Effective Components of Optimal Wheat Production from the Perspective of Farmers in the North of Khuzestan, Iran

Mohammad Sadegh Sabouri[a]*, Soraya Rafiei[a] and Davood Samarei[b]

Abstract

This research was carried out to investigate the role of legal, philosophical, economic, environmental, educational attitudes and some personal characteristics in farmers' professionalism in the production of optimal wheat in the north of Khuzestan Province, Iran. The methodological approach in this research was casual relative and applied survey. The data were collected by a survey and a questionnaire as the main research instruments. The samples comprised all wheat growers in Northern Khuzestan. Three hundred and ten farmers were selected by using a Cochran's formula through random sampling out of 23,485 wheat farmers of Northern Khuzestan. Finally, 302 questionnaires were analyzed. The questionnaire was developed from a review of the related literature. The content and face validity of the instruments were established after several times of review and correction by the faculty members of Islamic Azad University of Garmsar. The questionnaire and data were analyzed by the help of SPSS v21 software package. The reliability was reported to be 0.81 using a Cronbach's alpha. Stepwise regression analysis indicated the most important variable that accounted for 77.2% of the variance of the dependent variable was the economic variable. The next variables (environmental, legal components, and educational attitudes processes) captured 86.5% of the variance of optimal wheat production.

[a] Department of Agriculture, Garmsar Branch, Islamic Azad University, Garmsar, Iran
[b] Department of Agriculture, Karaj Branch, Islamic Azad University, Alborz, Iran
* Corresponding author's email: sabouri5517@gmail.com

INTRODUCTION

Agricultural development in the framework of the national development of the country has been considered to play an important role in accomplishing national development as a political and economic part. Accordingly, it is the most important priorities in state national development plans.

Human capital, as one of the most important factors of production, has a special place in the production and development of economy and society of all nations. Developing countries critically need skillful and technical human resources. The importance of this issue arises from the fact that the role of human resources, especially in the agricultural sector, is considered to be among the most urgent needs of developing countries and that agriculture is usually accentuated to a lesser extent than other industrial and productive sectors, whereas this sector has a high potential to contribute to growth and development (Soleimani & Khodaverdian, 2007).

Training has led to the effective use of the workforce by modern technologies and plays a significant role in the quality and quantity of human resources and can affect them in many ways (Imani Ghashlaqchayi, 2005). Moreover, there are elements like technological changes, organizational changes, human resource development, suitable affection to research and extension, and markets inclined to the sale of products have been mentioned as the factors influencing agricultural development; however, more importance has been placed on human resources (Mathieu, 2004; Swanson, 2006).

Wheat is the main source of energy and protein for Iranian population, as it accounts for 56% of the intake protein and 50% of calories needed in rural and urban communities in the form of bread (Birjandi & Farajollah Hosseini, 2009).

Wheat yield increased from 2688 kg ha^{-1} in 2002 to 3024 kg ha-1 in 2009 at the global level, indicating a general rise in yields despite ups and downs in production rate and acreage (FAO, 2011). The average wheat production in Asia indicates that the lowest production yield of 2590 kg ha-1 happened in 2000 and 2003 and the highest one (2947 kg ha^{-1}) occurred in 2009.

The recommended amount of nitrogen fertilizer for growing wheat depends on the fertility of the soil and the amount of rainfall in a certain region. Excessive consumption of nitrogen fertilizers not only may impair the crops but it may also lead to devastating effects on soil texture and contamination of the underground and surface water resources.

Rougoor et al. (1998) defined management capacity as having outstanding personal qualities and skills to deal with problems and opportunities at the right time and the right way. This requires a positive attitude and a good command and knowledge of quantity and quality of the wheat nutrition. Freeman and Omiti (2003) studied effective socioeconomic factors on fertilizer application in semi-arid Kenya. They found a positive significant relationship between the education and experience of the farmers and fertilizer application. Similar to land size, Extension-education workshops are positively related to the application of nitrogen fertilizers, but the coefficients were not statistically significant (Waithaka et al., 2007).

