Indian Journal of Fundamental and Applied Life Sciences ISSN: 2231– 6345 (Online)
An Open Access, Online International Journal Available at http:// http://www.cibtech.org/sp.ed/jls/2014/01/jls.htm
2014 Vol. 4 (S1) April-June, pp. 1328-1335/Ghaderi et al.
Research Article

INVESTIGATION THE EFFECT OF DIFFERENT EDUCATION LEVELS ON AGRICULTURAL VALUE ADDED

*** Motaleb Ghaderi[1], Roya Mansour[2], Zahra Amoli Jelodar[3]**
[1]*Master of Executive Management, Payam Noor University, Baneh, Kurdistan, Iran*
[2] *Master of Economics, Payam Noor University of Babol, Babol, Iran*
[3] *Master of Economics, Payam Noor University of Babol, Babol, Iran*
**Author for Correspondence*

ABSTRACT
The purpose of this study is investigating the effect of three different levels of human capital education (primary, secondary, higher education) on agricultural value added sect based on advanced neoclassic model in developed nations of G8 members through use of econometric method and panel data and evaluation of coefficient of regressive model for all of G8 members during 1995-2010 by Eviews 7. The hypothesis is that there is a meaningful difference between the effects of different education levels on agricultural value added sect in G8 members. Obtained results showed that the effect of education on added value of agriculture sect is positive and meaningful at primary and secondary levels and negative and meaningful at higher education level.

Keywords*: Agricultural Value Added Sect, Education, Human Capital, G8 Members*

INTRODUCTION
Knowledge-based economy term for the first time was introduced by economic organization of developed nations that represent the significant role of knowledge and technology in economy. In knowledge-based economy, knowledge is more important than past time from qualitative and quantitative viewpoints. Investment on knowledge means spending for those activities that leads to improvement of available knowledge level or acquiring and propagation of new knowledge. Generally, in knowledge-based economy, knowledge is the driving force of growth and wealth and leads to more production with respect to other traditional factors such as work and capital. Education, training or investments on human capital are some of prerequisites of knowledge-based economy.
In small scale, human capital means varying quality of labour force by improving their education levels and experiences and in large scale is the available knowledge and its impact on economy. In fact, in this study for investigating the effect of education on agricultural value added sect, human capital has been categorized into three different educated groups, i.e., primary, secondary and higher levels. Study and investigation of this subject could endow investors a proper knowledge about human capital composition and prepares necessary background policy suggestions for economic decision-makers and policymakers in all over the world especially in Iran.
After the WWII, because of continuous population growth, increase of GDP per capita and food security some nations thought about consumer's surplus. Soon afterwards, competitiveness and the application of knowledge and technology for optimized utilization of production factors and also growth of agricultural value added sect became the important issues of most countries (Torabi & Mohammadzadeh Asl, 2006).
Regarding to the fact that agriculture is one of the most important sect of the country that encompasses considerable present of production, employment and nonoil exports, thereupon, the purpose of this study is investigating the effect of human capital on agricultural value added sect in developed and industrialized nations of G8 group during 1995-2010.

LITERATURE & THEORETICAL
Technology advancement and accessibility to convergence of technology through qualitative promotion of human force by improving the education and increase of training facilities for labour force in

agricultural sect leads to increase of agricultural productions' efficiency and finally increase of growth rate of added value.

Agricultural sect is important from three viewpoints; firstly, it is an appropriate source for the development of industry and industry development in rural areas led to a dynamic progressive interaction between agriculture and industry; secondly, strategic significance of food production is an issue that nobody can ignore it, so susceptible and risky aspect that may overshadow the international political relations between various nations (Shakeri, 2004); thirdly, growth of non-agricultural sect of rural areas is depended upon, to great extent, the growth of agricultural sect; in fact, the increase of farmers' income leads to more demand and increase of employment of labour force and growth rate of payments in non-agricultural sect of rural areas; thus the immigrant labour force skew value-added of sectors (Mellor, 2004). In addition, agricultural value added sect have a considerable impact on added value of industry and services sects (Valadkhani, 1988). In addition to more increasing of competitiveness power, this sect could prepare an appropriate bed for effective help in the field of food security, welfare of rural society and decrease of migration from villages to urban areas. In addition to mentioned cases, saving supply, feasibility of exchange currency income and supply of labour force in agricultural sect are influential factors of economic growth (Tehranghian, 2003).

