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An Evaluation of Investment Project in Gaziantep Footwear Industry: NPV and IRR Approach*

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ABSTRACT

Turkey's Gaziantep province received tremendous support from the government in many industries such as carpet, textile, food, footwear, agriculture and tourism taking the lead. Gaziantep has been continuously developing and operating in the footwear manufacturing sector for several decades. But the absence of an accredited test laboratory for the footwear industry in the region, the high costs and time losses caused by the regional producers having to carry out these tests in Istanbul, Gaziantep-based manufacturers have had to initiate the establishment of the Accredited Test Laboratory in their province. The aim of this study is to investigate whether investment in the shoe testing laboratory is feasible for the Gaziantep footwear industry. A purposeful field study was carried out for the shoe sector and a face-to-face survey was carried out in 11 large companies. The data obtained were analyzed in terms of economic and financial analysis using Net Present Value (NPV) and Internal Rate of Return (IRR) methods. As a result of the findings, it has been determined that the investment is feasible and the establishment of an accredited test laboratory in Gaziantep will contribute to both Gaziantep and the Southeastern Anatolia Region in Turkey.

Keywords: *Net Present Value (NPV), Internal Rate of Return (IRR), Investment Projects, footwear industry, Gaziantep, Turkey.*

Jel Classification*: D81, G11, G17, M21, M40.*

Gaziantep Ayakkabı Sektöründe Bir Yatırım Proje Değerlemesi: NBD ve İKO yaklaşımı

ÖZET

Türkiye'nin Gaziantep ilinde halı, tekstil, gıda, ayakkabı, tarım ve turizm gibi pek çok sektör hükümetten büyük destek almistir. Gaziantep, uzun yıllardır ayakkabı imalatı sektöründe sürekli gelişme ve faaliyet göstermektedir. Bölgede akredite bir test laboratuvarının bulunmaması, bölgesel üreticilerin bu testleri İstanbul'da yapmak zorunda kalmaları nedeniyle ortaya çıkan yüksek maliyet ve zaman kayıpları nedeniyle, Gaziantep merkezli üreticiler Akredite Test laboratuvari kurulmasını başlatmak zorunluluğunu hissetmislerdir. Bu çalışmanın amacı, ayakkabı test laboratuarına yapılan yatırımın Gaziantep ayakkabı endüstrisi için faydalı bir yatırım olup olmadığını araştırmaktır.

Amaca yönelik olarak ayakkabı sektörüne yönelik bir saha çalışması gerçekleştirilmiş ve 11 büyük firmada yüz yüze anket uygulaması yapılmıştır. Elde edilen veriler Net Bugünkü Değer (NBD) ve İç karlılık oranı (İKO) yöntemleri ile ekonomik ve finansal analiz açısından incelenmiştir. Elde edilen bulgular neticesinde yapılan yatırımın yapılabilir olduğu ve Gaziantep'te akredite bir test labıratuvarının kurulmasının hem Gaziantep'e hem de Güneydoğu Anadolu Bölgesine önemli katkılar sağlayacağı tespit edilmiştir.

Anahtar Kelimeler: *Net Bugünkü Değer (NBD), İç karlılık oranı (İKO), Yatırım Projeleri, Ayakkabı Endüstrisi, Gaziantep, Türkiye*

JEL Sınıflandırması: *D81, G11, G17, M21, M40.*

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1. INTRODUCTION

According to OECD (2019:1), regional development is seen as a general effort to reduce regional disparities by supporting economic activities in the regions. To identify the challenges and policies, in 1999, the Regional Development Policy Committee (RDPC) was created which seek to enhance living standards in all types of regions, from cities to rural areas, as well as improve different regions' contribution to national performance through implementing new policies. Regional development strategies assess regional business potentials and use those potentials to form a competitive advantage over other regions (Harmaakorpi and Pekkarinen, 2003: 2; Melkas and Uotila, 2013: 213).

Ipekyolu Development Agency was established in 2008 in TRC1 zone which covers Adiyaman, Gaziantep and Kilis provinces and Gaziantep province is the centre of this zone. Gaziantep has received considerable support from the Turkish government, and it enjoys an advantageous position in carpet, food, plastic, footwear, and textile sectors. Development of these sectors is very important when the sectors are evaluated economically. One of the main reasons is that Turkey has become a centre of industry and commerce in the region by developing closer trade and economic relations with its southern neighbours. Through improving its border trade with neighbouring countries, Turkey has provided a significant contribution to its economy. This is especially the case in respect of bilateral relations with the Middle East countries which have accelerated economic development (Ulusoy and Turan, 2016:160).

Table 1. Development Zones

Development Zones codes	**Provinces**	**Central Province**
TR31	İzmir	İzmir
TR62	Adana, Mersin	Adana
TR10	İstanbul	İstanbul
TR52	Karaman, Konya	Konya
TR83	Amasya, Çorum, Samsun, Tokat	Samsun
TRA1	Bayburt, Erzincan, Erzurum	Erzurum
TRB2	Bitlis, Hakkâri, Muş, Van	Van
TRC1	Adıyaman, Gaziantep, Kilis	Gaziantep
TRC2	Diyarbakır, Şanlıurfa	Diyarbakır
TRC3	Batman, Mardin, Şırnak, Siirt	Mardin

Source: Official Journal Number: 27062, Resolution: 2008/14306

One of the key industry in footwear manufacturing and Gaziantep has been continuously developing and operating in the footwear manufacturing sector for several decades. Next section explains in detail of current footwear manufacturing industry in Gaziantep. One of the key issues industry faces in the province is the absence of the physical and chemical tests required by the buyer companies. Because of legal regulations, the absence of an accredited test laboratory in the region, the high costs and time losses caused by the regional producers having to carry out these tests in Istanbul, encouraged Gaziantep-based manufacturers for the establishment of the Accredited Test Laboratory in their province. The aim of this study is to investigate the effects of investing in the shoe testing laboratory for the Gaziantep footwear industry. Further, the study seeks to determine whether or not the test laboratory will create added value for the sector and Gaziantep province. The rest of the paper will provide an overview of the literature on the footwear manufacturing overall and

specifically in Gaziantep province (Section 1-2), and then an analysis and results of interviews with eleven companies in footwear industry in Gaziantep (Section 3-4), and conclude the study.

