Analysis and criticism on determination of key sectors in regional input-output table generated by location quotient method (The Case study: Yazd Province)

Abstract:

Generating regional input-output tables from non-survey methods is considered by the regional issues analysts. One of the most important non-surveying methods is location quotient technique .

The mentioned technique can be adjusted the National technical coefficients so that as part of its business and the other coefficients is considered as regional import coefficients.

The obtained tables from kinds of cross industry location quotients (Including the AFLQ) have a main criticism that the so weak sectors in terms of output share and SLQ size, put unreal in high ranking from the viewpoint of output multiplier and Backward Linkage (Rasmussen method).

In this paper we determine the key sector of Yazd Province in attention to the considered problem and its solution; at first the Transactions coefficients table of Yazd Generate from Iranian Input-output table in 2006 by AFLQ technique. Then a reasonable adjustment will be done in column of the weak sectors (the sectors with SLQ lower than 0.2 averages (SLQi)) by multiplication the AFLQ column of this sectors to their SLQ amount (for sector j, AFLQij =AFLQij*SLQj).

Also with examination of different criteria, four criteria, including Backward and Forward Linkages based on Rasmussen method adjustment relation to standard deviation (BLj/BS, FLi/FS) and input-output elasticities of output and employment selected for determination of Yazd key sectors by MRI method.

On the basis of results, the following sections selected as key sector at Yazd Province; agriculture and horticulture, other mines, producing food products, textiles and clothing, manufacturing other non-metallic mineral products, manufacturing basic metals, Construction, wholesale and retail (Trade), road transportation, education and other services.

The results are agreeable and logical according to regional circumstances and conditions.

Key Words: Regional Input Output Table, Location Quotients, key sectors, Yazd Province.

1. Introduction

Using from input-output model in analysis of regional economic structure is one of the best choices. A regional input-output model traces the interactions of local industries with each other, with industries outside the region, and with final demand sectors (Schaffer, 1999).

Regional input-output tables can be generated by statistical (full surveying) and non-statistical (non-surveying) methods. Each of these methods has its own advantages and disadvantages. Disadvantages of statistical limitations, time and high expenses have led that regional input-output models are today generated by estimation techniques, traditionally called non-surveying techniques, using national input-output tables.

Among non-surveying methods for generating regional tables, location quotients, supply-demand pool, crosscut for estimating output coefficients, RAS and Generation of Regional Input – Output Table (GRIT) can be mentioned. This article will focus on the methods of location quotients and the challenges associated with its results.

Although some researchers such as Miller and Robinson, and Mc Can and Dewhurst have criticized the results of location quotients methods (Miller and Robinson, 1988; Mc Can and Dewhurst,1998); on the other hand, these methods have some drawbacks, including having equal consumption functions, production methods and industries combinations in all regions and also complete self-sufficiency, because of their least requirement for statistical data in the region and also rather proper estimation for regional coefficients they have high attractiveness for regional analysis.
Whereas the obtained tables from Kinds of cross industry location quotients have a main criticism that the so weak sectors in terms of output share and SLQ size, put unreal in high ranking from the viewpoint of multiplier output and Backward Linkage (Rasmussen method).
In this paper we determine the key sector of Yazd Province in attention to the considered problem and its solution; at first the Transactions coefficients table of Yazd Generate from Iranian Input-output table in 2006 by AFLQ technique. Then a reasonable adjustment will be done in column of the weak sectors.
In next section, In order to determine the key sectors, with examination of different criteria, appropriate indicators are selected. Then key sectors of Yazd are determinate by Multi-rank index (MRI) method.

2. Reviewing methods of location quotients and generating regional tables

Location quotients expressed on the concept of region share show the professional position of various economic sections in a region compared with the country. If the location quotients, obtained for a section or activity in the region, are larger than one or equal to it, the region is self-sufficient for that activity or has a relative advantage, thus, during these circumstances, the regional technical coefficients are considered as national technical coefficients. But, if location quotients for a regional activity or economic section are smaller than one, then it can be said that the region doesn't have a relative advantage for that activity and has to import a part of products for that activity from other regions.
There are various location quotients, but in the present paper, four kinds including simple location quotient (SLQ), cross industry location quotient (CILQ), Flegg location quotient (FLQ) and the (AFLQ) method are studied using the statistics for added value. The reasons for using value added statistics and its preference to employment and production statistics is that firstly; this statistics is more reliable than estimation statistics for sections employment. Secondly, it also includes the production efficiency. The above location quotients are calculated as follows:

