Location, Industry Competition and Profitability

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Abstract

The construction of one or more plants in optimum sites and in the best possible situation, not only improves materials circulation and customer services, but also puts the company in a desirable situation. Decisions associated with the selection and acquisition of features of a center's site selection can have a great impact on the ability to gain and maintain competitive advantages. This study tests the impact of distance from population centers on the profitability for the first time. The sample which has been used in the food products industry, includes 21 firms listed in Tehran Stock Exchange during 2009 to 2014, and panel data regression methods were used to process and test the hypotheses. The results showed that product market competition enhances the negative impact of corporate distance from Tehran and big cities on the basic earnings power (earnings before tax). However, the relative power of the firm in a competitive environment weakens the negative impact of corporate distance from Tehran and big cities on the basic earnings power (earnings before tax).

Keywords: Corporate Location, Distance from Population Centers, Industry Competition, Profitability, Tehran Stock Exchange.

JEL: M41, R30

1. Introduction

Studying about the establishment of companies in various places has long been considered by economists and geographers. Indeed, how do enterprises decide upon installations and their productive activities in a special place? Finding an answer to this question can be of particular importance for investors in economic activities as well as policy makers in an area. On the one hand, investors are trying to find a place to maximize their earnings, and on the other hand, policy makers are trying to attract the activities with the greatest impact on the economic growth and regional development to their regions (Sabaqh Karimi, 2001). The construction of one or more industrial unit in optimum sites and in the best possible situation, not only improves materials circulation and customer services, but also puts the plant in a desirable situation. Decisions associated with the selection and learning features of a center's location can have a great impact on the ability to gain and maintain competitive advantages (Mazzarol and Choo, 2003). However, existing theories (Weber's model and Hotelling's model), have considered distance from population centers to reduce company's profitability, and industry competition is expected to increase this impact (Losch's model).

The impact of the plant site and its distance from or nearness to population centers on company's profitability is an issue that has not been investigated in researches so far. Therefore, this study investigates and tests this issue at the level of food industry companies listed in Tehran Stock Exchange, and at the same time, examines the effects of industry competition on this relationship.

It is worth mentioning that food industry, as one of the most profitable industries in Tehran Stock Exchange in recent years, has been highly dependent on population centers for food consumption and thus, testing location models that emphasize on the center of raw materials supply and the produced materials consumption, can cover the perspective of produced materials consumption in this industry well.

2. Theoretical Background

Basically, the purpose of selecting a specific site for production is to maximize company's earnings. Hence, the best site is where that will maximize company's earnings. Scholars have distinguished between exclusive and competitive markets about the impact of site on profitability. In exclusive markets, the company can compensate the increased cost resulting from distance from population centers through increasing the price of goods and services, and thus, has no effect on its profitability. But in competitive markets, increasing prices is not simply possible, and therefore, distance from population centers cannot reduce firm profitability. Of course, the issue is not that simple and some models are designed and developed, that will be mentioned later.

2.1. Weber's Model

Weber (1909), established the foundation of modern location theories. One of his basic assumptions was that firms determine their location based on cost minimization. When the firm has minimized its transportation costs, it will be able to maximize its earnings (the difference between revenue and cost of raw materials and transportation). It should be noted

that the firm's revenues and raw materials cost are the same in different places, and only transportation costs of raw materials and products to the market matters. In this regard, the firm selects a location for production that minimizes transportation costs. Where to establish the firm depends on the resultant of tensile forces related to raw materials location and market. On the one hand, in case of lower transportation costs of raw materials, the firm will tend to be established in the market location, and on the other hand, in case of lower transportation costs of the products, the firm will be attracted towards raw materials location. In each case, firm nature and the type of its products have a widespread impact on firm's location (see Sabagh Kermani, 2001; Mirkatooli and Manafi Azar, 2009; Weber, 1990; Reid, 1966; Hannik, 1999).