1.1. Overview of the Footwear Manufacturing in Gaziantep Province

The Textile, Clothing, Leather and Footwear (TCLF) industries form a major part of manufacturing production, employment and trade in many developing countries. They are characterized by geographically dispersed production and rapid market-driven changes, providing employment opportunities to millions of workers worldwide (www.ilo.org, 2019: 1). Footwear was seen as a necessary product but today consumer expectations and fashion taste also shape the industry (https://quantis-intl.com, 2019: 1).

Under the textile and clothing industries, the footwear industry, however, is characterized by relatively low capital intensity; low investment costs; and the use of low – skilled labour – factors that enable the industry to enjoy uninhibited growth and quickly adjust to changing market conditions (Keane J. and Willem te Velde, 2008: 7).

The global footwear sector continues to grow in both production and consumption. The most recent and comprehensive study is the World Footwear Report (2014) by the Association of the Footwear and Leather Products of Portugal (APICCAPS). According to the report, global footwear production exceeded 22 billion for the first time in 2013. Turkey came in 8th place among the top 10 footwear producing countries in 2012 and rose up to 7th place in 2013 (Table 2 below).

Table 2. Top 10 Countries in the World Shoes Consumption and Shoe Manufacturing

Top 10 Countries in the World Shoes Consumption				Top 10 Countries in World Shoe Manufacturing			
Number	Country	Number of pairs (Million)	Percentage (%)	Number	Country	Number of pairs (Million)	Percentage (%)
1	China	3.678	19	1	China	14.200	63.3
2	USA	2.285	11.8	2	India	2.065	9.2
3	India	2.068	10.7	3	Brazil	900	4
4	Brazil	816	4.2	4	Vietnamese	770	3.4
5	Japan	674	3.5	5	Indonesia	700	3.1
6	Indonesia	540	2.8	6	Pakistan	370	1.7
7	Britain	447	2.3	7	Turkey	300	1.3
8	Russia	434	2.2	8	Bangladesh	298	1.3
9	Germany	407	2.1	9	Mexican	245	1.1
10	France	402	2.1	10	Italy	202	0.9

Source: World Footwear Year Book-2014 APPICCAPS

China is the leading country in footwear production with 14.2 billion pairs followed by India with 2.065 billion pairs.

According to the data of world footwear exports, approximately $135 billion of shoes were exported in 2016, China was in the first place, followed by Vietnam, Italy and Germany. Table 3 below shows the countries exporting the most footwear in the world.

Table 3. Footwear Exporter Top 10 Countries (Thousand $) - 2016

Number	Country	Value (-1000 $)	Percentage in the World (%)
1	China	47.202.913	35
2	Vietnam	18.361.234	13,6
3	Italy	10.707.969	7,9
4	Germany	6.036.408	4,5
5	Belgium	5.967.638	4,4
6	Indonesia	4.639.859	3.4
7	France	3.396.740	2,5
8	Netherlands	3.263.366	2,4
9	Hong Kong	3.139.030	2.3
10	Spain	3.089.709	2.3

Source: Trademap, 2016

In terms of production capacity, Turkey's footwear sector holds 2nd place in the European Union rankings (Turkey is not an EU member), and 10th place in the world. Turkish footwear sector export is worth only $704.163.000, which makes up a global share of only 0.5% The annual capacity of Turkey is estimated to be 500 million pairs of footwear. But official figures show that production is below these numbers. According to the most recent data based on a report, World Footwear Year Book- APICCAPS 2014, Turkey produced 300 million pairs of shoes in 2013.

Turkey's National Footwear Industry consists of footwear-producing companies, industrial enterprises that provide input to the production companies, and companies that provide services as outsourcing to the manufacturers like stitch services. Turkey's National Footwear Industry has an important place in the manufacturing industry with its "labor-intensive" feature and offers a range of opportunities including entry-level jobs for unskilled labor, which, like many developing countries with high unemployment, still provides an important means of employment for the Turkish labor force. The raw material manufacturers for shoes play an important role. Therefore, Turkish manufacturers often perceive the footwear industry as one of the priority sectors. This structural feature is likely to keep the sector as a priority sector in the future.

According to the Turkey Footwear Industry Research, Development and Education Foundation and the Footwear Manufacturers' Association of Turkey (TASD) forecasting and APICCAPS report, the data of the sector is given in Table 4.

Table 4. Turkey Footwear Industry in Numbers

Sectoral Size	**Description**
Produced Shoe Quantity	300 million pairs
Sold Shoe Quantity	220 million pairs
Size of the Sector	3.2 billion euro
Number of Employees	300,000 people
World Footwear Manufacturing in Turkey share	7th (%1.3)
Number of Companies	22,000
Average price per pair of shoes	9.6 USD
Annual Per Capability Spending	59 USD
Annual per capita consumption	2.5 pair

Source: APICCAPS World Footwear Yearbook 2014.

In the above table, 42% of Turkey's € 3.2 billion shoe sector is female, 41% is male and 17% is children. As the table shows, the average price for a pair of shoes in Turkey is 36.9 TL and annual per capita consumption of footwear is 2.5 pairs. Importantly, that last figure is 5.5 pairs in Europe and 7 pairs in the United States. Annual per capita footwear consumption in Turkey is $59, compared to $143 dollars in Europe. Turkey's total annual consumption is 191 million pairs of footwear, placing the country at 17th in world rankings.