2-1- Simple location quotient

$$SLQ_i = (\frac{V_i^R}{V^R}) \Big/ (\frac{V_i^N}{V^N})$$

V_i^R: Added value for ith section of the province; V^R: Total added value for the province; V_i^N: Added value for ith section of the country; V^N: Total added value for the country
In this method, if $SLQ_i < 1$, then $a_{ij}^r = a_{ij}^n \times SLQ_i$ and if $SLQ_i >= 1$, then $a_{ij}^r = a_{ij}^n$. Then, the difference between the matrix for direct national coefficients and direct regional

coefficients is considered as the matrix for imports coefficients; the row of regional intermediate imports coefficients is obtained by column adding the elements of mentioned matrix.

Some researchers such as Miller and Blair have concluded that rather better results are obtained by simple location quotients, applying a number of non-surveying methods including some location quotients (Miller and Blair, 1985). But, the fact is that simple location quotients consider only the size of purchaser section for determining the size of regional imports and represent the differences between national and regional coefficients totally.

2-2- Cross industry location quotient

$$CILQ_{ij} = \frac{SLQ_i}{SLQ_j} = \left(\frac{V_i^R}{V_i^N}\right) \Big/ \left(\frac{V_j^R}{V_j^N}\right)$$

CILQij indicates the proportion between the regional value added share of section i and the regional value added share of section j compared with similar national values. In this method, proportions are used for adjustment national input coefficients cell by cell to extract the regional input coefficients. Thus, if $CILQ_{ij} < 1$, then $a_{ij}^r = a_{ij}^n \times CILQ_{ij}$ and hence, $m_{ij}^r = a_{ij}^n - a_{ij}^r$. If $CILQ_{ij} >= 1$, then $a_{ij}^r = a_{ij}^n$ and $m_{ij}^r = 0$ (m_{ij}^r is intermediate imports coefficients).

According to the results of Miller and Blair research (1985), cross industry location quotients may lead to overestimate the intermediate transactions in some sections.

2-3- Flegg location quotient

In SLQi and CILQij, the size of region usually doesn't play any role in adjustment national coefficients into regional coefficients[1]. In that case, Flegg and Webber following Round provided some versions of location quotients in which the size of region has been considered (Flegg and Webber, 1997; Round, 1978). Flegg method is provided as follows:

$$FLQ_{ij} = CILQ_{ij} \times \lambda^*, \quad \lambda^* = [LOg_2(1 + \frac{V^R}{V^N})]^{\sigma}, \quad 0 \le \sigma, \lambda^* \le 1$$

In this method, λ^* has been considered as a adjustment coefficient for the size of region. National coefficients are also modified as $a_{ij}^r = a_{ij}^n \times FLQ_{ij}$ and the coefficients for intermediate imports are also calculated by $m_{ij}^r = a_{ij}^n - a_{ij}^r$. If $FLQ_{ij} >= 1$, then $a_{ij}^r = a_{ij}^n$.

In this relation, $\sigma = 0.3$ is usually considered (Flegg and Webber, 2000).

2-4- Adjustment Flegg location quotient (AFLQ)

A possible shortcoming of the FLQ formula was highlighted by McCann and Dewhurst, 1998, who argued that regional specialization may cause a rise in the magnitude of regional Input coefficients, possibly causing them to surpass the

[1] Round (1978), suggests that any given regional trading coefficient is likely to be function of: (1)relative size of supplying sector, (2) relative size of purchasing sector and (3) relative size of region.

corresponding national coefficients. In response to this criticism, Flegg and Webber, reformulating their formula by adding a specialization term.

$$AFLQ_{ij} = CILQ_{ij} \times \lambda^* \times Log_2(1 + SLQ_j)$$

Where the specialization term is applied only when SLQj >1 (Flegg and Tohmo, 2008). So if SLQj >1 then it is possible for sector that regional coefficients are more than the same ones in national levels. In this method, regional coefficients obtained from $a_{ij}^r = a_{ij}^n \times AFLQ_{ij}$.

