International Journal of Asian Social Science
ISSN(e): 2224-4441/ISSN(p): 2226-5139
journal homepage: http://www.aessweb.com/journals/5007

INVESTIGATION DEVELOPMENT DEGREE OF ESFAHAN PROVINCE OF IRAN IN TERMS OF EDUCATIONAL INDICES

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ABSTRACT

Undoubtedly, human capital can be considered as the main sources of economic development in each country. The human capital provides the better use of physical capital and promotes social relations. One of the most common types of human capital is education. The study of literature in this filed shows that the education has a significant positive impact on economic growth. Investment in elementary, guidance and high schools are fundamental aspects of education. Therefore, with consider to the importance of investing in education, planning for education and development of educational levels, is also important. However, the differences between living places of people could be considered as the main factors which increase educational inequality. In other words, the amount of enjoyment of people from educational facilities is depending on their living place characteristics. Accordingly, this study attempts to investigate the development degree in the counties of Esfahan province of Iran in terms of educational indices. The results indicate that the development degrees of the counties have fluctuated during the 2007-2010 significantly. These reflect the instability in the distribution of educational facilities in Esfahan province.

Keywords: Development Degree, Economic growth, Educational facilities distribution, Educational indices, Esfahan province, Human capital.

JEL Classification: I25, I20, I28.

1. INTRODUCTION

Human capital plays a key role in both neoclassical and endogenous growth models (Rebelo, 1991; Mankiw *et al.*, 1992; Sianesi and Van Reenen, 2003). Providing education and health services to people is one of the major ways to improve the quality of human resources (Isola1 and Alani, 2012). The seminal work of Becker (1962) and Schultz (1962) presented a formal model of

† Corresponding author
DOI: 10.18488/journal.1/2015.5.1/1.1.37.44
ISSN(e): 2224-4441/ISSN(p): 2226-5139

education as an investment good that augmented the stock of human capital (Chatterji, 2008). Education being an important component of human capital has always attracted the attention from economists, researchers and policy makers (Chandra, 2011). Much of the earlier literatures focused on the relationship between education and economic growth using different model specifications. Awel (2013) indicated the relationship between human capital and economic growth for Sweden over the period 1870-2000. The results showed that education has a significant positive impact on economic growth in Sweden. Son *et al.* (2013) emphasized that within the European Union there is a strong positive influence of education on economic growth. Benos and Zotou (2013) investigated the effect of education on economic growth and found evidence of a genuine effect of education on economic growth using meta-regression analysis for a world sample. Oluwatoyin (2012) found a positive relationship between government expenditure on education an economic growth in Nigeria. Tansel and Gungor (2012) examined the gender effects of education using province level data for Turkey. The main findings indicate that female education positively and significantly affects the steady-state level of labor productivity. Simoes (2011) examined the relationship between different levels of education, i.e. between education composition and growth Results point to a significant long term relationship not only between higher education and growth but also between lower schooling levels and growth. Cooray (2010) examined the effect of the quantity and quality of education on economic growth. The results of this study showed that education quantity when measured by enrolment ratios, unambiguously influences economic growth. Chandra (2011) determined the causal relationship between education spending and economic growth in India. The findings indicated that economic growth affects the level of government spending on education irrespective of any lag effects, but investments in education also tend to influence economic growth after some time-lag. Loening *et al.* (2010) examined the determinants of economic growth in Guatemala, with a particular focus on schooling. The results based on the error-correction methodology showed a better educated labor force has a positive and significant impact on economic growth during 1951-2002. Dracea *et al.* (2010) investigated the impact of education funding over the economic growth in Romania during the interval of time 1991-2009. They showed the doubling of education expenditure volume (an increase of 100%) would imply an increased value of the ratio GDP.

Also, education could be considered as one of the most vital elements in combating poverty. Awan *et al.* (2011) showed educational achievement is negatively related to the poverty incidence in Pakistan. Gyimah-Brempong (2010) investigated the positive and significant effects of education on several development outcomes in African countries. Carmen (2009) indicated the education is highly correlated to economic development and wellbeing in Europe, the United States and Canada. Summing up, the review of literature in this field shows that education can directly participate in production as a productive factor. It promotes the innovation and eases the adaption of new technologies. On the other hand, education can be affected the economic growth indirectly. It increases the labor force productivity. In addition above effects, education decreases the poverty. Therefore, education has multidimensional effect on the economic growth. Accordingly and with respect to the role of education in economic growth, the rest of the study is organized as follows: after the introduction, section 2 introduces the method of this study to determine the development

degree of counties of Esfahan. The variables and research methodology are presented in section 2. The major findings are presented in section 3. Section 4 concludes.