2.2. Hotelling Model

This model, indicates the role of location in determining the firm's market share. Assume that there is a market which is as a straight line, like Figure 1, and demand distribution is uniform along it, and consumers are at specific intervals from each other. In mode A of Figure 2, the seller is located on one side of the market and has all the market under his control and acts exactly exclusively. In mode B, the second seller enters the market and affects the market covered by the first seller, and the first seller's market is reduced to the extent of point M to the location of the first seller. In this case, the first seller will suffer loss due to losing a large part of its market and thus, attempts to change its place so as to possess a greater share of the market, and his only way is to move to the left side of the second seller. Likewise, the second seller must also change his location, and this will continue to the extent that neither of them cannot gain anything and even suffers loss because of moving and taking a share from the market (see Sabagh Kermani, 2001; Mirkatooli and Manafi Azar, 2009; Hotteling, 1929; Hannik, 1999; Sanjo, 2007).
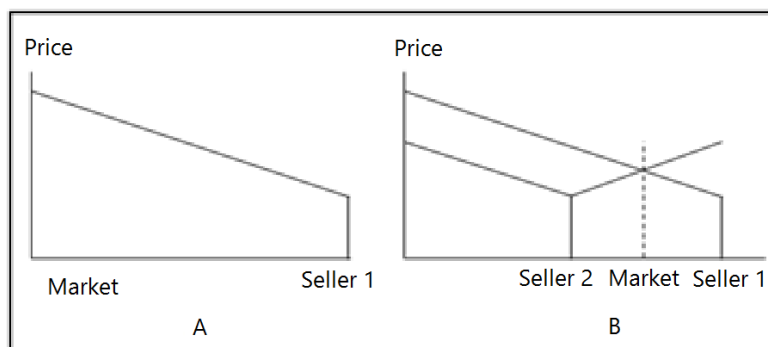

Figure 1. The impact of increased competition on enterprises' markets

2.3. Losch's Model

According to Sabagh Kermani (2001), the impact of distance in the sphere of influence of the monopolist firm's market constitutes the basis of Losch's model. Assume that the location of the first firm is Point B in Figure 2. To make it easy, assume that the area is geographically and continentally homogeneous and transportation costs, population dispersion, etc. are the same. In this case, the demand for the firm's product at point B will be more than everywhere,

since this point is the only point at which goods are cheaper than anywhere else (because consumers do not pay for goods transportation costs). The farther we get from the firm, the more the cost of goods purchased for the customers, due to the distance, will be. Eventually, at a distance such as K (or K´) final cost units added to the price of goods are too high that there will be no demand for that product. The distance at which the goods are sold is called goods range, and the maximum distance at which the goods can be sold is called goods outer range. In figure 2, goods outer range is the distance from B to K. Any sales that are outside this distance are additional earnings it gains. This additional earnings is in fact the monopolist's rente which it gains in the absence of competitors. This economic rente that is given to the monopolist can be a function of its prices for customers at different distances. If this price is increased more than usual, the demand will be likely to reach to a lesser extent that is needed for survival. Therefore, unreasonable prices will shrink the size of the firm's market (see Sabagh Kermani, 2001; Losch, 1954; Hannik, 1999).
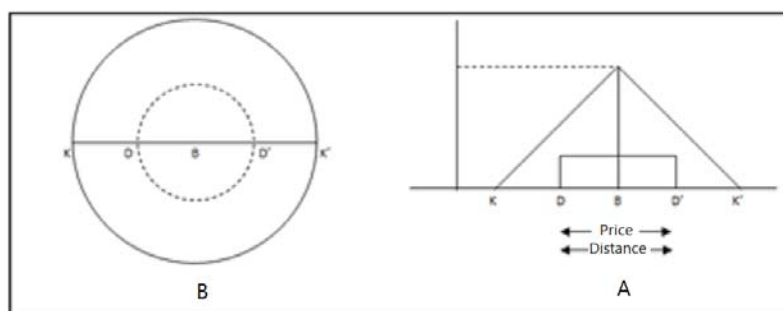

Figure 2. Market's maximum and minimum with two different perspectives

2.4. Company's Profitability

The concept of earnings is basically an accounting concept and much of the efforts of accountants is focused on its measurement. Earnings is among the greatest indicators of measuring a business unit activities and potential economic decision-makers (Rahnama Roodposhti and Salehi, 2010). Various studies have addressed the issue of profitability and identifying the factors affecting it. Company's life (Rietveld and schipper, 1995), corporate governance (Bernotas, 2005), company's growth (Lin and Rowe, 2006), company's size (Cinca et al, 2005), advertisement costs (Esther, 2006), research and development costs (Verbeek and Debackere, 2006), type of industry (Acquaah and Chi, 2007), staffs' satisfaction (Yee et al, 2008), quality management (Pignanelli and Csillag, 2008), the level of staff's training and experience (Chiliya and Roberts-Lombard, 2012), working capital management (Ukaegbu, 2014), human capital reporting (Ghadiri Moghaddam et al, 2013), capital structure (Rahimian et al, 2013), economic indices (Ahmad Poor and Ebrahim Poor, 2012), growth (Khajavi et al, 2014), etc., are among effective factors on profitability that have been investigated in international studies. But in this study the effect of location on company's profitability is investigated for the first time.