3. Methodology

It seems AFLQ technique is the most agreeable method for generate regional coefficients from national ones in attention to advantages and disadvantages of kinds examined location quotients. In spite of this, the obtained tables from kinds of cross industry location quotients (Including the AFLQ) have a main criticism that the so weak sectors in terms of output share and SLQ size, put unreal in high ranking from the viewpoint of multiplier output and Backward Linkage (Rasmussen method).

In this paper that the key sector of Yazd Province are determine in attention to the mentioned problem and its solution, the process will be organized in several steps. At first step, the transactions coefficients table of Yazd generate from Iranian Input-output table in 2006 by AFLQ technique. In next step, a reasonable adjustment will be done in column of the weak sector (the sectors with SLQ lower than definite limit). the limitation obtained from equation 0.2 averages (SLQi) that it seems can be proper instrument for determination of weak sectors. Then the location quotient column of weak sectors is multiplied to their SLQ amount. In other worlds, for weak sectors: AFLQij =AFLQij*SLQj. This action causes available amounts in column of the weak sector will be adjusted whereas they were big unreal because of their tiny share from their national amount before the adjustment.

In third step, the characters of each criteria for key sector determination are examined and then best criteria is selected in regard to regional transaction table obtained from AFLQ method.

In final step, the key sectors of Yazd are determined by selected criteria and Multi – Rank Index (MRI) method. a Brief explanation will be presented for criteria and MRI in the following section.

3-1- output and Employment multipliers

One of the advantages of input – output table can be examined the effects of changes in final demand in one sector on economy as whole. Output and Employment multipliers are tools to do this. Multipliers can be obtained using Leontief inverse matrix.

The elements of the inverse are relabeled as partial output multipliers. Thus the sums of these columns are output multipliers:

$$QMULT_J = \sum_i r_{ij}$$

Where i counts through the number of industries and r_{ij} is the ij'th element of Leontief inverse matrix. Output multiplier refers to the total rand value of new sales resulting in the economy motivated by one rand in direct new sales in a given sector.

Employment multipliers were developed by Moore and Petersen at the same time as an analogous to their income multipliers. They estimated a set of aggregated employment production relationships and used the coefficients showing change in employment per change in output, transforming the multiplier from dollar terms into employment terms.

Employment multiplier shows the effect of Changes in final demand on employment amount. Total employment multipliers for an industry, are produced by multiplying the row vector of direct employment multipliers (which are the employment/output ratios) by the appropriate column vector in the inverse matrix:

$$EMULT_J = \sum_i (l_i / x_i).r_{ij}$$

Employment multiplier measures the total change in employment that results from an initial change in direct employment to change in sales to a particular final demand sector (Argyrios and others, 2008; Schaffer, 1999).

3-2- Backward and Forward Linkage

Backward and Forward Linkages are one of the most important tools to analyze the economic structure and identify the key sector in the economic system. Activities and industries with highest linkages are considered key sectors, because by focus on production resources, it is prepared more incentives for faster output growth, employment and income in comparison with other types of resource allocation (Esfandiari, 1999).

One of the important methods in the evolution of Backward and Forward Linkages is Rasmussen method. Rasmussen method is based on the column (or row) sums of the Leontief inverse to measure intersectoral linkages.

The backward linkage is defined as the column sums of the inverse matrix (power of dispersion index):

$$BL_j = \frac{\frac{1}{n}\sum_{i=1}^{n} r_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}} = \frac{n\sum_{i=1}^{n} r_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}}$$

This index describes how an increase in final demand for a sector is dispersed throughout the entire economy.

Forward linkage is also defined as the row sums of the Leontief inverse matrix (sensitivity of dispersion index):

$$FL_i = \frac{\frac{1}{n}\sum_{j=1}^{n} r_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}} = \frac{n\sum_{j=1}^{n} r_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{n} r_{ij}}$$

This index expresses the increase in the output of an industry following an increase in the final demand for one or other industries in the system.