Government policies especially those related to technology, industry and education implies more attention and in this context the role of economic units and infrastructures, investment motivation and education is vital. In this direction, government have to be taken into account policies of preparing the bed for cooperation among state, universities and agricultural sect in such a manner that this cooperation led to enforcement, improving and prevalence of modern technology on all various economic and agricultural sects and facilitating development of communicational infrastructures. Moreover, these policies leads to better accessibility to skills and abilities through official training, encouraging individuals and agricultural units for continuous training and learning and finally making a compromise between supply and demand of labor force in agricultural sect based on required skills. It is expected that with regard to future economic prospects of the world, these states should attract the attention of investors toward the components of knowledge-based economy and acquiring competitive advantages in agricultural sect with appropriate decisions and performing proper economic policies and thereby bringing forth development of knowledge and technology, competitiveness power increase in international economy arena, continuous and sustain increase of economic growth of added value in agricultural sect and eventually social, political and economic development.

Hall and Scobie (2008) studied the decisive role of local and international knowledge on growth of agricultural value added sect in New Zealand; according to their conclusion, growth of agricultural value added sect in this country is strongly influenced by knowledge level.

Emadzadeh and Baktash (2005) believe that technology and technical knowledge play a significant role in manufacturing of industrial products, in addition, labor force with high level of technical knowledge and proper training are able to form a dynamic production cycle and technological transformation and lead to increase of productive capacity and competitiveness potential in national and international markets.

In this paper the effect of education level on added value of industry sect has been investigated by means of time series data of 1966-2001 periods and Cab-Douglas pattern. Obtained results showed that 1 present increase of physical capital and professional and nonprofessional labour work leads to 0.34, 0.29 and 0.11 present increase of added value of industry sect, respectively. Therefore, education has a positive effect on added value of industry sect and GDP shows a greater reaction with respect to professional labour force in comparison with other production factors. Additionally, training the labour force will increase production of industry sect and with increase of human capital the domestic production will also increase. This study suggest that economic growth, from one hand, stem from investment on human capital of industry sect, and from other hand, growth of industrial production.

Tahamipoor and Shahmoradi (2007) believe that, nowadays, all nations pursuit development in the field of productivity, that is, they could achieve more production with less consumption of resources. In order

to increase productivity in Iran's economy, agricultural sect have to be taken into account as a main and significant sect of economic activities, because increase of productivity in this sect, regarding its high priority, could lead to economic development. Form other hand, according to the article 5 of Forth Development Plan, agricultural value added sect during forth plan of development should be grow 6.5 present annually that 2.2 present of this growth should be obtained through improving productivity of all production factors. Thereupon, in this study productivity growth rate of all productive factors has been measured during years of forth and pervious development plans and then the share of productivity growth with respect to growth of added value has been computed. For this purpose, model of Solo residue index, added value variables, occupancy rate and the value of available agricultural capital have been used. Obtained results showed that annul average of productivity growth rate of all productive factors in agricultural sect during 1967-2003 is -3.08 present.

Bashirimonazzam and Shahabadi (2011) argue that with regard to progressive growth of population and increase of demand for food and also due to limitation of production factors; based on endogenous growth models the best way for increase the efficiency per hectare is attention to R & D activities, attracting overflow of R & D of commercial partners and increase the cost of training and propagation. Thus, present study investigate the effect of accumulated internal and external research and development expenditures, accumulated cost of training and propagation and finally the influence of traditional factors on growth of added value in agricultural sect during 1968 – 2007 period. Study results represent a little effect of internal accumulation of research and development, in addition, no relation between external accumulation of research and development on growth of added value in agricultural sect observed, the relation between accumulation variable coefficient of agricultural training and propagation on added value of this sect is meaningless, while traditional variable coefficients of production (accumulation of labor force and physical capital) are meaningful.