3. Empirical Background

Ejngton (2000), conducted a survey in the United States and concluded that market demand

elasticity for goods, market scope, how to price goods, and in short, the extent of selling goods in the market, have significant effects on corporate earnings. Wang and Hong (2016) founded that companies that offer their products via the Internet and takeaways to the customer have increasing profitability.

Sridhar and Wan (2010) stated that capitals have not been attractive locations for Brazilian, Hindi, and Chinese companies, especially if they were large. Also, the relationship between access to raw materials and company's location in Brazil, China, and India have been negative.

John et al (2011) examined the relation of company's location and dividends policy. In fact, the impact of geographical location on agency costs and dividends policy was examined. Their results showed that isolated companies divide more earnings, which is the result of high agency costs. Arena and Dewally (2012) investigated the relationship of company's geographical location and the amount of debt. The results showed that companies located in rural areas face more financing problems compared to companies located in urban areas and attract smaller banks with less credibility. In addition, these companies are trying to reduce their information flaws through more reliance on banking relationships. Cook and Wilson (2013) concluded that countries' tax laws are not the only determinants of the company's location and countries can influence this factor by signing free trade contracts. Although dispersed studies on companies' locations have been conducted around the world, but it has not been welcomed in Iran, and of course, profitability is a popular subject that has attracted much attention (e.g. see Ahmad Poor and Ebrahim Poor, 2012; Haghighat and Mortazavi, 2014; Khajavi et al, 2014; Tavakolnia and Mostafavi Makrani, 2016).

4. Hypotheses

Given the above mentioned materials, the following hypotheses have been developed:

H1: Product market competition moderates the impact of company's distance from population centers on profitability.

H2: Company's relative power in a competitive environment moderates the impact of company's distance from population centers on profitability.

5. Methodology

5.1. Population and sample

The population of the study includes all firms listed in Tehran Stock Exchange in Food & Beverage industry, except Sugar Industry, during the years 2010 to 2014. Due to the limited number of observations, sampling is not done and the whole population (including 21 companies) will be examined. It is worth mentioning that the required data will be extracted from companies' financial statements and Rah Avard Novin software.

5.2. Variables and Models

The following regression models are used in this study to test the developed hypotheses:

$Profitability_{i,t} = \beta_0 + \beta_1 Distance_{i,t} + \beta_2 HHI_{j,t} + \beta_3 Distance*HHI_{j,t} + \beta_4 Size_{i,t} + \beta_5 CI_{i,t} + \varepsilon_{i,t}$

$Profitability_{i,t} = \beta_0 + \beta_1 Distance_{i,t} + \beta_2 HHI_{j,t} + \beta_3 Distance_{i,t}*HHI_{j,t} + \beta_4 Size_{i,t} +$

$\beta_5 Distance_{i,t}*Size_{i,t} + \beta_6 Distance_{i,t}*HHI_{j,t}*Size_{i,t} + \beta_7 CI_{i,t} + \varepsilon_{i,t}$

Where:

Profitability = the ratio of net profit to assets (return on assets - ROA), and the ratio of earnings before tax to total assets (basic earnings power - BEP) are used to measure it.

Distance = company's distance from population centers, which is calculated in two ways:

Distance1 = Distance (based on kilometers) of the plant of the company's products to Tehran, and is calculated by using the natural values logarithm; and

Distance2 = Distance (based on kilometers) of the plant of company's products to the nearest big city, and is calculated by using the natural logarithm. For example, if a plant is located in Rasht, its distance is considered zero.

HHI = Herfindahl-Hirschman Index as a criterion for concentration at industry level, which is calculated as follows (Datta et al, 2013):

$$HHI_{jt} = \sum_{i=1}^{Nj} (Sales_{jit} / \sum_{i=1}^{Nj} Sales_{jit})^2$$

Where:

HHI_{jt}= is HHI of industry j at time t;

$Sales_{jit}$= indicates sales of company i in industry j at time t;

Higher values of Herfindahl-Hirschman index indicate greater concentration and less market competition.

Size = Company's size, which is the logarithm of the company's assets.