It is possible a sector with high BL_j and FL_i amount has weak relation with other sectors; therefore it is necessary the considered indices be accompanied with their variation coefficients. Accordingly, the coefficients to be introduced from the invers matrix so:

$$BL_{vj} = \sqrt{\frac{\frac{1}{n-1}\sum_{i=1}^{n}(r_{ij} - \frac{1}{n}\sum_{i=1}^{n} r_{ij})^2}{\frac{1}{n}\sum_{i=1}^{n} r_{ij}}} \quad , \quad FL_{vi} = \sqrt{\frac{\frac{1}{n-1}\sum_{j=1}^{n}(r_{ij} - \frac{1}{n}\sum_{j=1}^{n} r_{ij})^2}{\frac{1}{n}\sum_{j=1}^{n} r_{ij}}}$$

Now, backward variation index ($BS_j = \frac{BL_{vj}}{\overline{\overline{BL}}}$) and forward variation index ($FS_i = \frac{FL_{vi}}{\overline{\overline{FL}}}$) is calculated (the indices divided by their average). It seems the low values of BS and FS is necessary for BL_j and FL_i. If the values of both backward and forward linkages of sectors are above the unit and also having BS and FS smaller relativity, these sectors are called as key sectors (Jahangard, 1999; Kweka and other, 2001; KULA, 2008; dehghanizadeh, 2011).

One of the problems when using these methods is that there is not a general criterion for final sectors priority based on the results of linkages. But it seems that in attention to the nature and definition of BL_j and FL_i and their related variation, it can be used from BLj/BS and FLi/FS proportion for ranking of sectors (Dehghanizadeh and Khoshakhlagh, 2008).

3-3- Elasticity's input - output

The input-output elasticity approach proposed by Mattas and Shrestha (1991) provided a new insight for the determination of sectoral priorities. Elasticity's indicators are attempted to regard the relative magnitude of a sector (in terms of total sales to final demand) as an important factor in the assessment process of the developmental importance of this sector.

Mattas and Shrestha claimed that their approach was better than linkages analysis and multipliers analysis because it took into account the sectors' share of the output.

input-output elasticity can be definite as, the gradual changes on the gross output, total income and total employment magnitudes of an economy, respectively, due to a one percent change in sales to final demand of a sector j. A summary of the formulas of the elasticity follows:

$$OE_j = \sum_{i=1}^{n} r_{ij}(\frac{F_j}{X}) = OM_j(\frac{F_j}{X})$$

$$EE_j = [\frac{\sum_{i=1}^{n}(\frac{L_i}{X_j})r_{ij}}{(\frac{L_j}{X_j})}][\frac{F_j}{X}]$$

In which, OM j: Type I output multiplier, X: total gross output of the economy as a whole and L_i: employment amount of sector i. also based on elasticity concepts in microeconomics, the following equation can be considered to calculated the employment elasticity.

$$EE_{XF_j} = \sum_{i=1}^{n} l_{ij}(\frac{F_j}{L})$$

In which, L: total employment and l_{ij} : elements of employment matrix.

Based on this method, the sectors having higher elasticity will be have the higher priority (Imansyah and Others, 2000; Argyrios and others, 2008).

3-4- Determinate of key sectors

Determination of key sectors is important for a developing country where, given scarcity of resources, investment decisions have to be selective. Key sectors play an important role in initiating the process of economic growth and diversification of the industrial structure of the economy.

Evaluation of key sectors leads to different result in condition of different ways and according to specific definitions. As all sectors in the economy are important in one way or another, identification of key sectors may only be justifiable on ordinal terms. That is, some sectors are key relative to others. So it may be difficult to choose key sectors. Thus it seems necessary that there is a method could be identified key sectors in a fairly comprehensive manner and with regard to different result from different aspects. The Multi-rank index is one of the ways that can be used in this field.

In this method, at first all indices for ranking sectors (such as backward linkage, forward linkage and etc) are considered. Then a statistical sample is made by S=n*p, that p is number of used indices and n is number of key sectors (for example the first ten sectors). Then the frequency with which each of the sectors appears in S is determined. Thus, the higher the frequency of a sector in S, the more it is likely to be identified as key. Finally, the cut-off point between key and non-key sectors is established. The most convenient way to determine the cut-off point in S is to calculate the simple average frequency so that if a sector has above average frequency it is considered key (Kweka and Other, 2001).