2. METHODOLOGY

As previously mentioned, the main purpose of this study is to investigate the development degree of Esfahan counties subject to some educational factors. Therefore, one of the main questions in this study are which factors can be used in order to rank the counties of Esfahan and how Esfahan counties can be classified in terms of these characteristics. There are various factors to evaluate the educational status but, in this study, 37 educational indices are used to rank and determine development degree of counties of Esfahan in term of educational status. These indices are selected according to data availability. It should be noted that the data that used in this study have been collected by the Statistics Centre of Iran (SCI) during 2007-2010. The selected educational factors are presented in table 1.

Table-1. Key Educational Determinants and Factors for ranking Esfahan's Counties

Order	Educational Indices
1,2	The ratio of classes and schools to special course students number
3,4	The ratio of Teaching and clerical staff employees to special course students number
5,6	The ratio of classes and schools to pre-primary education course students number
7,8	The ratio of teaching and clerical staff employees to pre-primary education course students
9,10	The ratio classes and schools to primary education course students number
11,12	The ratio of teaching and clerical staff employees to primary education course students
13,14	The ratio of classes and schools to lower secondary education course students
15,16	The ratio of teaching and clerical staff employees to lower secondary education course students
17,18	The ratio of classes and schools to upper secondary education course students
19,20	The ratio of teaching and clerical staff employees to upper secondary education course students
21,22	The ratio of classes and schools to pre-university education course students
23,24	The ratio of classes and schools to evening general education course students
25,26	The ratio of classes and schools to evening complementary education course students
27,28	The ratio of classes and schools to evening pre-university education course students
29,30	The ratio of classes to literacy movement preliminary course students in urban and rural areas
31,32	The ratio of classes to literacy movement complementary course students in urban and rural areas
33,34	The ratio of classes to literacy movement final course students in urban and rural areas
35,36	The ratio of centres and teachers to technical and vocational training organization trainees
37	The ratio of distance learning centres to students number

It should be noted that Formal education in Iran is divided into general and higher education: General education, including primary, lower secondary, upper secondary and technical and vocational training, is under supervision of the Ministry of Education. Primary education course is first education period which begins at the age of 6. Students that pass the 5- year primary education may enroll in lower secondary schools. Lower secondary education is a three-year course during

which students are instructed in different courses in addition to prerequisite courses of the upper secondary education. Upper secondary education is established in academic year 1993-1994, the new system gradually replaced the old one. The new system lasts three years whose first year (first and second term) is general for all fields of study. In the second year (the third term) the students are divided into one of the fields of theoretical (mathematics and physics, empirical sciences, and humanities), technical and vocational, and work and knowledge courses. Pre-university education is a one-year course after completing the upper secondary course. Evening general education (for adults) is the educational level of this course corresponds with the ordinary lower secondary course and lasts 3 years. Evening complementary education (for adults) is education in this course is similar to general or technical and vocational upper secondary education and lasts 4 years. Also Special Education is education curse for children and teenagers who are unruly, physically or mentally retarded, and /or suffers from learning disabilities and illness. It encompasses pre-school, primary, lower secondary, upper secondary and technical and vocational training courses.

However, the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) is used to rank intended counties. The TOPSIS is a multi-criteria decision analysis method, which was originally developed by Hwang and Yoon (1981) with further developments by Yoon (1987) and Hwang *et al.* (1993). The TOPSIS is based on the concept that the chosen alternative should have the shortest geometric distance from the positive ideal solution and the longest geometric distance from the negative ideal solution. The TOPSIS process is carried out as follows:

Step 1 Create an evaluation matrix: this matrix consist of m alternatives and n criteria, with the intersection of each alternative and criteria given as x_{ij}. Accordingly, in this study the matrix $(x_{ij})_{m\times n}$ is formed for 23 counties and 37 indices to rank them.

Step 2 The matrix $(x_{ij})_{m\times n}$ is then normalized to form the matrix $R=(r_{ij})_{m\times n}$, using the normalization method. $r_{ij}= x_{ij}/ \text{pmax}(v_j)$, i= 1, 2, …, m, j= 1, 2, … , n. where is $\text{pmax}(v_j)$ the maximum possible value of the indicator v_j. In the other word, r_{ij} can be calculated using vector normalization as following formula:

$$r_{ij}=\frac{xij}{\sqrt{\sum_{i=1}^{m} xij^2}} \quad , i= 1, 2, \ldots,m, j = 1, 2, \ldots,n \qquad (1)$$

Step 3 Calculate the weighted normalized decision matrix as below:

$$T= (t_{ij})_{m\times n} = (w_j r_{ij})_{m\times n} , i= 1, 2, \ldots,m \qquad (2)$$

Where,

$$w_{ij}= W_j/\sum_{j=1}^{n} W_j \quad , j= 1, 2, \ldots , n \qquad , \sum_{j=1}^{n} w_j = 1 \qquad (3)$$

Wj = the original weight given to the indicator vj, j= 1, 2, … , n.