CI = Is investment in fixed assets, which is the ratio of fixed assets to total assets.

In order to investigate the effect of distance from population centers on profitability (hypothesis 1), the variable of Distance is used. The variable of Distance*HHI is used to investigate the effect of product market competition on the relationship of distance from population centers and profitability (second hypothesis), and the variable of Distance*HHI*Size indicates the impact of company's relative power in the competitive environment on profitability. It should be noted that Zoltan and Audretsch (1987) argued that larger companies have more innovation and can potentially play a greater role in the market. Thus, the product of size and industry concentration (competition) can show that, overall, to what extent the company is able to show its power. Higher values of the product indicate more relative power of the company. Meanwhile, to prevent the problem of autocorrelation, the method of mean-centering has been used.

6. Findings

The data from 21 sample companies during the years 2010 to 2014 were extracted from available databases and transferred to Excel software. After necessary calculations for the independent, dependent, and control variables, necessary information for the required statistical test were saves in appropriate files and processed in Eviews9 software. It is noteworthy that to assure the reliability of the variables, Im, Pesaran, and Shin's test was used, and to eliminate the effects of possible variance heterogeneity, Estimated Generalized Least Squares method (EGSL) was used. Descriptive statistics and reliability of the results of testing variables reliability are shown in Table 1. It is worth mentioning that because the definition of management optimism variable was dummy (zero and one), it was excluded from descriptive statistics table.

Table 1. Descriptive statistics

Variables	Mean	Median	Max	Min	S.D.	Im, Pesaran & Shin sig.
ROA	0.087	0.071	0.383	-0.133	0.091	0.000
BEP	0.11	0.095	0.477	-0.133	0.11	0.000
Distance1	4.816	5.529	7.311	1.098	2.083	0.000
Distance2	3.113	2.302	6.865	0.693	1.764	0.000
HHI	0.164	0.15	0.207	0.144	0.024	0.000
Size	13.093	13.209	16.122	10.103	1.262	0.000
CI	0.296	0.244	0.824	0.035	0.181	0.000

Given Table 1, the mean and median values of the variables are close to each other, and also, outlier data that have a negative effect on the analysis quality have been removed. Also, the significance level of Im, Pesaran, and Shin for all the variables was less than 0.05. Therefore, all the variables are reliable within the period under study.

Using the firs criterion of distance (distance from Tehran) as well as the ratio of net profit to total assets, the results of testing the hypotheses are presented in Table 2. The results of Table 2 show that distance from Tehran has no significant effect on the company's profitability. Hence, the impact of industry competition and the company's relative power in the competitive environment cannot be discussed (rejecting the first and second hypotheses). However, the variable of company's size has a direct significant impact on the dependent variable, and the variable of investment in fixed assets has a significant inverse effect on the dependent variable.

Table 2. Hypotheses testing (by using Distance 1 and ROA)

Variable	Coef.	Sig.	Coef.	Sig.
β0	0.274	0.014	-0.356	0.03
Distance1	-0.037	0.064	0.037	0.08
HHI	-1.018	0.072	-1.36	0.006
Distance1*HHI	0.23	0.056	0.768	0.087
Size	0.057	0.000	0.05	0.000
Distance1*Size	_	_	-0.007	0.23
Distance1*HHI*Size	_	_	-0.032	0.317
CI	-0.113	0.000	-0.075	0.000
F statistics = 11.866			F statistics = 16.778	
F sig. = 0.000			F sig. = 0.000	
R-square = 0.346			R-square = 0.48	
Adjusted R-square = 0.308			Adjusted R-square = 0.434	
Durbin-watson = 1.89			Durbin-watson = 2.008	
Chaw test sig. = 0.000			Chaw test sig. = 0.000	
Hauseman test sig. = 0.001			Hauseman test sig. = 0.009	
Fixed assets model and EGSL method				

Using the firs criterion of distance (distance from Tehran) and the ratio of earnings before tax to total assets for profitability (basic earnings power), the results of testing the hypotheses are presented in Table 3. According to the presented results in Table 3, distance from Tehran has a significant inverse impact on earnings before tax, industry concentration (and increasing Herfindahl-Hirschman Index) has an inverse significant impact on earnings before tax (the direct impact of industry competition on earnings before tax) and also mitigates the inverse impact of distance from Tehran on earnings before tax. In other words, product market competition enhances the negative effect of distance from Tehran on the basic earnings (earnings before tax) (the impact of the first hypothesis). However, given the direct impact of distance from Tehran* Herfindahl-Hirschman Index*company's size on the dependent variable, it can be claimed that the company's relative power in a competitive environment, mitigates the negative effect of distance from Tehran on the basic earnings (earnings before tax) (the effect of the second hypothesis).