4. Data and information resources

In order to achieve the research objectives, the Iranian input – output table in 2006 that is the newest is used. To extract Yazd regional coefficients from the above table, we tried to avoid sections aggregation in order that estimations to be more accurate, but for some limitations including that some sectors are inactive in the province and the lack of production statistics for some sectors in the region, finally, a table with 38 sectors, conformed to ISIC codes, was extracted through aggregating the sectors of above table. Selected economic sectors are as follows:

1- agriculture and horticulture 2- animal husbandry, aviculture and … 3- forestry 4- fishing 5- other mines 6- producing food products 7- textiles and clothing 8- manufacturing wood and wooden products 9- manufacturing paper and paper products 10- manufacturing coke, products from oil 11- manufacturing chemical materials and products 12- manufacturing rubber and plastic products 13- manufacturing other non-metallic mineral products 14- manufacturing basic metals 15- manufacturing fabric metallic products 16- manufacturing machinery and equipments not being classified in another category 17- manufacturing electrical machinery 18- manufacturing radio and television, communication machines and devices 19- manufacturing medical tools, optic tools, instruments and clock 20- manufacturing motor vehicles, trailer ,semi-trailer and other transportation equipments 21- manufacturing furniture and artifacts not being classified in another category 22- electricity 23- natural gas distribution 24-

water 25- Construction 26- wholesale and retail 27- hotel and restaurant 28- railway 29- road transportation 30- piping transportation 31- air transportation 32- supporting and storekeeping 33- post and telecommunication 34- banking, other financial activities and insurance 35- real estate services 36- public services 37- education services 38- other services (business services, health and treatment, recreational, cultural and sporting, religious and political and other services).

In the present research, the statistics for gross output and added value of different sections has been extracted from the produced regional accounts by Iran Statistics Center. Employment figures for economic sectors are obtained from the Yazd Province Statistics Bureau.

5. Results evaluation

The content expressed in previous sections, AFLQ location quotient was considered for extraction of the transaction coefficients table of Yazd Province. The mentioned technique, estimates coefficients related to the strong sectors (in terms of output share or the size of SLQ) well but does not provide a good estimate for weak sectors. As evident from table 1, the sectors 4, 10,11, 18 and 20 have been larger than 1 in terms of proportion BLj/BS and put them in high ranking in despite of having a very small share of value added of province and low SLQ too. Also the mentioned sectors are in high ranking in terms of output multiplier. This condition causes the sectors will be key ones unrealistic (of the demand side).

According the research model in order to solve the above problem, amount of AFLQij for weak sectors have been adjusted in columnar manner based on this equation: AFLQij =AFLQij*SLQj and therefore great amount of the columns are significantly reduced. The results of these adjustments are presented in table 2, reflects the fact that the coefficients and rankings of very weak sectors have been reconstruction efficiently. For example, as the backward linkage, 4 sectors from very weak 5 ones have been faced to reducing index to lower than 1 and as a result they have been removed from key sectors in demand side.

After adjustment AFLQ amount of weak sectors, the next step of research is devoted to assessing the criteria associated with the determination of key industries.

In the third section, the criteria (output and employment multiplier, the backward and forward linkages and also employment and output elasticity's) were introduced as conventional methods for determination of key sectors.

Although each method has advantages and special features but it seems necessary that appropriate criteria should be selected based on thorough assessments in attention to nature of regional transaction coefficients table extraction from location quotient method (considering above problem specially).

Table 1: the situation and sectors ranking of Yazd province according AFLQ method

