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PERFORMANCE EVALUATION AND STRATEGY DEVELOPMENT STUDY USING AHP and DEA FOR BUSINESS CENTERS

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ABSTRACT

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In this thesis, performance evaluation has been carried out according to efficiency measurement for Business Centers which are financed by the European Commission and supported by local chambers. Three Business Centers were established in Gaziantep, Kocaeli and Izmir. The Centers deliver consulting, training and information services to Small and Medium sized Enterprises. In the performance evaluation of Business Centers which have similar inputs and outputs, Data Envelopment Analysis has been used even tough they are established in different regions. The two inputs used in Data Envelopment Analysis are qualitative and they have been transformed into quantitative variables using Analytical Hierarchy Process. Criteria have been defined for Analytical Hierarchy Process and with the participants' support and brain storming session, qualitative data was transformed into quantitative data. In order to perform the Analytical Hierarchy Process, a model has been formulated in Excel Sheet. In order to calculate efficiency the Warwick DEA Software was used.

Key words: Business Centers, Performance Evaluation, Data Envelopment Analysis, Analytical Hierarchy Process.

ÖZET

VERİ ZARFLAMA ANALİZİ VE ANALİTİK HİYERARŞİ PROSESİ İLE AB İŞ GELİŞTİRME MERKEZLERİNİN PERFORMANS DEĞERLENDİRİLMESİ ve STRATEJİ GELİŞTİRİLMESİ

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Bu tez çalışmasında, Avrupa Komisyonu tarafından finanse edilen ve yerel odalar tarafından desteklenen İş Merkezleri'nin (AB Iş Geliştirme Merkezleri) performans değerlendirilmesi etkenlik ölçümüne göre yapılmıştır. AB Iş Geliştirme Merkezleri, Gaziantep, İzmir ve Kocaeli bölgelerinde kurulmuş ve KOBİ lere danışmanlık, eğitim ve biligi hizmetleri sunmaktadırlar. Üç ayrı ilde kurulmuş olmasına rağmen aynı tür girdilere ve çıktılara sahip olan AB Iş Geliştirme Merkezleri'nin performans değerlendirmesinde Veri Zarflama Analizi yöntemi kullanılmıştır. Veri Zarflama Analizinde kullanılacak girdilerden iki tanesi nicel girdi olduğundan nitel girdiye dönüştürülmesi için Analitik Hiyerarşi Prosesi kullanılmıştır. Analitik Hiyerarşi Prosesi için kriterler belirlenmiş ve katılımcılaraın yardımı ile anket ve beyin fırtınası gerçekleştirilerek nicel veriler nitel verilere dönüştürülmüştür. Analitik Hiyerarşi Prosesini hesaplamak için Microsoft Excel'de uygun model formüle edilmiştir. Veri Zarflama Analizi için ise Warwick DEA Software kullanılmıştır.

Anahtar kelimeler: İş Merkezleri, Performans Değerlendirmesi, Veri Zarflama Analizi, Analitik Hiyerarşi Prosesi

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LIST OF SYMBOLS/ABREVIATIONS

BC	Business Center
SME	Small and Medium Size Enterprise
BCD	Business Center Director
EUD	EU Co-Director
BSM	Business Service Manager
EULTE	EU Long Term Expert
STE	Short Term Expert
OSS	Office Support Staff
IntSTE	International Short Term Expert
Local STE	Local Short Term Expert
DEA	Data Envelopment Analysis
AHP	Analytical Hierarchy Process
PCU	Project Coordination Unit
TOBB	The Union of Chambers of Commerce
KOSGEB	Small and Medium Size Enterprise Development Center

CHAPTER I

INTRODUCTION

1.1. Introduction

The importance of service companies is increasing in new economies all over the world. It is a well-known fact that in today's world, service facilities are dominating and they constitute the largest portion of economic activities. Therefore, designing and locating service facilities effectively plays a very important role in the profitability of service companies. Companies are being more vulnerable when they are not aware of their abilities. In order to understand companies operation and results it is important to review their performance. Performance measurement can be helpful in understanding the improvement area for companies and it can stimulate change and adaptation to market conditions.

This thesis will focus on Business Centers which operate in 3 different cities in Turkey. The organizational structure of this company consists of one Headquarter office in Ankara and 3 Business Centers in Izmir, Kocaeli and Gaziantep. The cities' economy and main industry sectors are completely different from each other. In headquarters office General strategies are developed and coordination is kept with Business Centers. The headquarters office makes strategic and common decisions; at the tactical and operational level, Business Centers make their own decisions. The basic organizational structure of each Business Center consists of one Director, 6 consultants, 3 office support staff and project basis short term consultants. Business Centers have similar resources and deliver consulting, training and information services.

Although in literature there are many studies on DEA to measure performance, this thesis will carry out an extended study to identify critical performance indicators using AHP technique.

1.2. Aim of the Thesis

The purpose of this thesis is to measure the performance level of Business Centers (BCs) in order to reach quantitative conclusions for future organization and certain measurements would be taken and evaluated. The nature of the comparison is very suitable for the 3 BCs since they have the same sort of activities such as Consulting, Training and Information services. In addition, the organizational structure of BCs is the same i.e. Director, Business Service Managers, Office Support Staff and Short Term Experts.