Allahyari (2009) argues that attitude is one of the main factors for the participation of individuals in different activities and the adoption of technology. The final target of the agricultural studies is the farmers who are mostly suffering from financial problems and who are illiterate or semi-illiterate and therefore, are unable to learn and apply new information.

Three categories of studies have been identified regarding the attitude-behavior relationship: The first category has focused on the question of whether attitudes can predict behavior. A guideline to moderator variable approach has been emphasized in the second category of the studies. That is, this category concentrates on the question of what conditions, attitudes, and people are predicted for

certain behaviors. The third category examines the psychological mechanisms that predict and conduct behavior. Bizer et al. (2003) have defined attitudes' components as the cognitive component of the beliefs, perceptions, and individual understanding of a phenomenon.

Emotional component includes the emotions which motivate people. In this sense, individuals react to the observers according to their emotions, not their rational understanding and witting.

Behavioral component is related to the fact that individual interest to do certain things may have been formed through emotional attachment to the subject, rational attitudes, or moderate attitudes which include emotional aspects in addition to the cognitive and intentional aspect of the actions.

Musselwhite and Herath (2006) likewise believe that insufficient understanding of concerned people's attitudes and behaviors may cause a serious problem in their adoption of the development policies. Carrete et al. (2007) argue that some ecological processes may happen at the population level in accordance with an individual's behaviors and decisions.

The main concept of the Theory of Planned Behavior is the fact that any action is done with the intention of controlling the accepted behavior (Bartlett & Bartlett, 2007). Attitude and subjective norms have a significant impact on behavioral intention (Perkins et al., 1992). Attitude is related to behavior, beliefs are related to the external expression of the behavior, beliefs are related to participation in certain conduct, and all of these factors are related to intentions to engage in a certain behavior (Bartlett & Bartlett, 2007). Nevertheless, there is a difference between attitude and behavior; unlike behavior, attitudes are not observable (Winter et al., 2005).

A group of studies have concentrated on the relationship between attitude and behavior (Winter et al., 2005). Holland et al.'s (2002) study, for example, focused on the mediatory role of the attitude while others have empha-

sized that the attitude-behavior relationship is reciprocal (Wood & Griffiths, 2004).

Nkembi (1998) considered income and livelihood strategies as the factors underpinning the protective attitude of the people. The literacy level of farmers is regarded as another effective factor in his/her attitudes (Fischer & Wall, 2007).

Winter et al. (2005) suggest that the following factors influence the protective attitudes and behaviors of farmers:

1- The personal environment (familial culture, socio-economic status, work environment);

2- Experiences (personal experiences which can affect individual interests and understanding);

3- Population growth;

4- Media and advertising;

5- And, other family events such as farming perspectives, land size and type, agronomic and non-agronomic income, and farming experiences.

Therefore, the improvements in the professional behaviors of farmers towards wheat optimal nutrition have led to studying different factors to figure out systematic intended activities. Therefore, the main research question can be stated as: What are the factors underpinning the professional behavior of wheat growers?

The present study sought to identify components influencing optimal wheat production from the perspective of farmers in the north of Khuzestan province, Iran. Therefore, this study specifically concentrated on improving professional behavior as a priority in the educational sector of the Ministry of Agriculture, identifying effective managerial factors to enhance professional behaviors.

METHODOLOGY

The methodological approach in this research was based on a casual-relative and an applied survey study. The data were collected through a questionnaire as the main research tool. The population consisted of all wheat farmers in Northern Khuzestan, Iran, includ-

ing Dezful, Andimeshk, and Shush townships (based on the number of wheat farmers) amounting to 23,485 people of which 310 farmers were selected by Cochran's formula through random sampling. The data were statistically analyzed by stepwise regression.

A questionnaire was developed from a review of the related literature to collect data. The content and face validity of the instrument was established after several times of review and correction by the faculty members of agricultural extension and education of Islamic Azad University of Garmsar. The questionnaire and data were analyzed by SPSS v21 software package. The validity of the questionnaire was verified by a group of experts and its reliability was reported to be 0.81 after applying Cronbach's coefficient (a total of 30 questionnaires were administered

in the same areas in Khuzestan Province). The professional behavior of farmers about optimal wheat production (knowledge, skill, and attitude) was considered the dependent variable. Stepwise regression analysis along with descriptive statistics were applied for data analysis.