Sector	% of value added	SLQ	Rank of SLQ	OMj	Rank of OMj	EMj	Rank of EMj	BLj/BS	Rank of BLj/BS	FLi/FS	Rank of FLi/FS	OEj	Rank of OEj	EEj	Rank of EEj
1	7.30	1.14	17	1.03	32	0.010	8	0.883	29	0.917	18	0.06	6	0.09	4
2	2.85	1.26	13	1.07	19	0.007	21	0.922	23	0.925	16	0.04	12	0.04	10
3	0.15	1.14	16	1.04	29	0.007	19	0.894	27	0.885	24	0.00	33	0.00	32
4	0.02	0.12	36	1.35	3	0.005	25	1.330	3	0.844	38	0.00	38	0.00	38
5	8.79	12.70	2	1.02	37	0.003	35	0.861	38	1.599	3	0.07	3	0.03	12
6	1.58	0.96	21	1.12	11	0.004	28	0.995	11	0.912	19	0.04	9	0.03	11
7	3.50	3.75	5	1.06	24	0.013	5	0.895	26	0.920	17	0.05	7	0.09	3
8	0.09	0.49	31	1.11	13	0.029	1	0.959	14	0.872	26	0.00	34	0.00	28
9	0.13	0.71	27	1.10	14	0.011	6	0.936	16	0.905	22	0.00	29	0.00	30
10	0.04	0.03	38	1.96	1	0.006	23	2.297	1	0.851	35	0.00	32	0.00	34
11	0.48	0.32	35	1.23	5	0.003	34	1.109	5	1.052	13	0.02	16	0.01	21
12	0.62	1.83	7	1.08	16	0.004	29	0.940	15	1.143	8	0.01	20	0.01	19
13	5.89	5.30	3	1.12	12	0.005	27	0.980	12	1.203	4	0.07	4	0.04	9
14	2.66	1.47	10	1.28	4	0.003	31	1.136	4	1.927	1	0.04	13	0.02	14
15	0.81	1.14	15	1.12	10	0.009	12	1.004	10	0.904	23	0.02	17	0.02	13
16	0.43	0.62	29	1.19	7	0.006	24	1.094	6	0.941	15	0.01	23	0.01	23
17	1.57	4.64	4	1.07	23	0.002	36	0.925	22	0.868	27	0.04	14	0.01	17
18	0.02	0.35	34	1.21	6	0.008	14	1.077	7	0.862	30	0.00	36	0.00	35
19	0.06	1.11	18	1.10	15	0.009	11	0.968	13	0.847	37	0.00	35	0.00	33
20	0.17	0.10	37	1.84	2	0.008	13	1.996	2	0.856	33	0.01	26	0.00	29
21	0.42	1.06	19	1.18	8	0.013	4	1.075	8	0.852	34	0.01	25	0.01	16
22	1.23	1.22	14	1.04	28	0.003	32	0.880	31	1.077	9	0.01	21	0.00	25
23	0.46	0.40	33	1.07	21	0.005	26	0.928	19	0.863	29	0.00	28	0.00	31
24	0.33	1.65	8	1.07	18	0.007	16	0.928	21	0.860	31	0.00	27	0.00	26
25	10.94	2.24	6	1.14	9	0.007	18	1.006	9	1.054	12	0.16	1	0.15	1
26	11.36	0.86	25	1.03	33	0.010	9	0.883	30	1.776	2	0.07	2	0.10	2
27	0.76	0.98	20	1.07	20	0.007	20	0.934	18	1.066	10	0.01	22	0.01	20
28	1.66	13.08	1	1.04	30	0.003	33	0.871	35	0.945	14	0.01	19	0.01	22
29	5.91	1.28	12	1.03	35	0.010	10	0.876	33	1.163	6	0.04	11	0.06	8
30	0.05	0.52	30	1.04	27	0.004	30	0.899	25	0.858	32	0.00	37	0.00	37
31	0.11	0.77	26	1.07	17	0.001	37	0.935	17	0.849	36	0.00	30	0.00	36
32	0.27	0.47	32	1.07	22	0.014	3	0.928	20	0.864	28	0.00	31	0.00	27
33	1.06	0.93	22	1.05	26	0.007	17	0.874	34	0.905	21	0.01	24	0.01	18
34	2.48	0.90	23	1.03	36	0.006	22	0.870	36	1.162	7	0.02	18	0.02	15
35	6.21	0.65	28	1.06	25	0.001	38	0.915	24	0.877	25	0.05	8	0.01	24
36	4.77	0.89	24	1.03	31	0.017	2	0.887	28	0.911	20	0.04	15	0.09	5
37	6.98	1.48	9	1.01	38	0.010	7	0.862	37	1.056	11	0.04	10	0.07	7
38	7.83	1.30	11	1.03	34	0.007	15	0.878	32	1.185	5	0.06	5	0.07	6

Note: Output multiplier (OMj); employment multiplier (EMj); Output elasticity (OEj); employment elasticity (EEj)

The calculation of output multiplier is not justified according to studies of Schaffer (1999) and Bourque and Conway (1977) and so if output multipliers are to have any meaning, they should be based on industrial activity alone.

On this basis and considering the results of output multiplier (table1) which is somewhat modified in table 2, therefore we disregard output multiplier criterion.

Employment coefficient is derived from production coefficient is removed also from criterion collection due to problems related to output multiplier and possible problems arising from direct employment coefficient of some weak sectors in terms of output share that it lead to growing employment multiplier of the sectors.