In Turkey, the footwear manufacturing industry is concentrated in Istanbul, Izmir, Konya and Gaziantep provinces. This study focuses on Gaziantep's footwear industry using the TOBB Industry Database. According to NACE Codes which are given in TOBB Industry Database, Table 5 shows the numbers the firms with capacity report, the numbers of personnel and production capacities of firms.

Table 5. Gaziantep Footwear Industry Capacity

Product Code	Registered Manufacturer	Personnel information						Production capacity *
		Engineer	Technician	Craftsman	Worker	Administrative staff	Total	Pairs
15.20.11	6	0	5	5	95	4	109	2,651,040
15.20.12	85	4	13	85	1548	106	1756	213,499,027
15.20.13	72	3	2	87	1077	69	1259	79,781,583
15.20.14	9	0	0	7	93	7	107	6,748,250
15.20.21	13	1	0	16	184	16	217	8,337,909
15.20.31	5	1	4	14	431	35	485	1,826,520
15.20.40	27	1	7	33	696	55	792	8,431,615
Total	217	10	31	247	4124	292	4725	321,275,944

Source: TOBB Industry Database, 2017. If the number of registered producers is 3 or less, the production capacity information is not provided. * As different products are produced under the heading of activity, there may be production capacity in different units.

Table 5 shows only firms with capacity reports. According to the data obtained from Gaziantep Chamber of Shoemakers, the number of footwear manufacturers is 875 and the total number of establishments is 2175. The detailed numbers of relevant firms are shown in Table 6.

Table 6. Numbers of Gaziantep Shoes Work Places

Total Manufacturer	**875**
Female's Shoe Manufacturer	150
Men's Shoe Manufacturer	400
Slippers Manufacturer	175
Sport Shoe Manufacturer	150
Sewer	450
Wholesaler	150
Shoe Repair	150
Yemeni and Local Handcrafts	50
Retailer	500
Total number of Workplaces	2175

Source: http://gko.org.tr/sektorumuz/, 2018

In order to determine the quality and health of the products produced by the firms operating in the footwear sector, detailed tests are required, and notification was published by the Ministry of Customs and Trade on 14 January 2015 in the official newspaper (number 29236).

The companies that manufacture the related products in Gaziantep and neighbouring provinces are obliged to carry out tests in accordance with the standards of Turkish Standards Institution (TSE) according to the communiqué published in the official newspaper on 14 January 2015. Since there is no accredited laboratory where such tests can be carried out in the region, companies carry out the relevant tests mainly by sending them to Istanbul. The establishment of an accredited laboratory in the region for chemical and physical tests to determine both the necessity of human health and product quality and to reveal the results will be of great benefit both in terms of time loss and cost to the enterprises. Chemical and physical tests types are as determined by global and national standards.

Establishing the image of durable and high-quality Turkish products, which are not harmful to human health and have been exposed to tests in obtaining competitive advantage in domestic and international markets, will make significant contributions to the development of the footwear industry.

There are many field works and empirical studies for the evaluation of investment projects in Turkey (Öztürk et al, 2015; Yılgör and Yücel, 2008; Honey, 2009; Doğanlı, 2006). These studies are generally prepared considering various sectors and provinces. This study has two main distinguishing features. First, it will make an important contribution to literature and will shed light on future studies as it is the first study conducted in Gaziantep. Secondly, this study was submitted to the Silk Road Development Agency as a feasibility report and was funded and implemented by the institution. Net present value (NPV) and Internal Rate of Return (IRR) was preferred in the methodology of this study. These methods, which take into account the time value of money, have been preferred because they are the two most used methods in the literature and show solid results. For this reason, this study aims to make important contributions to the literature and the real sector.

2. THEORETICAL FOUNDATIONS

Investment can be addressed in two parts, financial and real. Financial investments are investments that aim to increase the wealth of a person by using investment tools such as stocks, bonds and mutual funds. Real investments are those that are aimed at creating new production capacities in the economy. For this reason we could say that the real investment is more important for the country's economy (Sarıaslan, 2006:26).

There are many theoretical and empirical studies on the evaluation of investment projects (Berk, 1990; Akgüç, 1998; Büker et al. 2011; Türko, 1999; Sarıaslan, 2006; Ercan, 2010; Ceylan and Korkmaz, 2015; Öztürk et al., 2015; Yılgör and Yücel, 2008; Bal, 2009; Doğanlı, 2006; Alper, 2007; Ceylan, 2003). These studies provide detailed information about NPV and IRR and make important contributions to the financial study of this study.

One of the studies carried out on a provincial basis for the evaluation of investment projects in Turkey was carried out in Adana and Mersin. Yılgör and Yücel (2008), in their study, tried to determine what methods are used in the evaluation of investment projects, how the equity cost is determined and what risk factors affect it. In the study, a questionnaire application is also included. As a result, it is seen that companies need support in terms of technical knowledge and expertise in order to ensure efficiency in capital budgeting decisions.

In addition to this information, NFV (Net Future Value), PI (Profitability Index), internal rate of return (IRR) applications are included for the health sector and applications with numerical examples have been revealed by Öztürk et al, (2015).

One of the studies for the evaluation of classical investment projects is handled by Bal (2009). This study reveals what impact the firm’s free cash flow method has on capital budgeting through a free cash flow method to equity. The findings were observed that different results were reached in terms of both methods if free cash flow and free cash flow methods to equity were used in project valuation within the scope of capital budgeting. Other classical method work was examined by Doğanlı (2006) on a company in the textile industry in Turkey using mathematical programming techniques (integer programming) and mathematical results were discussed.