RESULT

According to Table 1, the highest frequency of the participants' age range was 26% belonging to the range of 41- 55 years. The majority of the participants had primary education. The highest frequency belonged to farmers with one land parcel (49.3%). The longest wheat growing experience was between 31-50 years (38.8%) and the lowest frequency was 21-30 years of experience for 43 farmers (14.3%).

Table 1
Frequency Distribution of Respondents' Individual Characteristics

	Variable	Frequency	Percent	Cumulative percentage
Age (Years)	25-40	78	25.9	25.9
	41-55	114	38.9	64
	56-80	110	36	100
	Illiterate	27	8.9	8.9
	Primary school	124	41.1	50
Knowledge	Secondary school	8	29.1	79.1
	High school	29	9.7	88.8
	Associate Diploma	34	11.2	100
	1-10	77	25.4	25.4
Wheat growing	11-20	65	21.5	46.9
experience	21-30	43	14.3	61.2
	31-50	117	38.8	100
	1	149	49.3	49.3
	2	36	11.9	61.2
Number of land plots	3	93	30.8	62
	4	15	5	97
	above 4	9	3	100

A correlation matrix was built to study the association of different variables with farmers' knowledge about optimal wheat production (Table 2). Educational level was significant at the 95% confidence level, and

environmental, legal component, economic factors, educational-attitudes processes, and experience have significant relationships with optimal wheat production at the 99% confidence level.

Table 2
The Correlation between Variables from Respondents' Viewpoint

Variables	r	P-value
Philosophy	0.098	0.875
Environmental	0.836**	0.000
Legal component	0.541**	0.000
Economic	0.834**	0.000
Educational-attitudes processes	0.669**	0.000
Age	-0.101	0.086
Education level	0.129*	0.027
Experience	0.258**	0.000
Average wheat yield	0.100	0.087

*P<0.05, **P<0.01

Stepwise regression analysis

Stepwise regression was used to determine the most important independent variables accounting for the variance of wheat manage-ment. The variables were introduced into the process in four steps, which gave the four sets of potentials a correlation of 86.5% of the variance (Table.3).

Table3
The Role of Independent Variables in Optimal Wheat Production

Model	R	R Square	Adjusted R square	Std. Error of the estimate
1	0.879a	0.772	0.772	0.35
2	0.922b	0.849	0.848	0.28
3	0.924c	0.854	0.853	0.28
4	0.931d	0.867	0.865	0.27

a, b, c, d are steps of regression analysis

As can be seen in Table 4, the economic fac-tors are the most important factors affecting the professional ethics of wheat farmers. This set of variables alone accounts for about 77.2% of the variance of the dependent vari-able. The second step of this regression is re-lated to environmental variables, which also account for about 84.8% of the variance of the professional ethics. In step three, the vari-ables are related to the legal components that can play a role in the management of wheat production. This factor explains 85.3% of the variance of the professional production ethics with the two previous ones. The fourth set belongs to the educational-attitudinal processes of wheat farmers who play a role in production management. In total, these four variables capture 86.5% of the variance of the dependent variable.

DISCUSSION AND CONCLUSIONS

The mean age of participants was 52.96 years with 80 and 25 years being the maxi-mum and minimum ages, respectively. The variance was 315.41 and the median was 48. The research findings indicated that partici-pants had high mean age and high mean work experience which is also in agreement with the findings of Mirdamadi and Bagheri varkane (2008) and Frick et al. (2004). Therefore, this fact should be considered in planning, organizing promotion activities, and supporting the production operations. FAO (2006) confirmed a positive significant

Table 4

The Result of Multiple Regressions (Stepwise Method) to Determine the Role of Independent Variables in Optimal Wheat Production

Model	Unstandardized Coefficients		Standardized Coefficients	*t*	*P*-value
	B	**SE**	**Beta**		
(Constant)	-0.521	0.112	-	-4.648[*]	0.000
Economic	0.509	0.038	0.536	13.559[*]	0.000
Environmental	0.537	0.055	0.401	9.821[*]	0.000
Legal components	-0.428	0.068	-0.498	-6.270[*]	0.002
Educational attitudes processes	-0.521	0.089	0.497	5.392[*]	0.000

F=484.123, [*]p<0.01

International Journal of Agricultural Management and Development, 8(4), 519-527, December 2018.