Table 2: the situation and sectors ranking of Yazd province according adjustmen AFLQ method

Sector	% of value added	SLQ	Rank of SLQ	OMj	Rank of OMj	EMj	Rank of EMj	BLj/BS	Rank of BLj/BS	FLi/FS	Rank of FLi/FS	OEj	Rank of OEj	EEj	Rank of EEj
1	7.30	1.14	17	1.03	31	0.010	8	0.949	29	0.982	14	0.06	6	0.09	4
2	2.85	1.26	13	1.07	15	0.007	20	0.991	21	0.995	12	0.04	12	0.04	10
3	0.15	1.14	16	1.04	28	0.007	18	0.961	26	0.952	22	0.00	32	0.00	32
4	0.02	0.12	36	1.04	27	0.004	29	0.963	24	0.908	38	0.00	38	0.00	38
5	8.79	12.70	2	1.02	37	0.003	33	0.926	38	1.547	1	0.07	3	0.03	12
6	1.58	0.96	21	1.12	6	0.004	25	1.070	6	0.955	19	0.04	9	0.03	11
7	3.50	3.75	5	1.06	22	0.013	5	0.961	25	0.968	16	0.05	7	0.09	3
8	0.09	0.49	31	1.11	8	0.029	1	1.031	9	0.935	24	0.00	33	0.00	28
9	0.13	0.71	27	1.10	9	0.011	6	1.006	12	0.954	20	0.00	29	0.00	29
10	0.04	0.03	38	1.03	33	0.001	37	0.948	30	0.913	34	0.00	34	0.00	37
11	0.48	0.32	35	1.07	17	0.002	35	0.994	19	0.968	17	0.02	17	0.00	25
12	0.62	1.83	7	1.07	12	0.004	26	1.009	11	1.029	9	0.01	20	0.01	19
13	5.89	5.30	3	1.12	7	0.005	24	1.054	7	1.177	4	0.07	4	0.04	9
14	2.66	1.47	10	1.28	1	0.003	30	1.221	1	1.500	2	0.04	13	0.02	14
15	0.81	1.14	15	1.12	5	0.009	12	1.079	5	0.929	26	0.02	16	0.02	13
16	0.43	0.62	29	1.19	2	0.006	22	1.176	2	0.927	27	0.01	23	0.01	22
17	1.57	4.64	4	1.06	21	0.002	34	0.994	18	0.921	29	0.04	14	0.01	17
18	0.02	0.35	34	1.07	16	0.007	16	0.992	20	0.916	31	0.00	36	0.00	34
19	0.06	1.11	18	1.10	10	0.009	11	1.041	8	0.912	35	0.00	35	0.00	33
20	0.17	0.10	37	1.08	11	0.004	27	1.021	10	0.911	36	0.00	28	0.00	31
21	0.42	1.06	19	1.18	3	0.013	4	1.156	3	0.914	32	0.01	25	0.01	16
22	1.23	1.22	14	1.04	25	0.003	31	0.947	31	0.991	13	0.01	21	0.00	24
23	0.46	0.40	33	1.07	19	0.005	23	0.998	15	0.922	28	0.00	27	0.00	30
24	0.33	1.65	8	1.07	13	0.007	14	0.997	17	0.919	30	0.00	26	0.00	26
25	10.94	2.24	6	1.14	4	0.007	17	1.081	4	1.091	5	0.16	1	0.15	1
26	11.36	0.86	25	1.03	32	0.010	9	0.949	28	1.279	3	0.07	2	0.10	2
27	0.76	0.98	20	1.07	18	0.007	19	1.004	13	1.046	8	0.01	22	0.01	20
28	1.66	13.08	1	1.04	29	0.003	32	0.936	35	0.973	15	0.01	19	0.01	21
29	5.91	1.28	12	1.03	35	0.010	10	0.942	33	1.078	6	0.04	11	0.06	8
30	0.05	0.52	30	1.04	26	0.004	28	0.966	23	0.909	37	0.00	37	0.00	36
31	0.11	0.77	26	1.07	14	0.001	36	1.004	14	0.913	33	0.00	30	0.00	35
32	0.27	0.47	32	1.07	20	0.014	3	0.998	16	0.929	25	0.00	31	0.00	27
33	1.06	0.93	22	1.05	24	0.007	15	0.940	34	0.953	21	0.01	24	0.01	18
34	2.48	0.90	23	1.03	36	0.006	21	0.935	36	1.008	11	0.02	18	0.02	15
35	6.21	0.65	28	1.06	23	0.001	38	0.984	22	0.939	23	0.05	8	0.01	23
36	4.77	0.89	24	1.03	30	0.017	2	0.954	27	0.957	18	0.04	15	0.09	5
37	6.98	1.48	9	1.01	38	0.010	7	0.927	37	1.013	10	0.04	10	0.07	7
38	7.83	1.30	11	1.03	34	0.007	13	0.943	32	1.066	7	0.06	5	0.07	6