Performance measurement is a solid indicator for reviewing the activities and operations of companies. Management can only realize that the operation of company is getting better or worse by looking at the performance. In this way measures can be taken by management. Although performance measurement is one of the key points, management should be careful to use suitable methods with suitable approaches.

Data Envelopment Analysis (DEA) was initially developed as a method for assessing the comparative efficiencies of organizational units such as the branch of banks, hospitals and schools. The key feature which makes the units comparable in each case is that they perform the same function in terms of the kind of resources they use and the type of output they produce. The 3 Business Centers have the same inputs and same outputs even though they are established in different regions having different economic, culture, and market conditions. In order to measure performance precisely this thesis is also aiming to take into account the effect of external indicators on the performance of 3 Business Centers. On the other hand, in DEA, inputs and outputs should have numerical value. In order to assign numerical values to inputs/outputs, Analytical Hierarchy Process (AHP) is used.

The Analytical Hierarchy Process is a technique for evaluating the factors that make up a decision. It takes your opinions of whether one factor is more important than another and converts them into a relative weighting of all the factors. Using this aspect of AHP, external inputs/outputs can be converted from qualitative data to quantitative data. In order to achieve this objective, firstly, criteria will be decided, and according to these criteria pairwise comparison matrices will be developed with the brain storming with Business Center's staff. The pairwise comparison matrix will allow to identify the relative importance of each alternatives which are Gaziantep, Kocaeli and İzmir Business Centers according to identified

criteria. In order to identify numerical values of external factor(s), a spreadsheet will be developed and the result will be numerical values for identified inputs or/and outputs for each Business Centers.

In the final stage of the thesis study, all inputs and outputs will be put into DEA Software in proper model and the model will be executed. Finally, the result will be discussed and key recommendations will be issued.

1.3. Literature Summary

AHP and DEA are getting more importance in decision making. AHP [1] was designed in a way that it can solve complex problems involving multiple criteria. It allows decision-makers to specify their preferences using a verbal scale. This verbal scale can be very useful in helping a group or an individual to make a fuzzy decision [2].

There are also some attempts related with organizations performance evaluation. The balanced scorecard integrated for company's strategic initiative which AHP used in order to identify relative weight of performance categories [3]. Feng Cuhan-Pan also used AHP in order to identify key performance indicators [4]. Strategic decision is not only based on intuitive feelings anymore. Hummel, also used AHP for strategic decision making. The choice for either an organizational structure based on disciplines or an organizational structure based on the fields of application of research. Saaty's analytic hierarchy process (AHP) has been used to facilitate joint decision-making processes by evoking consistent logical foundations and consensus formations [5]. AHP method applied the part of the strategic decision. The decisions might seem not important but it may affect the overall performance. Dağdeviren,et.al used AHP to make decisions on wage management in an organization. Their approach is to improve short-term productivity which will help towards long-term objectives.

DEA has been applied to a variety of applications for choosing performance frontiers [6]. DEA has been used alone in order to find efficient organization or branches. It has been applied in Textile and Cement Industry [7], health sector [8], and bank branches [9] among other. In literature there is no other example of AHP and DEA method integration used in Business Centers, whereas there are other method used SMEs performance measurement [10]. There have been not so many attempts in literature combining AHP and DEA. Shang and Sueyoshi [11] used an accounting procedure to determine the DMU inputs. To determine the

DMU outputs, they used an AHP model to examine non-monetary criteria associated with corporate goals and long-term objectives, and used the simulation model to analyze the tangible benefits. AHP and DEA integration was also used in facility layout planning [12]. The model was designed in order to transform qualitative data to quantitative data in order to find an efficient layout with the help of DEA. AHP was also used alone to make location decisions [13].

CHAPTER II

2. BUSINESS CENTERS PROJECT

2.1. Business Centers

2.1.1. General Background of Business Centers

Limited access to technical support for individual small and medium sized companies, both in the start-up phase and in any subsequent stage, is regarded as an important obstacle for sound business conduct. The upgrading of general business skills including financial management is considered to be of utmost importance. The lack of know-how relating to credit applications, coupled with weak financial and administrative knowledge is another problem to be addressed by the project.

An additional concern expressed by all SME organizations and the enterprises themselves relates to the upgrading of labor/staff skills. Access to tailor-made vocational training for companies has been identified as an important problem, which should be dealt with in SME support programmes.

Many enterprises seem to have sufficient potential for the development of international activities, but lack of the skills and knowledge on export market demands, export marketing, design, quality standards, and financial operations etc. for engaging in successful export marketing. Furthermore, the identification of suitable business partners and investment promotion activities is often hampered due to the lack of experience, manpower, credit and know-how available. These obstacles will be taken into account in this project.

The Business Centers have been established in three different geographical regions in Turkey. The selected areas are: Izmir, Gaziantep and Kocaeli. Izmir represents the dynamic, primarily SME-based, Aegean region, which is the second most important region after Istanbul/Marmara. The rapidly expanding industry of this region has a high potential of internationalization. Gaziantep represents Southeast Anatolia, a region marked by socio-economic challenges, such as low general income levels. The city of Gaziantep has taken a pioneering role for the whole South-Eastern Anatolia region. SME development and stimulation is seen as a major tool to achieve higher socio-economic stability in this region.