Garayeva and Akbulaev (2017) have introduced the concept of international capital budgeting in the evaluation of investment projects. In this study, the 'Adjusted Present Value' method was proposed in international capital budgeting, because it has a theoretical infrastructure similar to traditional capital budgeting, and offers companies a more flexible structure in evaluating international direct investment decisions using the Net Present Value method.

In his study, Alper (2007) states that the real option model, which takes flexibility into account, gives more accurate results than classical models in capital budgeting decisions. There is also an example showing how real options can be used to reveal the value of flexibility more accurately and more realistically in capital budgeting.

Net present value (NPV), Internal rate of return (IRR), NFV (Net Future Value), EAA (Equivalent Annual Annuity), PI (Profitability Index), PP1 (Payback Period 1), PP2 (Payback

Period 2) methods are used in the evaluation of investment projects. The common feature of these methods is that money takes into account the time value and the results are supportive of each other[1]. Therefore, for this reason, in this study, Net present value (NPV), and Internal Rate of Return (IRR) methods were included in the analysis.

3. METHODOLOGY

During the demand analysis process, a questionnaire was prepared in order to determine the past and current trend of the demand. One-to-one interviews were conducted by executives of 11 companies operating in the footwear sector, manufacturing to the chain stores of national brands, exporting and/or manufacturing with their own brand and supplying materials to the sector. The interviews took place in October 2017. In the light of the information obtained from the interviews, the investment analysis of the test laboratory was evaluated by using the Net Present Value approach (NPV) which is defined as the present value of the future net cash flows from an investment project.

NPV is one of the main ways to evaluate an investment analysis (Berk, 1990; Akgüç, 1998; Büker et al., 2011; Türko, 1999; Benamraoui et al. 2017). In this method, cash flows of the project to be invested are evaluated according to the time value of money. When calculating the time value of money, the rate of return expected by the investment is taken into consideration.

Many researchers agreed that the most popular and most sophisticated economic valuation technique is the NPV approach (Magni, 2005; Holmen and Pramborg, 2007; Svennebring and Wikberg, 2013; Zizlavsky, 2014; Benamraoui et al. 2017). It has been applied by many researchers in different industry investment and capital budgeting decisions. Arnold and Hatzopoulos (2000) showed that 80% of their sample companies in the UK use NPV method whereas Bennouna and Merchant (2010) estimated that, of the 88 firms used in their analysis, 94.2 % of Canadian companies use NPV. Furthermore, Graham and Harvey (2001) and Holmen and Pramborg (2007) reported that 57% of the CFOs in their survey of US firms always or almost always use the Payback method in capital budgeting decisions, as compared to the 76% (75%) using the NPV method (internal rate-of-return [IRR]) respectively.The net present value is calculated by the following formula (Sarıaslan, 2006:17; Ercan and Ban,2010: 142; Ceylan and Korkmaz, 2015:316; Akgüç, 1998:354; Emiroğlu, 2010:331-340; Büker et al., 2011:301-306):

$$NPV = \sum_{n=0}^{n} \frac{S_n}{(1+i)^n}$$

In NPV, S_n is the difference between the cash inflows and outflows in the n. year (net benefit); i symbolizes the discount rate and n is equal to the economic life of the project (20 years)(Interest rates (discount rates) and economic life are determined according to the feasibility preparation rules of the Ministry of Industry and Technology.)

1 In the background of this study, all other methods have been tested, and the outputs have been found to be consistent with the NPV and IRR results and that the investment is feasible.

If:

NPV > 0, accept the investment.
NPV < 0, reject the investment.
NPV = 0, the investment is marginal

In the equation above, "i" is calculated as a percentage. The result is not likely to be negative. Because every project with cash inflows and outflows has an internal rate of return. While calculating the IRR of the project, any “i” value is given according to the test and error method and its NPV is calculated. If the NPV found is a positive value, the value of “i” given is small and NPV is calculated again by giving a higher value of “i”. This method is repeated until NPV is negative. Thus, the actual “i” value can be calculated by applying the “interpolation” method for two “i” values that give a positive NPV and a negative NPV value. With the formula below, the IRR ("i") value can be found more clearly:

$$IRR = i^* = i_- + \frac{NPV_+}{|NPV_+ + NPV_-|}(i_- - i_+)$$

The parameters are;

i_- : “i” that makes NPV negative

i_+ : “i” that makes NPV positive

NBD_+ : Pozitive NPV

NBD_- : Negative NPV

According to the results obtained, IRR> i should be accepted, if IRR = i abstaining, the project should be rejected if IRR <i (Aşıkoğlu et al, 2011:311; Ercan and Ban,2010:151; Sarıaslan, 2006:177; Büker et al., 2011: 303-306).

4. RESULTS

4.1. Project Valuation Results under Certainty

In order to make a Net Present Value analysis, it is necessary to determine how much investment is needed first. Thus, technical visits have been made to the companies, and as a result of these visits, the size of the area to be invested and the necessity of the machines and equipment have been determined. The approximate investment cost for the construction of the areas, the machinery equipment and equipment to be used in the laboratory is given in Table 7. Another parameter in Net Present Value analysis is how much revenue will be generated from this investment. The number of tests that the companies were tested on and how much they were paid for these tests were determined in Table 8.

Table 7. Total Calculated Cost of Investment Period

Cost of Investment Period Items	Investment Cost* (USD - $)
Building-construction overall total costs	12,938.62
Total costs of Machines, devices and equipment	561,879.75
Tangible Fixed Assets costs (Total Cost of Furniture, Office and Computer Equipment)	24,057.03
Total costs of Services and benefits provided	33,071.11
Total Costs of Promotion Activities	13,055.09
Unpredictable costs	25,800.06
Total Investment Period Cost	670,801.66

Source: Author's own construction, 2018

* Laboratory devices, device maintenance, consumable materials and other expenses are traded on dollars.