For example, sector 8 with 0.11% share of output has 0.028 direct employment coefficients while sector 25 with 14.5 % share of output has 0.006 direct employment

coefficients. It is worth noting that sector 8 is at the first place in terms of employment multiplier in despite of its low number of employment, but sector 25 is in position 18 in despite of it has more than 30 times employment in comparison with sector 8).
Also, the definitions and nature of Elasticity's indicators are in a way that can overcome weaknesses related to employment and output multiplier. These criteria include share of sectors from output and employment and their multiplier simultaneously.
With these qualities, in this study, finally four criteria were considered to determine the key sectors of Yazd province; adjusted backward and forward linkages proportion to related standard deviations and elasticities of output and employment.
The final step is determination of regional key sectors on the basis of MRI method.
In MRI method, the statistical sample were identified as S=n*p=10*4=40. Then the frequency of each sector was calculated in terms of having number of ranks one to ten in criteria and their average total. Frequency of each sector compared with the obtained average clarifies the status of sectors is key ones or not (table 3).

Table 3: key sector of Yazd province using by MRI

sector	frequency	situation	sector	frequency	situation	sector	frequency	situation
1	2	Key	14	2	Key	27	1	-----
2	1	-----	15	1	-----	28	0	-----
3	0	-----	16	1	-----	29	2	Key
4	0	-----	17	0	-----	30	0	-----
5	2	Key	18	0	-----	31	0	-----
6	2	Key	19	1	-----	32	0	-----
7	2	Key	20	1	-----	33	0	-----
8	1	-----	21	1	-----	34	0	-----
9	0	-----	22	0	-----	35	1	-----
10	0	-----	23	0	-----	36	1	-----
11	0	-----	24	0	-----	37	3	Key
12	1	-----	25	4	Key	38	3	Key
13	4	Key	26	3	Key			
total frequency					40			
average					1.82			

Based on the results, the sectors agriculture and horticulture(1), other mines(5), producing food products(6), textiles and clothing(7), manufacturing other non-metallic mineral products(13), manufacturing basic metals(14), Construction(25), wholesale and retail (26), road transportation(29), education(37) and other services(38) Were as key sectors that it seems desirable and logical results according to the circumstances of the studied area and results of other studies.

6. Conclusion

The limitations of surveying methods have caused that regional input-output tables are generated by non-surveying techniques using national input-output tables. In that case, in the present article, common methods including simple location quotient (SLQ), cross industry quotient (CILQ), Flegg location quotient (FLQ) and AFLQ are applied to extract the regional coefficients for Yazd. But The obtained tables from kinds of cross industry location quotients (Including the AFLQ) have a main criticism that the so weak sectors in terms of output share and SLQ size, put unreal in high ranking from the viewpoint of output multiplier and Backward Linkage (Rasmussen method).

In this paper we determine the key sector of Yazd Province in attention to the considered problem and its solution; at first the Transactions coefficients table of Yazd Generate from Iranian Input-output table in 2006 by AFLQ technique. Then a reasonable adjustment will be done in column of the weak sectors (the sectors with SLQ lower than 0.2 averages (SLQi)) by multiplication the AFLQ column of this sectors to their SLQ amount (for sector j, AFLQij =AFLQij*SLQj).

Also with examination of different criteria, four criteria, including Backward and Forward Linkages based on Rasmussen method adjustment relation to standard deviation (BLj/BS, FLi/FS) and input-output elasticities of output and employment selected for determination of Yazd key sectors by MRI method.

On the basis of results, the following sections selected as key sector at Yazd Province; agriculture and horticulture, other mines, producing food products, textiles and clothing, manufacturing other non-metallic mineral products, manufacturing basic metals, Construction, wholesale and retail (Trade), road transportation, education and other services. The results are agreeable and logical according to regional circumstances and conditions.

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