RESEARCH METHOD

In this paper, combinational data have been used for pattern assessment during 1995-2001 period and a regressive correlation between the impacts of human capital on agricultural value added sect in G8 member countries has been obtained and results will be evaluated.

G8 group consist of 8 industrial countries that form 65 % of world economy. Leaders of these countries hold a common conference annually. United State of America, Japan, Germany, United Kingdom, France, Italy, Canada and Russia are members of this group. In this study, World development Indicator (WDI) have been used for computing agricultural value added sect (AVA), labor force (L), physical capital (K) and productivity of all factors (TFP). Among different human capital indicators average years of education have more advantages relative to other indicators. In this paper, for human capital variable, average years of education has been used at three different levels, that is, primary (EDU1), secondary (EDU2) and higher education (EDU3) that are derived from Robert Barro and Jong-Wha Lee [1] data.

RESULTS AND CONCLUSIONS

- Unit root test

At first, it is necessary to investigate statistical properties of used variables in the model from viewpoints of conservativeness and possibility of existing the unit root.

Philips-Perron (PP) unit root, Augmented Dickey-Fuller (ADF) and Pesaran and Shin (Im) tests are conducted for all variables of mentioned model. Results show that in model only labor force variable at 1st difference level has been conservative, other remaining variables are at the level of 5% conservativeness; in other words, null hypothesis based on non-conservativeness of remaining variables at

[1] Barro and Lee has computed average years of education during 1950-2010 for 138 countries all of world that their results could be find in Harvard University website: http://www.cid.harvard.edu/ciddata/ciddata.html

the level of 5% is rejected. Therefore, the variables of agricultural value added sect, physical capital, total productivity, primary secondary and higher levels of education are accumulated zero rank or I(0) and only labour force variable at 1st difference level is accumulated zero rank or I(0). Results are shown in table (1).

Table (1): Results of unit root test of OPEC members' countries

Variables	(PP) test statistic	P-value	(ADF) test statistic	P-value	(Im) test statistic	P-value	Accumulation order
AVA	60.859	0.000	57.264	0.000	-5.10	0.000	**I(0)**
K	41.573	0.000	45.894	0.000	-4.22	0.000	**I(0)**
$d_1(L)$	55.107	0.000	51.967	0.000	-4.74	0.000	**I(0)**
TFP	37.631	0.001	36.683	0.002	-3.28	0.000	**I(0)**
EDU1	67.223	0.000	49.749	0.000	-3.64	0.000	**I(0)**
EDU2	63.712	0.000	59.799	0.000	-5.83	0.000	**I(0)**
EDU3	77.0818	0.0000	66.4642	0.0000	-6.53	0.000	**I(0)**

Source: Calculations of research

Now, model and its variable are introduced. Then, model estimation by virtue of Chaw tests (Likelihood ratio) has been done to determine whether the model is pooled or panel and if it is a panel, Hasman test should be used to be specified whether panel model is a model with constant or random affects. Afterwards, the model is estimated and its falseness and its autocorrelation at the end final model will be presented.

- model introduction and used variables

Based on present study and available data, following variables are used for model description.