Table 8. Chemical Test Quantity and Fees of Gaziantep Province

NF (Number of Firms)	A (Average number of annual tests (pcs/firm))	B=A*NF (Total Gaziantep Test Number)	C (Average 1 package test fee (Istanbul))	D=B*C (Total Gaziantep paid test fee)	E (1 pcs Cargo Fee)	F=B*E (Total Cargo Fee)
100	40 pcs	4000 Test	70$	280,000$	4$	16,000$
450	40 pcs	18000 Test	70$	1,260,000$	4$	72,000$

Source: Authors' own construction, 2018

217 shoe manufacturers are registered in the TOBB Industry. As a result of the interview with Gaziantep Chamber of Shoemakers, it is estimated that the number of firms with shoes or slippers or boots manufacturing companies without capacity report is approximately 875. As stated in Table 8, it is possible to carry out a minimum of 4000 package tests per year, considering that only 100 of these companies have these tests. The annual cost of 4000 package tests in Gaziantep province is 4000*70$=280,000$ and 4000*4$=16,000$ for cargo. These figures are valid for minimum test levels.

Approximately half of 875 companies (450 firms) have to take these tests. It is considered that these companies have been tested, which means that there will be an average of 18,000 packages per year test. The annual cost for Gaziantep province is 18,000*70$=1,260,000$ for test and 18,000*4$=72,000$ for cargo. In addition, quality-oriented companies also carry out endurance tests. As a result of surveys and face-to-face interviews with firms, companies working with quality focus stated that it is necessary to test the durability of the products (base, sheet, adhesive, auxiliary materials etc.) that they take as semi-finished products. The average durability test costs of the companies are estimated to be approximately 517,54$ per company according to TSE's durability test fees. In addition, companies that want to get the CE certificate cost approximately 5000$ per product for export into the EU. They pay these fees until the results are valid from the tests if the test results are negative.

Tablo 9. Physical Test Quantities of Gaziantep Province

NF (Number of Firms)	A (Average number of annual tests (pcs/firm))	B=A*NF (Total Gaziantep Test Number)
25 firms	20 pcs	500 tests

Source: Authors' own construction, 2018

Table 10. Revenue Items

		Revenue Items	Pcs/year	Price	Exchange rate	Total revenue
Revenue	1	Compulsory Chemical Testing (Package)	4,000	$60.00	1.00	$240,000.00
	2	Physical test	500	$15.00	1.00	$7,500.00
		Total revenue	4,500			$247,500.00

Source: Authors' own construction, 2018

Table 11. Annual cost of sales and cost items

		Cost Items	Pcs / year	price	Exchange rate	Total cost
Costs of Sales	1	Helyum	26	$250.00	1.00	$6,500.00
	2	Argon	26	$250.00	1.00	$6,500.00
	3	Spare parts and chemical equipment	1	$5,000.00	1.00	$5,000.00
		Total cost				$18,000.00

Source: Authors' own construction, 2018

Table 12. Personnel Expenses

		Personnel Details	Pcs/year	Salary(Mountly)	Exchange rate	Total salary
Expenses	1	Laboratory Staff	12	$850.60	1.00	$10,207.20
	2	Laboratory Staff	12	$850.60	1.00	$10,207.20
	3	Laboratory Staff	12	$850.60	1.00	$10,207.20
		Total Salary paid($)				$30,621.60

Source: Authors' own construction, 2018

According to the data set above, the cash flows will be as follows: It is planned that the annual positive cash flow will be approximately 198,878.95 $. This amount was used as the annual cash flow ($S_{0,1,.n}$) in the Net Present Value analysis.

Tablo 13. Annual Earning Before Taxes

	Details of the Earning Before Taxes	Total ($)
Annual Earning Before Tax	Total revenue (+)	$ 247,500.00
	Total costs of sales (-)	($ 18,000.00)
	Total expenditures (-)	($ 30,621.60)
	Annual Earning Before Taxes ($)	$ 198,878.95

Source: Authors' own construction, 2018

At this stage, economic analysis can be carried out. The aim of the economic analysis is to determine the benefits and costs of the project in general. For this purpose, if the project is not carried out in Gaziantep, the costs of the sector and the benefit to be provided to the sector in Gaziantep is discussed in detail in this section. The analysis of the numerical data of benefits and costs in economic analysis is carried out with the help of the following formula;

$$ENPV = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \frac{S_2}{(1+i)^2} \dots + \frac{S_n}{(1+i)^n}$$

In the formula above, the Economic Net Present Value (ENPV), Sn is the difference between the benefit and cost in the nth year (net benefit), i is the discount rate (9%)[2] and n equals the economic life of the project (20 years). The analysis was carried out in two stages. The first analysis was based on 4000 tests; the second analysis was considered according to the condition of 18000 tests.

Table 14. Economic Analysis Results (For 4000 tests)

Years	Cargo savings (4$*4000pcs)	Test Cost savings (70-60) *4000 pcs	Total Benefit (S_n) ($)	Net Present Value Factor (S_n /1.09)^n ($)
1	16,000.00	40,000.00	56,000.00	51,376.15
2	16,000.00	40,000.00	56,000.00	47,134.08
3	16,000.00	40,000.00	56,000.00	43,242.27
4	16,000.00	40,000.00	56,000.00	39,671.81
5	16,000.00	40,000.00	56,000.00	36,396.16
6	16,000.00	40,000.00	56,000.00	33,390.97
7	16,000.00	40,000.00	56,000.00	30,633.92
8	16,000.00	40,000.00	56,000.00	28,104.51
9	16,000.00	40,000.00	56,000.00	25,783.96
10	16,000.00	40,000.00	56,000.00	23,655.01
11	16,000.00	40,000.00	56,000.00	21,701.84
12	16,000.00	40,000.00	56,000.00	19,909.94
13	16,000.00	40,000.00	56,000.00	18,266.00
14	16,000.00	40,000.00	56,000.00	16,757.80
15	16,000.00	40,000.00	56,000.00	15,374.13
16	16,000.00	40,000.00	56,000.00	14,104.71
17	16,000.00	40,000.00	56,000.00	12,940.10
18	16,000.00	40,000.00	56,000.00	11,871.65
19	16,000.00	40,000.00	56,000.00	10,891.42
20	16,000.00	40,000.00	56,000.00	9,992.13
Economic Benefits of Total Net Present Values($)				511,198.56
Economic Costs of Total investments ($)				296,000.00
Difference between the NPV and Costs($)				215,198.56