Table 3. Hypotheses testing (by using Distance 1 and BEP)

Variable	Coef.	Sig.	Coef.	Sig.
$\beta 0$	0.415	0.003	0.567	0.012
Distance1	-0.056	0.025	-0.07	0.000
HHI	-1.603	0.033	-1.727	0.01
Distance1*HHI	0.34	0.021	0.944	0.019
Size	0.018	0.000	0.071	0.000
Distance1*Size	_	_	-0.01	0.155
Distance1*HHI*Size	_	_	0.098	0.009
CI	-0.134	0.000	-0.079	0.001
F statistics = 13.938			F statistics = 16.669	
F sig. = 0.000			F sig. = 0.000	
R-square = 0.348			R-square = 0.395	
Adjusted R-square = 0.31			Adjusted R-square = 0.351	
Durbin-watson = 1.822			Durbin-watson = 1.937	
Chaw test sig. = 0.000			Chaw test sig. = 0.000	
Hauseman test sig. = 0.000			Hauseman test sig. = 0.000	
Fixed assets model and EGSL method				

Using the second criterion of distance (distance from Tehran) as well as the ratio of net profit to total assets (return on assets) for profitability, the results of testing the hypotheses are presented in Table 4.

The results of Table 4 indicate that distance from big cities does not have a significant impact on company's profitability; thus, the impact of industry competition and the company's relative power in a competitive environment cannot be discussed (rejecting the first and second hypotheses). However, the variable of company's size has a direct and significant impact on the dependent variable, and the variable of investment in fixed assets has a significant effect on the dependent variable.

Table 4. Hypotheses testing (by using Distance 2 and ROA)

Variable	Coef.	Sig.	Coef.	Sig.
β0	0.234	0.000	0.231	0.004
Distance2	-0.068	0.066	-0.069	0.07
HHI	-0.639	0.175	-0.629	0.168
Distance2*HHI	0.176	0.07	0.221	0.243
Size	0.018	0.007	0.016	0.005
Distance2*Size	_	_	-0.019	0.211
Distance2*HHI*Size	_	_	-0.022	0.18
CI	-0.102	0.000	-0.097	0.000
F statistics = 15.869			F statistics = 16.669	
F Sig. = 0.000			F Sig. = 0.000	
R-square = 0.383			R-square = 0.395	
Adjusted R-square = 0.347			Adjusted R-square = 0.351	
Durbin-watson =1.928			Durbin-watson = 1.937	
Chaw test sig. = 0.000			Chaw test sig. = 0.000	
Hauseman test sig. = 0.000			Hauseman test sig. = 0.000	
Fixed assets model and EGSL method				

Using the second criterion of distance (distance from Tehran) and the ratio of earnings before tax to total assets for profitability (basic earnings power), the results of testing the hypotheses are presented in Table 5. According to the results in Table 5, distance from big cities has an inverse significant effect on earnings before taxes and increased industry concentration (Herfindahl-Hirschman Index), while having a significant impact on earnings before tax (direct impact of earnings before tax on industry competition), mitigates the inverse impact of distance from big cities on earnings before tax. In other words, product market competition, enhances the negative impact of distance from big cities on basic earnings power (earnings before tax) (the impact of the first hypothesis).

However, given the direct impact of distance from big cities* Herfindahl-Hirschman Index*company's size on the dependent variable, it can be claimed that the company's relative power in a competitive environment, mitigates the negative effect of distance from big cities on the basic earnings power (earnings before tax) (the effect of the second hypothesis).