$AVA_{it}= f (L_{it}, K_{it}, TFP_{it}, EDU1_{it}, EDU2_{it}, EDU3_{it})$ (1)

Variables:

AVA_{it}: Agricultural value added sect (in terms of current dollar) for 8 countries of G8 group during (1995-2010)

L_{it}: Labor force of 8 countries of G8 group during (1995-2010)

K_{it}: Physical capital of 8 countries of G8 group during (1995-2010)

TFP_{it}: Total factors productivity of 8 countries of G8 group during (1995-2010)

$EDU1_{it}$: Average years of primary education of 8 countries of G8 group during (1995-2010)

$EDU2_{it}$: Average years of secondary education of 8 countries of G8 group during (1995-2010)

$EDU3_{it}$: Average years of higher education of 8 countries of G8 group during (1995-2010)

i = 1, 2, 3,…, 8

t = 1995-2010

In this study for evaluation variable of physical capital, physical capital adjustment equation has been used as follows:

$$K_t = (1 - \delta)K_{t-1} + I_t \quad (2)$$

Here,

K_t is physical capital, I Gross investment and δ is depreciation rate that considered 4 % for all countries based on Rumor study (2001, Rumer) because there is no statistic about depreciation rate of various nations. It is notable that in economic studies that have been conducted about Iran's economy, depreciation rate has been considered 4 %. As could be observed, in above equation initial value of physical capital is needed. For obtaining initial value of physical capital PIM method has been applied. According to this method initial value of physical capital (K_{t-1}) could be computed by the following equation:

$$K_{t-1} = \frac{I_t}{r+\delta} \quad (3)$$

Here; r is average rate of annual investment growth.

Moreover, in this paper productivity of labor force has been computed by Dyvyzhya Index according to the following equation in each year and for all countries.

$$\text{TFP} = \frac{GDP}{k\hat{}\alpha * L\hat{}(1-\alpha)} \quad (4)$$

Here;

GDP is gross domestic product, K available capital, L labor force; α capital share in production and 1- α is share of labor force in production. Rumor argue that share of capital in production for countries is 1/3 that could be used as an approximation for productive elasticity of capital. It is notable that under complete competition circumstances and constant efficiency with respect to scale and lack of external consequences, productive elasticity of capital is equal to share of capital in production and obtained results of TFP based on both methods, that is, Solo remaining and Dyvyzhya Index are equal.

- Chaw test (Lagrange coefficient)

With regard to the results of Chaw test as could be observed from table (2), H_0 hypothesis based on pooled model (non-panel model) is not rejected; therefore model is a pooled not a panel model. Thus, the model of combinational method is pooled model. Results of Chaw test are shown in table (2).

Table (2): results of Chaw test

Effect Test	Statistic	Degree of freedom	Prob
Cross-Section F	1.083721	(7,76)	0.3822

Source: Calculations of research

– Model evaluation and results analysis

As mentioned before, considered pattern has been evaluated by combinational method and its model is as follows:

$$AVA_{it} = \beta_1 + \beta_2\, d_1 \log(L_{it}) + \beta_3 \log(K_{it}) + \beta_4 \log(TFP)_{it} + \beta_5 \log(EDU1_{it}) + \beta_6 \log(EDU2_{it}) + \beta_7 \log(EDU3_{it}) + u_{it} \quad (5)$$

Obtained results of model estimation have been shown in table (3).

Table 3: Results of model estimation

Descriptive variable	Combinational data test		
	Coefficient	T statistic	P-value
Labor force	4.73E+10	3.445285	0.0009
Physical capital	4.53E+10	33.22439	0.0000
Total Factor Productivity	7.09E+10	5.955738	0.0000
Average of primary education years	1.01E+12	11.21292	0.0000
Average of secondary education years	1.32E+11	10.28761	0.0000
Average of higher education years	-6.50E+10	8.874952	0.0000
c	-4.23E+11	-4.861746	0.0000
F- statistic	299.0020		
Prob(F-statistic)	0.000000		
R^2	0.988041		
Adjust R^2	0.984737		
Durbin-Watson statistic (D-W)	1.597688		