Source: Authors' own construction, 2018

According to Table 14, in the case of 4000 tests, the Total of Economic Benefits is calculated as 511,198.56 $. The Total Present Value of the Economic Cost is calculated as 296,000 $. Therefore, since the sum of the Net Present Values of the Total Economic Benefits

[2] Interest rates (discount rates) and economic life are determined according to the feasibility preparation rules of the Ministry of Industry and Technology.

by years is greater than the Total Present Value of the Economic Cost (215,198.56$); the implementation of the project (since it is ENPV > 0) economically is considered.

According to Table 15, in the case of 18000 tests, the Total of Economic Benefits is calculated as 2,300,393.51$. The Total Present Value of the Economic Cost is calculated as 1,332,000.00 $. Therefore, since the sum of the Net Present Values of the Total Economic Benefits by years is greater than the Total Present Value of the Economic Cost (968,393.51$); the implementation of the project (since it is ENPV > 0) economically is considered.

Table 15: Economic Analysis Results (For 18000 tests)

Years	Cargo savings (4$*4000pcs)	Test Cost savings (70-60) *4000 pcs	Total Benefit (S_n) ($)	Net Present Value Factor (S_n /1.09)^n ($)
1	72,000.00	180,000.00	252,000.00	231,192.66
2	72,000.00	180,000.00	252,000.00	212,103.36
3	72,000.00	180,000.00	252,000.00	194,590.24
4	72,000.00	180,000.00	252,000.00	178,523.15
5	72,000.00	180,000.00	252,000.00	163,782.71
6	72,000.00	180,000.00	252,000.00	150,259.37
7	72,000.00	180,000.00	252,000.00	137,852.63
8	72,000.00	180,000.00	252,000.00	126,470.30
9	72,000.00	180,000.00	252,000.00	116,027.80
10	72,000.00	180,000.00	252,000.00	106,447.52
11	72,000.00	180,000.00	252,000.00	97,658.28
12	72,000.00	180,000.00	252,000.00	89,594.75
13	72,000.00	180,000.00	252,000.00	82,197.02
14	72,000.00	180,000.00	252,000.00	75,410.11
15	72,000.00	180,000.00	252,000.00	69,183.59
16	72,000.00	180,000.00	252,000.00	63,471.18
17	72,000.00	180,000.00	252,000.00	58,230.44
18	72,000.00	180,000.00	252,000.00	53,422.42
19	72,000.00	180,000.00	252,000.00	49,011.40
20	72,000.00	180,000.00	252,000.00	44,964.58
Economic Benefits of Total Net Present Values($)				2,300,393.51
Economic Costs of Total investments ($)				1,332,000.00
Difference between NPV and Cost of investment ($)				968,393.51

Source: Authors' own construction, 2018

Economic analysis was found to be acceptable in both cases. However, apart from quantitative analysis which is the monetary value of the project, the project has other benefits that cannot be measured such as public interest, regional development, environment, human health and efficiency. It is possible to handle these benefits in 2 groups as follows:

a) Sector-Based Effects:

i.Testing services will be provided to the shoe industry and the test times and expenses will be reduced.

ii.Expenses transferred outside the region will remain within the region.

iii.The companies that do not have the test may follow the example of the test companies and thus the production of higher quality products will be ensured.

iv.The reliability of the companies will increase in accordance with the test results.

v.Quality and assurance awareness will develop in companies.

vi.It will support the R & D and P & D activities of the companies.

vii.The test services will be provided for the institutions, organizations and companies operating in the region.

b) Regional-Based Impacts:

i.Academic studies and scientific outputs will be obtained in the province. (The analysis of the academic studies to be carried out in Gaziantep University and other universities in the province will be provided with expert staff within the laboratory)

ii.As the confidence of the companies increases in line with the test results, the export figures in the province will also increase.

iii.Based on the increases in production, it will contribute to employment in the province.

iv.Testing services will be provided to the relevant companies in the province.

v.In the province, external dependence for tests will be eliminated.

NPV method was used for financial analysis. The purpose of financial analysis is to reveal the level of profitability to run the project. The NPV method can be defined as the difference between the sum of the present value of the inflow of money to be provided over the economic life of the investment and the present discounted value of the investment required by the investment over a certain discount rate. The formula to be used in financial analysis is as follows:

$$FNPV = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \frac{S_2}{(1+i)^2} \dots + \frac{S_n}{(1+i)^n}$$

In the formula above, financial net present value (FNPV), Sn is the difference between the benefit and cost in the nth year (net benefit), i is the discount rate (12%)[3] and n equals to the economic life of the project (20 years).

In the financial analysis of the project, only cash inflows and outputs are included. The cost factors that do not cause cash outflow such as depreciation have not been taken into consideration in the analysis. In addition, costs are included in the calculations at fixed prices. Inflation increases or decreases and VAT provisions are not taken into consideration. When the data obtained from the analysis of the revenue and expenses are used, Table 16 is obtained and analyzed.

[3] Interest rates (discount rates) and economic life are determined according to the feasibility preparation rules of the Ministry of Industry and Technology.