524

relationship between age and experience in their studies.

As the results of the data analysis revealed, the highest frequency of the wheat growing experience was reported to be between 31 and 50 years. In the case of the operating system, the highest frequency of 128 participants (42.4%) belonged to the variable of "cooperative" and the lowest frequency of 71 participants (23.5%) belonged to "private ownership". The frequency for the "private-rented" variable was 95 participants (31.5%) which agree with Biswas (2010), Cai et al. (2009), and Cakmak (2010). Moreover, a positive significant relationship was reported between the private ownership of the agricultural lands and the adoption of soil conservation technologies. Perhaps, one of the explanations for this relationship is that a farmer feels more responsible to maintain and improve the soil of his/her privately-owned land.

Economic factors which included fertilizer price, subsidies allocated to wheat, support from investment, land ownership, repayment of bank loans, land ownership, and arable land size are the main challenges to deal with by wheat growers for optimal nutrition of wheat fields (Ikerd, 2009). This was also confirmed by Waithaka et al. (2007) and Feres and Soriano (2010). This set of variables alone accounts for about 77.2% of the variance of the dependent variables.

Environmental factors are the second class of variables that are involved in explaining the optimal management of wheat production. This variable not only included climate conditions but also the necessary infrastructure. These variables also account for 7.6% of the variance of the optimal management. Environmental factors play a supportive role in productions. This is in agreement with Allahyari (2009), Clearfield and Osgood (1987), Feres and Sariano (2010), Goldhamar (2009), and Soleimani and Khorvardiyan (2007).

In step three, variables are related to the legal components that can play a role in the management of wheat production. This factor accounts for 85.3% of the variance of professional production ethics. These variables also support production, but they are more structured over the variables. This finding is also consistent with the findings of FAO (2011).

The fourth set belongs to the educational-attitudinal processes of wheat farmers who play a role in production nutrition management. These variables account for about 1.2% of the variance of the dependent variables. The expectation of a greater share of these variables in improving production is due to the need to be investigated. This finding is also similar to Allahyari (2009), Berry (2008) and Birjandi and Farajollah Hosseini (2009).

The main point of this research is the fact that the number is constant; it shows that nutrition management and professional ethics of farmers should be strengthened and empowered. Therefore, the operational results of the research can be illustrated in Figure. 2
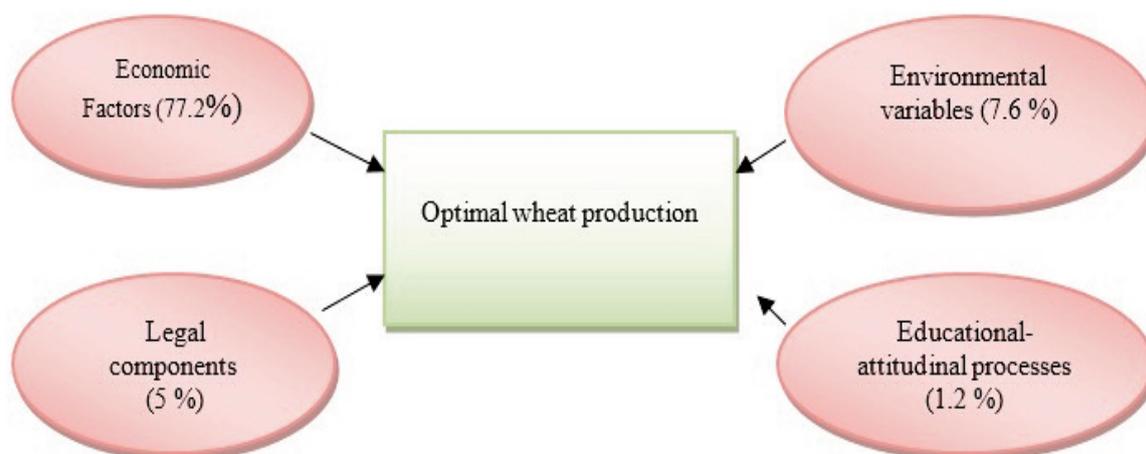
Figure 1. Experimental model of the study regarding of the Effective components on optimal wheat production from the perspective of farmers in north of Khuzestan.