Source: Calculations of research

Coefficient of labor force variable (L) has a positive and meaningful effect equal to 4.73E+10. In other words, one percent increase in labor force leads to 4.73E+10 percent increase of added value in agricultural sect.
Coefficient of physical capital variable (K) has a positive and meaningful effect equal to 4.53E+10 that suggests positive and meaningful influence of physical capital on agricultural value added sect in G8 countries. In other words, one percent increase in physical capital leads to 4.53E+10 percent increase of added value in agricultural sect.
Coefficient of total factor productivity variable (TFP) has a positive and meaningful effect equal to 7.09E+10 that shows the significance of this variable on agricultural value added sect in G8 countries. In other words, one percent increase in total factor productivity leads to 7.09E+10 percent increase of added value in agricultural sect.
Coefficient of primary education year's variable (EDU1) has a positive and meaningful effect equal to 1.01E+10. In other words, one percent increases in years of primary education leads to 1.01E +10 percent increase of added value in agricultural sect.
Coefficient of secondary education year's variable (EDU2) has a positive and meaningful effect equal to 1.32E+10. In other words, one percent increases in years of secondary education leads to 1.32E +10 percent increase of added value in agricultural sect.
Coefficient of higher education variable (EDU 3) has a negative and meaningful effect from statistical viewpoint and equal to -605E+10. This means that one percent increase in years of higher education leads to -605E +10 percent decrease of added value in agricultural sect.
According to the table, F test represent meaningfulness of whole regression.
Value of DW statistic is 1.59 which is high and verifies that there is no autocorrelation. Determination coefficient of model (adjusted and non-adjusted) is high that suggests high descriptive power of this model.

CONCLUSION

Generally, before 1960s economists consider education sporadically. Primary studies that considered the role of education on quality of labor force are ascribed to William Petti. But more significant study is attributed to Adam Smith, from one hand he believed in skillful labor force as a source for development and economic welfare and from other hand argued that with increase of competition between universities, efficiency of educational centers will increase. After Smith Alfred Marshall survived "economy and education" as a significant issue and studied their relationship. He considers education as a national capital and believed that conditions that compel parents to participate in education of their children should be reconsidered. At the mid of 1950s, Walsh conducted the first empirical study based on cost – profit analysis. One could say that to the end of 1950s, social scientist and economists sporadically addressed education and its significance. Afterwards (at the beginning of 1960s), in this field dealing with different issues changed, therefore, they considered the difference between development of nations because of educational differences, so that in 1970s "Shultz" and "Denison" and "Baker" sought the roots and essence of economic growth fluctuations in "education" subject. Then several authors such as "Mincer" and "Miller" recognized the influence of education on comprehension power of individuals.
With this overview one could say that university is effective in economic and servicing from two viewpoints: firstly, preparing influential labor force through improvement of individuals' productivity and efficiency. Secondly, through extending the knowledge boundaries and technology advancement. Because the universities are responsible for preparing labor force and improvement of efficiency and productivity in higher levels of professions; therefore, they play an important role in servicing development, because higher education as a part of overall educational process leads to improvement of productivity level of labor force through training the needed skills and specialty in individuals and enhancement of their comprehension power. In current study with a comprehensive insight into theoretical background of the effect of human capital education on agricultural value added sect, the correlation between

abovementioned variables in G8 members group during 1995-2010 has been investigated. Obtained conclusions could be used by researchers. Study conclusions are as follows:

1- There is a linear relation between human capital and agricultural value added sect in industrial G8 countries; as root unit and Chaw tests suggested, the model of G8 countries is combinational and all of these cases are a reason for selecting a linear model.

2- The effect of labor force on agricultural value added sect in G8 countries is meaningful and positive from statistical point of view.

3- The effect of physical capital on agricultural value added sect in G8 countries is meaningful and positive from statistical point of view.

4- There is a positive and meaningful relation between total factor productivity and agricultural value added sect in G8 members

5- There is a positive and meaningful relation between average years of primary education and agricultural value added sect in G8 members

6- There is a positive and meaningful relation between average years of secondary education and agricultural value added sect in G8 members

7- There is a negative and meaningful relation between average years of higher education and agricultural value added sect in G8 members. That is, the more the years of education the less the agricultural value added sect.