Table 16. Financial Analysis Results

Years	Cash Flow(Sn) ($)	Net Present Value(NPV) $(Sn /1.12)^n$ ($)
0	-670,801.64	-670,801.64
1	198,878.95	177,570.49
2	198,878.95	158,545.08
3	198,878.95	141,558.11
4	198,878.95	126,391.17
5	198,878.95	112,849.26
6	198,878.95	100,758.26
7	198,878.95	89,962.74
8	198,878.95	80,323.87
9	198,878.95	71,717.74
10	198,878.95	64,033.70
11	198,878.95	57,172.94
12	198,878.95	51,047.27
13	198,878.95	45,577.92
14	198,878.95	40,694.57
15	198,878.95	36,334.44
16	198,878.95	32,441.46
17	198,878.95	28,965.59
18	198,878.95	25,862.14
19	198,878.95	23,091.19
20	198,878.95	20,617.14
Total discounted cash flow($)		1,485,515.08
Costs of Total investments($)		670,801.64
Difference between the NPV and Cost of investment($)		814,713.43
Internal Rate of Return (IRR)		**29.48%**

Source: Authors' own construction, 2018. Internal Rate of Return (IRR) is calculated by excel.

According to Table 16, the present value of the cash inflows during the economic life of the project (20 years) is calculated as $ 1,485,515.08. The present value of the investment is estimated as 670,801.64 $. Therefore, since the present value of the cash inflows of the investment is greater than the present value of the investment ($ 814,713.43), the investment can be made financially. In other words, FNPV > 0, even in the minimum number of tests, the project can be made. In addition, it is concluded that the investment is a highly profitable project within the framework of the analysis performed. On the other hand, the Internal Rate of Return (IRR) was calculated as 29.48%. Here, it is concluded that the project is feasible as it has IRR> i (29.48%> 12%).

4.2. Project Valuation Results under Uncertainty

Financial analysis of the project was carried out under certain assumptions. However, deviations in the targets present by the enterprise within the framework of demand analysis may occur and some deviations may occur in operating revenues.

When evaluating investment projects under the assumption of certainty, it is assumed that the realization of project parameters such as cash inflows, cash outflows, and the total investment amount required to evaluate the project alternatives, and also that all predicted numerical values do not deviate from the actual values. However, it is often incorrect to

assume that the predictions about the future will be definite and that the actual values will be realized. Because the future is full of uncertainties and risks, it is almost impossible to estimate the values of the project alternatives in advance.

Analyses were also made on the cash flows of the enterprise, in other words, by taking measures regarding a decrease in revenues. The risk factor "α" value was coded and its effect on cash flows was examined. "α" can be expressed as the regulatory factor for possible positive cash flows that will occur each year. Some methods are developed for the assessment of risky investment projects (Brealey et al., 2012; Ceylan and Korkmaz, 2015). Firstly, changing some parameters of the project in order to carry out sensitivity analyses. Secondly, to find out project risk, statistical methods such as sensitivity analysis, scenario analysis, or Monte Carlo simulation could be used.

In this study, a sensitivity analysis was preferred in the analysis of risk. In addition, cash flow risk adjustment method is used. Therefore, it is possible to show the adjustment factor "α" in the following analysis:

$$RNPV = -C + \frac{S_0\,\alpha}{(1+i)^0} + \frac{S_1\alpha}{(1+i)^1} + \frac{S_2\,\alpha}{(1+i)^2} \dots + \frac{S_n\,\alpha}{(1+i)^n}$$

Where, RNPV indicates that Risky Net Present Value of the project cash flows and investment costs.

Table 17. Cash Flow in Case of 10% Risk Factor

Years	Cash Flow(CF) (Sn) (USD)	Net Present Value(NPV) (Sn /1.12)^n (USD)	Risk Factor(α)	Adjusted Cash Flows(1-α)*CF (USD)	NPV of Risky Cash Flow(CF) (USD)
0	-670,801.64	-670,801.64		-670,801.64	-670,801.64
1	198,878.95	177,570.49	0.10	178,991.05	159,813.44
2	198,878.95	158,545.08	0.10	178,991.05	142,690.57
3	198,878.95	141,558.11	0.10	178,991.05	127,402.30
4	198,878.95	126,391.17	0.10	178,991.05	113,752.05
5	198,878.95	112,849.26	0.10	178,991.05	101,564.33
6	198,878.95	100,758.26	0.10	178,991.05	90,682.44
7	198,878.95	89,962.74	0.10	178,991.05	80,966.46
8	198,878.95	80,323.87	0.10	178,991.05	72,291.48
9	198,878.95	71,717.74	0.10	178,991.05	64,545.97
10	198,878.95	64,033.70	0.10	178,991.05	57,630.33
11	198,878.95	57,172.94	0.10	178,991.05	51,455.65
12	198,878.95	51,047.27	0.10	178,991.05	45,942.54
13	198,878.95	45,577.92	0.10	178,991.05	41,020.13
14	198,878.95	40,694.57	0.10	178,991.05	36,625.12
15	198,878.95	36,334.44	0.10	178,991.05	32,701.00
16	198,878.95	32,441.46	0.10	178,991.05	29,197.32
17	198,878.95	28,965.59	0.10	178,991.05	26,069.03
18	198,878.95	25,862.14	0.10	178,991.05	23,275.92
19	198,878.95	23,091.19	0.10	178,991.05	20,782.07
20	198,878.95	20,617.14	0.10	178,991.05	18,555.42
Total discounted cash flow($)		1,485,515.08			1,336,963.57

Costs of Total investments($)	670,801.64		670,801.64
Difference between the NPV and Cost of investment($)	814,713.43		666,161.93
Internal Rate of Return (IRR)			**26.44%**

Source: Authors' own construction, 2018. Internal Rate of Return (IRR) is calculated by excel.