Recommendations

In sum, the following recommendations can be proposed for educational, structural, natural, and economic infrastructure in order to change the professional behavior of the wheat growers regarding the optimal wheat nutrition.

- Economic factors played the most crucial role in managing wheat production in Khuzestan province. Therefore, agricultural investment is vital and improves production. Therefore, it is suggested that the government play a more effective role in supporting economic packs so that traditional agriculture is replaced with commercial agriculture.
- Environmental conditions may not be very much in control of us, but proper environmental management should be taken into consideration. Agricultural extension and education can play an important role too.
- There needs to be a stronger link between farmers and legislative institutions. This communication should be accurate and sustainable so that timely support services are provided to farmers by legal entities.

- Extension training should be more pragmatic in the field of farmers' demand. So, these trainings should focus on optimal economic, environmental, and legal management for the farmers in Northern Khuzestan.
- Enrichment of the less fertile soils by applying crop rotation, planting appropriate species and identifying deficiencies and missing elements required for crop growth based on soil and plant testing.
- Targeting subsidies for chemical fertilizers and encouraging biological fertilizers.
- Encouraging optimal consumption by training farmers to use chemical fertilizers based on real necessity of the different agricultural product and urging the high-performance farmers to share their experience with other farmers.

REFERENCES

Allahyari, M.S. (2009). Reorganization of agricultural extension toward green agricultural. *American Journal of Agricultural Biological Science, 4*(2), 105-109.

Bartlett, M. E., & Bartlett, J. E. (17 January, 2007). *Using the theory of planned behavior to predict research productivity*. College Teaching and Learning Conference, 17 -19 January. (pp, 33-40). Honolulu: North Carolina State University.

Berry, P. (2008). The impacts on knowledge management, information systems and sustainable development. *A Survey World Development, 24* (1), 76-83.

Birjandi, A., & Farajollah Hosseini, S.J. (2009). Knowledge of engineers supervised the production of lesions in various stages of Qazvin Province. *Journal of Agricultural Extension and Education, 2*(4), 2-13.

Biswas, A. (2010). Integrated water management: Is it working. *Water Resources Development Journal, 24* (1), 5-22.

Bizer, G. Y., Barden, J. C., & Petty, R. E. (2003). *Attitudes. In* L. Nadel (Ed.), Encyclopedia of cognitive science .London: Macmillan.

Cai, X., Ringlar, J., & Yun, N. (2009). Substitution between water and other agricultural inputs: Implications for water conservation in a river basin context. *Ecological Economics, 31*(2), 38-50.

Cakmak, E. (2010). *Agricultural water pricing: Turkey.* OECD consultant report.41. Retrieved from http://www.oecd.org/water/UNworld

Carrete, M., Grande, J. M., Tella, J. L., Sanchez-Zapata, J. A., Donazar, J. A., Diaz-Delgado, R., & Romo, A. (2007). Habitat, human pressure, and social behavior: Partial ling out factors affecting large- scale territory extinction in an endangered vulture. *Biological Conservation, 136*(1), 143-154.

Clearfield, F., & Osgood, B.T. (1987). Sociological aspects of the adoption of conservation practices. [On line]. Retrieved from WWW: URL: http:// www.people.nrcs. wisc.edu/Soc Scilnstitute/ Adoption1Main. Htm.

FAO (2006). *Land degradation in the Turkey*. Rome, Italy.