REFERENCES

Akbari, N.; Samty, M. and Hadyan, V. (2003), The effect of government expenditure on value added agriculture, Journal of Agricultural Economics and Development, 11 (41-42), Spring, Summer, pp. 137-166.

Arabi, gh. and Shahvaly, M. (2001), building agricultural extension and education for undergraduate students in coping with the challenges of change, Journal of Agricultural Economics and Development, Summer, No. 9 (34), pp. 281-300.

Bashiri monazam, F. and Shahabadi, A. (2012), the role of knowledge in the development of value-added agriculture, Journal of Rural Development, winter, No. 14 (4), pp. 105-125.

Emadi, MA. and Ardekani, M. (2002), combining local knowledge and formal knowledge; necessary for achieving sustainable development of agriculture, Agricultural Economic Development, Spring, No. 10 (37), pp. 11-36.

Emadzadeh, M. and Bektas, F. (2005), the effect of education on the value-added sector, Knowledge and Development, No. 16, pp. 37-50.

Haji Mir Rahimi, d. And Hussaini, SM (2003), strategies to achieve professional competence and professional educators and educational needs of agricultural higher education institutions, Journal of Agricultural Science, Spring, No. 9 (1), pp. 125-145.

Hall, J.and Scobie, G.M. (2006), The role of R & D in productivity growth; the case of agriculture in New Zealand, 1927-2001". New Zealand Treasuy, working Paper 06/01. Also, available on; http;//www.tresury.govt.nz/pubilicutions/research-policy/wp/2006/06-01/twp06-01.pdf.Retrieved at; 2010.08.14.

Molaie, Bakhtiar (2013), Effect of different levels of manpower GDP in the Middle East, the first National Conference on investment and GDP.

Molaie, Bakhtiar. and Houshmand, P. (2014), examined the relationship between levels of education on value added services, the political saga of the First International Conference (with approach to the Middle East) and Epic (economic and accounting management approach).

Sasoli, M. and Saleh, I. (2007), The effect of monetary and fiscal policies on the value added of the agricultural sector, monthly Agricultural Economics, November, 1 (3), pp. 233-242.

Shahabadi, A. (2009), Iran's agricultural growth during the period 1342 to 1385, Journal of Rural Development, 12, No. 4, pp. 125-147.

Shakeri, A. (2004). Place of agricultural economic development process, Journal of Agricultural Economics and Development, 12, No. 48, pp. 105-156.
Shakeri, A. and Mousavi, MH (2004) examine the factors affecting public and private investment in agriculture, Journal of Agricultural Economics and Development Economics, Fall & Winter, No. 43.
Tahami Pour, M. and Shah Morad, M. (2008), measured TFP growth in agricultural output, and assess its contribution to value added growth, Journal of Agricultural Economics, 1 (2).
Torabi, T. and Zadeh principle, n. (2006), Economic Growth in Developing Countries, Journal NEW ECONOMY. Year 2, No. 7, pp. 91-119.
Torkamani, J. and Bagheri, M. (2003) examine the relationship between private and public investment, the growth of value added in agriculture, Journal of Agricultural Economics and Development, Winter, No. 10 (40), pp. 1-24.
Tranchyan, A. (2004), the role of agriculture in the economy (1381-1340), Journal of Political Economy Info, Year 22, No. 248, pp. 1-6.
Valadkhany, A. (1988), the importance of value-added sectors of Iran's economy using input - output table, Journal of the Plan and Budget, Year 2, No. 9 (row 21), pp. 29-38.
Zamani, G. and A. Ardekani, M. (2002), Educational Evaluation, Shiraz University Alumni Association, Journal of Agricultural Research, 20 (1), pp. 97-106.
Zamanipoor, A. (2002) Evaluation of the role of agricultural extension and training of Birjand city, Journal of Agricultural Sciences and Technology, the second half, No. 15 (2), pp. 119-129.