Table 5. Hypotheses testing (by using Distance 2 and BEP)

Variable	Coef.	Sig.	Coef.	Sig.
$\beta 0$	0.346	0.001	0.336	0.000
Distance2	-0.069	0.021	-0.093	0.008
HHI	-1.049	0.004	-1.205	0.027
Distance2*HHI	0.283	0.017	0.274	0.007
Size	0.022	0.000	0.024	0.000
Distance2*Size	_	_	-0.019	0.208
Distance2*HHI*Size	_	_	-0.145	0.002
CI	-0.123	0.000	-0.111	0.000
F statistics = 15.824			F statistics = 18.143	
F sig. = 0.000			F sig. = 0.000	
R-square = 0.504			R-square = 0.507	
Adjusted R-square = 0.469			Adjusted R-square = 0.457	
Durbin-watson = 1.876			Durbin-watson = 1.875	
Chaw test sig. = 0.000			Chaw test sig. = 0.000	
Hauseman test sig. = 0.000			Hauseman test sig. = 0.000	
Fixed assets model and EGSL method				

7. Conclusion

Business, trade, and economic activity are objective and functional manifestations of business enterprises' activities and measures that reveal financial concepts and financial assumptions and theories. Objectives related to these indicators and components will be revealed in the form of earnings, wealth, value, and efficiency. Earnings are the interest from the differences of sales (revenues) and expenses which makes sense with a short-term look. The concept of earnings is basically an accounting concept and much of the efforts of accountants is focused on its measurement. Earnings are among the greatest indicators of measuring a business unit activities and potential economic decision-makers activities. From a practical perspective, accounting earnings is defined as the difference between realized revenues from the period's transactions and the relevant expired cost of goods sold (Rahnama Roodposhti and Salehi, 2010). For the first time, this study linked this pure accounting concept to a geographical-economic concept called distance from population centers. To explain how the relationship exists, the existing literature in regional economic texts was significantly used.

Having noted Weber's model (1909), Hotteling's model (1929), and Losch's model (1954), and presenting two hypotheses, some models were explained, which included some direct and some moderating impacts. The results of testing the hypotheses showed that distance from Tehran and big cities has an inverse significant on earnings before tax (basic earnings power) and increased industry concentration (Herfindahl-Hirschman index) has an inverse significant impact on earnings before tax (the direct impact of industry competition on earnings before tax), and also mitigates the inverse impact of distance from Tehran and big cities on earnings before tax. In other words, product market competition enhances the negative impact of company's distance from Tehran and big cities on basic earnings power (earnings before tax)

(the effect of the first hypothesis). Meanwhile, company's relative power in a competitive environment mitigates the negative effect of company's distance from Tehran and big cities on basic earnings power (earnings before tax) (the effect of the second hypothesis). Thus, regardless of tax benefits of the location of establishing the plant, less distance from Tehran and big cities could help to improve the company's profitability in food industry, and reducing industry competition and increasing company's relative power in the industry mitigates the effects of distance from population centers on profitability. However, a significant difference in terms of net profit (earnings after tax) was not observed. Therefore, it is clear that rules relating to tax exemptions have played a significant role in this regard. For example, according to the Note number 3 of Article 138 of tax exemption law, factories which are located within the watershed of Tehran and do not have less than fifty staffs, in case of moving their facilities outside the radius of one hundred twenty kilometers from the center of Tehran, and based on the regulations established by the Ministry of Economic and Financial affairs and the relevant Ministry in each case, will be exempted from paying taxes on income resulting from related industrial activities, up to ten years from the date of operating in the new location. Also, plants located in one hundred twenty radius of Tehran and control zones of big cities (Mashhad, Tabriz, Arak, Isfehan, Shiraz, and Ahvaz) and have entirely transferred their facilities to approved industrial towns, will receive half of tax exemption time of this Note starting from the operating date in the new location.

Given the companies, factories, and population fragmentation policies from Tehran and big cities (regarding subsequent pollution), It is suggested that optimal solutions be provided to resolve the reducing effect of distance from Tehran and big cities on profitability. Also, although increasing companies and factories in Tehran and big cities is not desirable in terms of political and macro-economic policies, but according to the results of the study, being located in Tehran or big cities can be recommended as one of the ways of increasing profitability for companies operating in food industries listed in Tehran Stock Exchange. Investors in listed firms in Tehran Stock Exchange are also recommended to take into account, when investigating in food industry that being located in big cities can increase earnings before tax and at the same time, will not significantly affect net profit figure. Unless the company's management has considered appropriate approaches for tax management, and in other words, has minimized the effects of income tax on earnings before tax, which will bring net profit and earnings before tax closer to each other (Which can, for example, be considered as a way of identifying these companies). Also, taking into account the company's relative power in the industry and also the competition that exists in food industry, can have a great contribution to more efficient evaluation of the relationship of distance from population centers and the company's profitability.

In addition, it is recommended to the interested researchers to conduct more comprehensive and more accurate studies and retest results of this study, and also identify and argue the effect of location on other accounting variables.

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