Step 4 Determine the worst alternative (A_w) and the best alternative (A_b):

$$A_w= \{(\max (t_{ij}|i= 1, 2,\ldots, m)|j\epsilon J_-), (=\{(\min (t_{ij}|i= 1, 2,\ldots,m)|j\epsilon J_+) \equiv \{t_{wj}| j=1, 2,\ldots,n\} \qquad (4)$$

$$A_b= \{(\min (t_{ij}|i= 1, 2,\ldots, m)|j\epsilon J_-), (=\{(\text{man} (t_{ij}|i= 1, 2,\ldots,m)|j\epsilon J_+) \equiv \{t_{bj}| j=1, 2,\ldots,n\} \qquad (5)$$

Where,

J+ = {j= 1, 2, …, n| j Associated with the criteria having a positive impact} and,

J- = {j= 1, 2, …, n| j Associated with the criteria having a negative impact}

Step 5 Calculate the L2-distance between the target alternative i and the worst condition A_w as bellow:

$$d_{iw}= \sqrt{\sum_{j=1}^{n}(t_{ij} - t_{wj})^2} \quad (6)$$

Also, the distance between the alternative i and the best condition A_b is equal:

$$d_{ib}= \sqrt{\sum_{j=1}^{n}(t_{ij} - t_{bj})^2} \quad (7)$$

Where,

d_{iw} and d_{ib} = L2-norm distances from the target alternative i to the worst and best conditions, respectively.

Step 6 Calculate the similarity to the best condition:

$S_{ib}= d_{iw}/(d_{ib} + d_{iw})$, j= 1, 2, … , n $\quad 0 \leq S_{ib} \leq 1$ (8)

S_{ib}= 1 if and only if the alternative solution has the best condition; and

S_{ib}= 0 if and only if the alternative solution has the worst condition

Therefore, amount of S_{ib} will be closer to one for any alternative A_i that is closer to the ideal solution.

Step 7 Rank the alternatives according to S_{ib}: Ranking alternatives is done in this step and it is possible to rank the existing alternatives based on the highest importance according to descending order Ketabi *et al.* (2012).

3. FINDING AND DISCUSSION

In this section, the development degree of counties of Esfahan province is indicated using TOPSIS method during 2007-2010.

The results are presented in table 2. As can be seen, Aran & Bidgol county is located in sixth place in 2007 and at the end of the year 2010 has located in the same place. The best rating of this town is the second rank in 2009. The Ardestan rank position has fluctuated during the period under review. Also, the development degree of Barkhar been falling consistently and its position has changed from fifteenth in 2007 to the twenty-third position in 2010. Although, Chadegan has located in fifth in 2009 and this is the best rank for this county during the period 2007-2010, but, overall its rank has declined in 2010.

Although, Esfahan is considered as centre of Esfahan province but, its development degree has changed a little during the intended period so that its position has enhanced to fourteenth at the end of the period. Although, the degree of development of Falavarjan has increased to fourth in 2009, however, its rank has fallen in 2010 significantly. Faridan County has located in the first place in 2007 and 2009 and its development degree has always been in good condition. Although, Fereydounshahr has located in eighth place at the beginning of the period but, its development degree has increased so that this county has located in second place in the end of period. Conversely, Golpayegan had fourth rank in 2007 but its development degree has declined over the study period. Kashan had eighteenth rank in 2007 but its rank has increased to second in 2008 and this is the best place during the 2007-2010, but then it reduced to the nineteenth in 2010. Khansar has located in the second place at the beginning of the studied period but, its situation has decreased continuously. The best situation of KhomeiniShahr is related to 2008, but it decreased to the twenty-second at the end of period. However, khor and Biabanak is placed in the first place in

the same year. The development degree of Lenjan in terms of education indices has always declined during the study period and its educational condition is worse generally. Also, the situation of Mobarakeh in terms of educational status is very low. Naein had not a good educational situation during the period 2007-2010 in comparison to other areas and its lowest development degree is related to 2009. But, the status of Najafabad has improved during the period under review and the best ranking of this County is fifth in 2007. On the other hand, Natanz had relatively good level of development in the early of period but its development level has reduced gradually. The educational situation of Semirom has fluctuated during the studied period so that this county had fifth rank in 2007, but its position has gradually declined to the eighteenth in 2009 and then has enhanced to eighth in 2010. Despite, Shahinshahr and Maimeh has located in twenty-first rank at the beginning of intended period but its development degree has increased continuously so that this county has located in third place in 2010. On the contrary, Shahreza in the early of the studied period had high development degree, but then its rank has declined in the end of the period. Also, Tiran and keron had the first rank in 2008 but, its development degree has reduced in the end of the period.