Although there is a 10% decrease in the positive cash flows of the project, the investment value of the project is greater than the present value of the investment (USD 666,161.93). In other words, even under 10% risk factor, RNPV> 0, the project is in a feasible position. At the same time, Internal Rate of Return (IRR) was calculated as 26.44% if the risk factor was 10%. Here, it is seen that the project is still feasible under 10% risk because it has IRR> (26.44%> 12%) at 10% risk level.

Table 18. Cash Flow in Case of Maximum Risk Factor

Years	Cash Flow(CF) (Sn) (USD)	Net Present Value(NPV) (Sn /1.12)^n (USD)	Risk Factor(α)	Adjusted Cash Flows(1-α)*CF (USD)	NPV of Risky Cash Flow(CF) (USD)
0	-670,801.64	-670,801.64		-670,801.64	-670,801.64
1	198,878.95	177,570.49	0.5484	89,813.73	80,190.83
2	198,878.95	158,545.08	0.5484	89,813.73	71,598.96
3	198,878.95	141,558.11	0.5484	89,813.73	63,927.64
4	198,878.95	126,391.17	0.5484	89,813.73	57,078.25
5	198,878.95	112,849.26	0.5484	89,813.73	50,962.72
6	198,878.95	100,758.26	0.5484	89,813.73	45,502.43
7	198,878.95	89,962.74	0.5484	89,813.73	40,627.17
8	198,878.95	80,323.87	0.5484	89,813.73	36,274.26
9	198,878.95	71,717.74	0.5484	89,813.73	32,387.73
10	198,878.95	64,033.70	0.5484	89,813.73	28,917.62
11	198,878.95	57,172.94	0.5484	89,813.73	25,819.30
12	198,878.95	51,047.27	0.5484	89,813.73	23,052.95
13	198,878.95	45,577.92	0.5484	89,813.73	20,582.99
14	198,878.95	40,694.57	0.5484	89,813.73	18,377.67
15	198,878.95	36,334.44	0.5484	89,813.73	16,408.63
16	198,878.95	32,441.46	0.5484	89,813.73	14,650.57
17	198,878.95	28,965.59	0.5484	89,813.73	13,080.86
18	198,878.95	25,862.14	0.5484	89,813.73	11,679.34
19	198,878.95	23,091.19	0.5484	89,813.73	10,427.98
20	198,878.95	20,617.14	0.5484	89,813.73	9,310.70
Total discounted cash flow($)		1,485,515.08			670,858.61
Costs of Total investments($)		670,801.64			670,801.64
Difference between the NPV and Cost of investment($)		814,713.43			56.97
Internal Rate of Return (IRR)					**12.00 %**

Source: Authors' own construction, 2018

Despite a decline of 54.84% in the positive cash flows of the project, the present value of the cash flows of the investment is greater than the present value of the total investment (56.97 USD). From this point of view, the project can be said to be profitable. In other words, even under the risk factor of 54.84%, RNPV> 0, the project is in a position to be profitable.

The project has a very profitable and resistant cash flow, and in the worst case scenario it has the resistance that can recoup its costs and expenses. Internal Rate of Return (IRR) and discount rate (i) are equal to each other at 54.84% risk. In summary, in case of a 54.84% contraction in the cash flows obtained, the NPV of the project is reset, that is, it is at the breakeven point. This indicates that the project's cash flows are strong and that the project can be made under these determined assumptions.

5. CONCLUSION

It is of great importance to protect the consumer in the 21st century and to show that these products used by the consumers are not harmful to health. Changes, developments and measures taken in the world and Turkey footwear sectors, significantly affect the shoe industry in Gaziantep province. According to the data obtained from Gaziantep Chamber of Shoemakers, the number of footwear manufacturers in Gaziantep is 875 and the total number of establishments is 2175. These businesses provide an important contribution to Turkey's economy.

Firms that manufacture shoes in Gaziantep have chemical tests and physical tests related to their durability to show that the products they produce do not contain harmful substances for human health both before their domestic and international sales. As a result of this necessity, the companies that manufacture the relevant products are required to take a test from accredited testing laboratories (in accordance with TSE standards) to prove that the product they produce is not harmful. Since there is no accredited laboratory where such tests can be carried out in the region, companies carry out the relevant tests mainly by sending them to the Istanbul province. For this reason, the need for a test laboratory to meet both local and regional needs emerges in Gaziantep.

The aim of this study is to bring the financial events of the accredited test laboratory established in Gaziantep to the financial literature before and after the installation within the framework of the feasibility report. The feasibility study was created as the birth of the idea of investment, pre-feasibility studies, feasibility study, technical, legal, organizational, economic and financial studies, evaluation and investment decisions, preparation of the final project, and implementation of the project.

In this context, the companies' opinions in the Gaziantep shoe sector were received through survey and included in the feasibility studies. Net present value (NPV) and internal rate of return (IRR) methods, which take into account the time value of money, were used in the economic and financial analysis during the evaluation of the mentioned investment project. In the framework of the findings obtained, it was determined that the NPV value was greater than zero, in other words, it was positive and the investment project of IRR was higher than the projected interest rate. Therefore, it is seen that the project is profitable. In the advanced stage, the sensitivity analysis was carried out within the scope of the analysis of risky investment projects, and the reaction of NPV and IRR was examined against the shocks that would occur in positive cash flows. The results obtained in this context show that the project is still feasible even in case of a maximum loss of 54% in positive cash flows.

In this context, this study will make important contributions to the implementation of NPV and IRR methods in the financial literature. Moreover, this study will contribute

significantly to the field of footwear sector in Turkey, since it is the first study done in Gaziantep province. This study could be a roadmap for the similar future activities, which could be in the different sectors, different investment projects and feasibility studies for different provinces. As a result, it can be a great source to support the projects that will contribute significantly to the economy of Turkey.

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