FAO (2011). The state of food and agriculture. Retrieved from www.fao.org/catalog/intere.htm

Feres, E., & Soriano, M. A. (2010). Deficit irrigation for reducing agricultural water use. *Journal of Experimental Botany, 58* (2), 147-159.

Fischer, A., & Wall, R. V. D. (2007). Invasive plant suppresses charismatic seabird –the construction of attitudes towards biodiversity management options. *Biological Conservation, 135* (2), 256-267.

Freeman, H. A., & Omiti, J. M. (2003). Fertilizer use in semi-arid areas of Kenya: Analysis of smallholder farmers' adoption behavior under liberalized market. *Nutrient Cycling in Agro ecosystems, 66* (2), 23-31.

Frick, J., Kaiser, F. G., & Wilson, M. (2004). Environmental knowledge and conservation behavior: Exploring prevalence and structure in a representative sample. *Journal of Environmental Education, 22* (1), 26-32.

Goldhamar, D. (2009). *Regulated deficit irrigation in trees and vines: Agricultural water management. Proceeding of a workshop in a Tunisia*. Washington D. C., the National Academic Press, Pp. 11-15.

Holland, R. W., Werplandken, B., & Knippenberg, A. V. (2002). On the nature of attitude-behavior relations: the strong guide, the weeks follow. *European Journal of Social Psychology, 32* (6), 869-876.

Ikerd, J. (2009). Sustainable agriculture: It's about people. *Journal of Agricultural Sustainable Development, 6* (1), 34-39.

Imani Ghashlaqchai, F. (2005). *Effectiveness of short-term extension training held in rural districts of Ardebil Province in 2001-2002*. Unpublished thesis for educational management, Faculty of Humanities,Tarbiat Moallem University, Tehran,Iran.

Mathieu, A. (2004). The meaning of practices: Farmers conceptions in agricultural development strategies. *Journal of Agricultural Education and Extension, 10*(3), 101 – 109.

Mirdamadi, S.A. M., & Bagheri varkane, A.S.

(2008). Survey of high school students' interest to protect environment in Tehran. *Academic Journal of the Environment. 46* (2), 39-21.

Musselwhite, G., & Herath, G. (2006).Chaos theory and assessment of forest stakeholder attitudes towards Australian forest policy. *Forest Policy and Economics, 14* (2),65-74.

Nkembi, L. N. (1998). Participatory forest conservation and sustainable livelihoods: Banyang-Mbo wildlife sanctuary. Retrieved from http:// www. fao. Org / DOCREP/ ARTICLE/WFC/ XII/0630- C1. HTM.

Perkins, H. M., Crown, E. M., Rigakis, K. B., & Eggertson, B. S. (1992). Attitudes and behavioral intentions of agricultural workers toward disposable protective coveralls. *Clothing and Textiles Research Journal, 11*(1), 67-73.

Rougoor, C. W., Trip, G., Huirne, R. B. M., &Renkema, J. A. (1998) How to define and study farmers'management capacity: theory and use in agricultural economics. *Agricultural Economics, 18* (1), 261-272.

Soleimani, N., & Khodaverdian, M. (2007). Study of teaching methods in unofficial technical training courses in livestock affairs. *Jihad Magazine, 278*, 68-50.

Swanson .E. B. (2006). Extension strategies for poverty alleviation: Lessons from China and India. *Journal of Agricultural Education and Extension, 12*(4), 285-299.

Waithaka, M.M., Thornton, P.K., Shepherd, K.D., & Ndiwa, N.N. (2007). Factors affecting the use of fertilizers and manure by smallholders: The case of Vihiga, western Kenya. *Nutrient Cycling in Agroecosystems, 78* (3), 211-224.

Winter, K., Randa, J. A., & Holtum, J. A. M.

(2005). Carbon isotope composition and water-use efficiency in plants with crassulacean acid metabolism. *Functional Plant Biology 32* (1), 381–388.

Wood, R. T. A., & Griffiths, M. D. (2004). Adolescent lottery and scratch card players: Do their attitudes influence their gambling behavior? *Journal of Adolescence, 27*, 467-475.

International Journal of Agricultural Management and Development, 8(4), 519-527, December 2018.

527