Table-2. Ranking Esfahan Counties in terms of educational indices using TOPSIS method during 2007-2010

Year	2007		2008		2009		2010	
County	**S_{ib}**	**Rank**	**S_{ib}**	**Rank**	**S_{ib}**	**Rank**	**S_{ib}**	**Rank**
Aran & Bidgol	0.3589	6	0.3083	9	0.4297	2	0.365	6
Ardestan	0.3254	14	0.3052	10	0.2614	14	0.344	10
Barkhar	0.3217	15	0.1945	22	0.2446	17	0.173	23
Chadegan	0.3538	7	0.2896	13	0.3245	5	0.301	12
Dehaghan	-	-	0.3252	7	0.2807	11	0.358	7
Esfahan	0.2857	19	0.267	15	0.2293	20	0.29	14
Falavarjan	0.3279	13	0.3363	5	0.337	4	0.294	13
Faridan	0.4907	1	0.3473	4	0.435	1	0.37	4
Fereidownshahr	0.3524	8	0.3553	3	0.4057	3	0.39	2
Golpayegan	0.3856	4	0.2629	17	0.2728	12	0.351	9
Kashan	0.3052	18	0.3656	2	0.3083	9	0.234	19
Khansar	0.4818	2	0.2654	16	0.3147	7	0.303	11
Khomeinishahr	0.2829	20	0.3296	6	0.248	16	0.204	22
khoor and Biabanak	-	-	-	-	0.3027	10	0.405	1
Lenjan	0.319	16	0.2915	11	0.2673	13	0.241	18
Mobarakeh	0.3079	17	0.2251	20	0.1823	23	0.277	15
Naein	0.3418	11	0.2593	18	0.2042	22	0.259	17
Najafabad	0.3507	10	0.3099	8	0.3094	8	0.365	5
Natanz	0.3514	9	0.2319	19	0.2064	21	0.22	20
Semirom	0.3757	5	0.2911	12	0.2421	18	0.358	8
Shahinshahr&Maimeh	0.2376	21	0.2808	14	0.3212	6	0.374	3
Shahreza	0.4299	3	0.225	21	0.2341	19	0.218	21
Tiran and keron	0.3402	12	0.4371	1	0.2502	15	0.264	16

Source: authors' findings

4. CONCLUSIONS

As mentioned before, education plays a key role in economics growth. It increases the productivity of workers and employees and raises the quality of jobs in the economy. On the other

hand education reduces poverty and inequality. Therefore, determining the educational status of areas is important in order to efficient allocate of educational facilities. Accordingly, the development degree of Esfahan Counties is determined in terms of educational indices during 2007-2010. Based on the results of this study, the counties could be divided into three main groups. The first group is included the counties that their ranking have improved over the intended period Such as, Fereidownshahr, Najafabad, Shahinshahr and Maimeh khor and Biabanak. The second group is related to the counties that had higher development degree at the beginning of intended period but gradually lost their positions included Barkhar, Khansar, Shahreza and Natanz. Other counties are considered in the third group that their development degrees have fluctuated considerably during intended period. Although, Khansar County was in the second ranking in 2007, but its development degree has declined so that it has placed in eleventh place at the end of studied period. Shahreza has ranked in third in 2007, but its development degree has reduced extremely. Also, Tiran and keron had the best development degree in 2008, but the education status of this county has worse in other years. Kashan ranking was eighteenth in the beginning of period but it has ranked second place in 2008 and then its development degree has reduced significantly. Aran and Bidgol also ranked second in 2009 but its ranking has fluctuated considerably. Shahinshahr & Maimeh which located in the third rank at the end of period but this county had the lowest situation in 2007. Summing up, the educational development degrees of Counties of Esfahan province have fluctuated significantly. This indicates that there is instability in the management of educational facilities in Esfahan province.

5. ACKNOWLEDGEMENT

I would like to appreciate from Payame Noor University in order to support us by Grant.

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