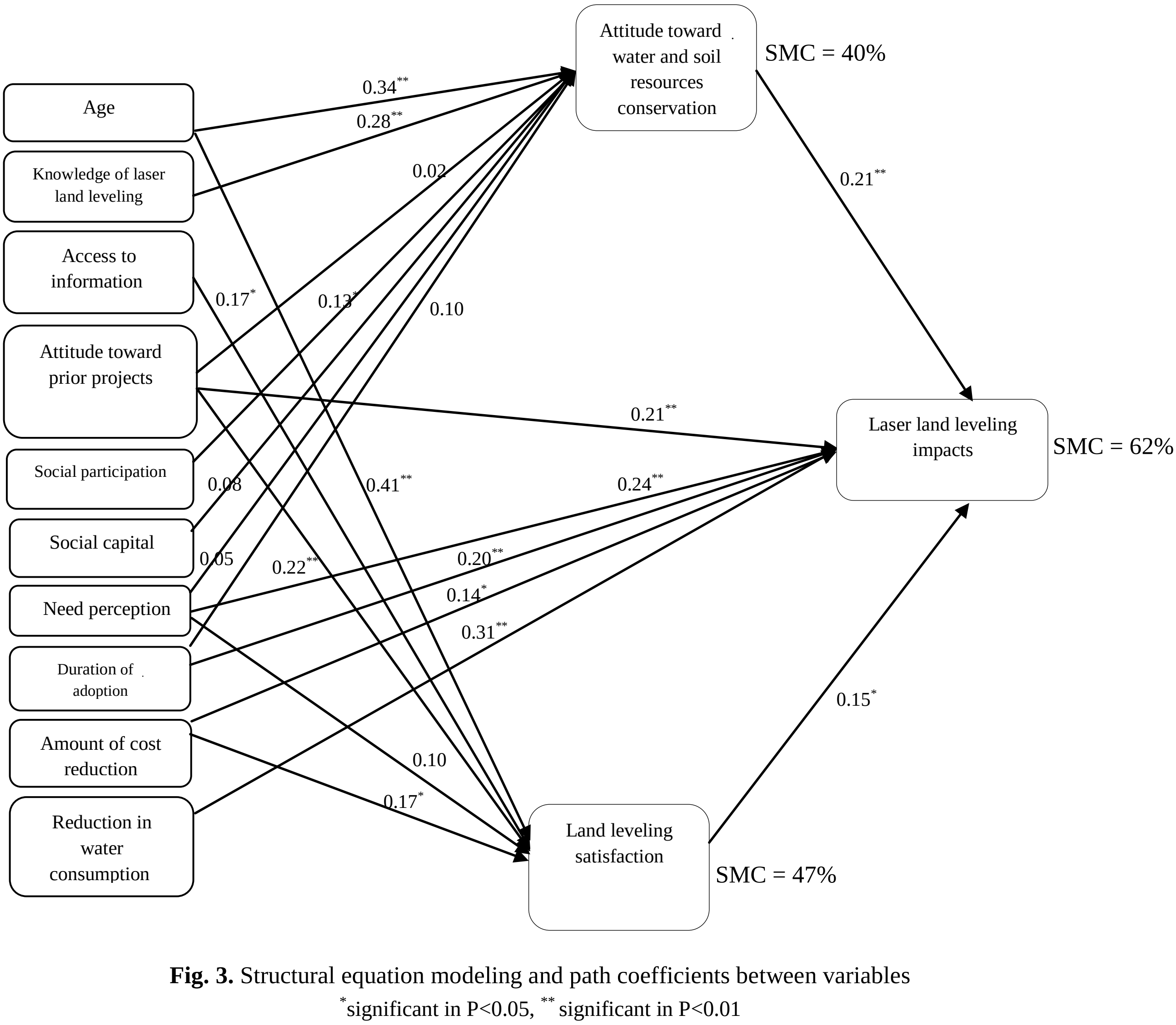

Fig. 3. Structural equation modeling and path coefficients between variables
*significant in P<0.05, **significant in P<0.01

Conclusion and recommendations

Impact assessment is a continuous process to help the policy-makers fully think through and understand the consequences of possible and actual government interventions: from the early stages of identifying a policy challenge, through the development of policy options, public consultation and final decision-making, and on to the review of implementation. Identifying these impacts and consequences is considered an important executive mean for managers and project planners of these kinds of projects since it not only measures and presents the plans' developments, but it also determines their impacts on the target group. Furthermore, focusing on the key determinants of stakeholder attitude formation toward the impacts of agricultural development projects is important, because it helps project planners, project proponents, and decision-makers to better understand stakeholders' traits and values, and this knowledge aids in making projects more inclusive.

This study endeavoured to investigate key factors determining the impacts of laser land levelling technology, as an important innovation to sustainable agricultural development in Iran. According to the results, reduction in water consumption was the most important factor to anticipate the project impacts among adopters of the innovation. Iran is located in an arid and semi-arid region. Having an average annual precipitation of 250 mm, Iran receives less than one third of the global average precipitation (750 mm). Bearing in mind such a climatic condition, many severe or mild droughts are inevitable. In recent years, Iran has experienced several droughts. The current severe, prolonged and extensive drought in Iran has not only affected agricultural productivity but has also threatened water resource sustainability. Fars is one of the drought-prone areas of Iran, experiencing several severe droughts and suffering from the ongoing consequences of drought. A laser land levelling plan, as one of the environmental strategies of increasing the use of inputs, particularly water, is taken into account by experts and specialists. This technology plays an important role in the reduction of water consumption and helps farmers to cope with drought. So it is determined by farmers to be the most effective variable.

In addition, perceiving impacts were affected directly by the duration of adoption of the technology. Rahman (2003) reported a direct effect of the duration of adoption of modern technologies on perception of incompatible impacts on the environment. Based on the results, laser land levelling satisfaction affected project impacts directly. Hence, increasing farmers' satisfaction is effective in increasing positive impacts of the project via precise implementation of a laser levelling project and sufficient monitoring. The effect of farmers' attitudes toward water and soil resources conservation on the project's impacts is important. Attitude provides direction and purpose to behaviours and performance. The more favourable a person's attitude toward a behaviour, the more they intend to perform that behaviour. Beckford et al. (2010) believed that environmental attitude has a significant impact on environmental behaviour. It is necessary to design for suitable training courses to raise the awareness of farmers and improve their attitudes regarding the conservation of basic resources, especially water and soil. Attitude toward prior executive projects in villages affected the project's impacts, so that taking advantage of farmers' participation, capturing their attention and confidence, involving them and conferring some responsibilities to them are effective in the diffusion of modern innovations and formation of positive attitudes among farmers toward government executive projects.

Due to increasing concerns of environmental debates towards the impacts and consequences of modern technologies on the environment, it is necessary to introduce a motion toward an environmentally friendly agricultural strategy. The Environmental Impact Assessment method is one approach to assess the possible positive or negative impacts that a proposed project may have on the environment. EIA seeks the evaluation of the effects likely to arise from a major project (or other actions) significantly affecting the environment and is a useful tool for promoting sustainable development. Taking action to achieve environmentally friendly agriculture requires that sustainable agriculture, as successful management of water and soil resources to satisfy changing farmers' needs along with the environmental conservation increase, would be taken into consideration. It is hoped that the results of this study will be used to develop a comprehensive agricultural development strategy conducive to the diffusion of new environmentally friendly innovations.

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