Kocaeli (Izmit) represents the Marmara region, the most developed industrial region of Turkey. About 38 % of Turkish industry and SMEs are located in this region. The locations of Business Centers are shown in Figure 2.1. The contact information of Business Centers can be found in Appendix VI.

Figure 2.1 The location of Business Centers

2.1.2. Wider Objective, Project Purpose and Results

2.1.2.1. Project Wider Objective

The overall objective of the EU Turkish Business Center project is to support economic growth through improvement of SME business operations, increase employment opportunities, contribute to economic/social development and contribute to EU-Turkish business relations in the framework of the Customs Union.

2.1.2.2. Project Purpose

The project finances the development and implementation of three Business Centers in Gaziantep, lzmir and Kocaeli regions. The Business Centers have been developed with a view to:

- Support SMEs general business operations through provision of information and training/advisory services in management-related topics such as business planning, marketing, financial management, access to credit, etc.
- Assist SMEs in the internationalization process towards the EU and the Mediterranean partners through existing networks and individual actions.
- Build up experience in policy guidelines to be presented to appropriate existing channels on the local, regional and national level (administrations/business organizations) in order to improve the business climate for SMEs

More specifically, the Centers also aim to:

- Stimulate the use of environmentally sustainable methods of business operation
- Promote increased participation of women entrepreneurs in business activities

Expected results

- Three independent and self-sustaining EU-Turkish Business Centers able to continue operations at the end of the project, after which they will be managed and run by local Turkish staff.
- Each of these Centers will have provided assistance to at least 1,200 companies over the project period.
- A BC Strategy and appropriate tools to promote and implement environmental sustainability in the BC's own operations and the services that are provided to SMEs.
- A strategy and appropriate tools to facilitate the use of the Centers and their services by women and plans for increased women's participation in the formal economy
- BCs that are fully integrated in a network of existing Business Centers in the EU member states and the EU Mediterranean partners Syria, Egypt, Jordan, Morocco and Tunisia.
- A comprehensive evaluation of the performance of the three Business Centers and according to the needs on the ground and a demand-driven approach, a detailed strategy for the establishment of additional Centers in other regions with development potential
- The experiences gained during the project period concerning the business environment for SMEs interpreted into Policy Level Advice available for the appropriate institutions in Turkey.

The primary target groups for the project are private, Turkish Small- and Medium-Sized Enterprises (SME) as well as start-ups/potential entrepreneurs in the selected areas. The project counterpart is the The Union of Chambers of Commerce, (TOBB).

2.1.2.3. Needs of the Beneficiaries

The needs of the beneficiaries can be defined as: technical assistance and counseling on how to start a business; technical assistance and counseling for individual companies in order to improve their general business operations; technical assistance and counseling to assist in the internationalization process of individual SMEs; technical assistance and advisory services to prepare individual companies for application of credits and support to develop financial management skills.

2.1.3. Management Structure of the Project

Technical Assistance Contractor (TAC)

The technical assistance input is delivered by a 'Technical Assistance Contractor-TAC'. The TAC makes available both international experts and local experts, who are assigned to the BCs.

The Technical Assistance Contractor is responsible for carrying out the tasks described below.

- Initiate reporting procedures to TOBB and PCU
- Act as secretariat for the PCU
- Set up financial administration procedures
- Participate in regional business Center co-ordination meetings a monitor and evaluate business Center activities
- Provide advice for TOBB and PCU on business Center activities and SME policy issues
- Propose (if necessary) revisions/amendments to the programme
- Co-ordinate new business Center activities

Project Co-ordination Unit

A Project Co-ordination Unit (PCU). composed of representatives from TOBB, the EICC in Ankara, the European Commission's Representation to Turkey, the TAC Project Director and the six BC co-directors has been established for the duration of the project.

The PCU ensures the continuity, the synergy and exchange of experiences of the different Centers during the project. TOBB and the European Commission approve the annual work programmes and the six monthly progress reports for the project.

In the course of the project, it is aimed that the PCU develop into a platform for disseminating policy advice, as well as taking up the role of interface at national level between the individual Centers and national organizations, financial institutes etc.

Partners and Consultative committees

Two major national organizations, TOBB (counterpart) and KOSGEB participate in the project. Their participation ensures access by the project to existing nation-wide networks covering all sectors and regions. Both organizations have nominated representatives in the consultative committees (see below) and make available their knowledge and experience to the project.

For each of the three Centers, a local Chamber acts as a leading partner in the establishment of a local consortium of business organizations, which contains the key economic players for the region. The local consortium provides sponsorship and support for the success and sustainability of the Center and will ensure regional emphasis of the Centers. The local consortium participates in the consultative committee.

Business Centers

Initially each Business Center had one European and one Turkish co-director, jointly responsible for the daily management of the Centers. The directors of each Center were assisted by Technical Assistance as described above.

After consultations with the consultative committee, the directors were responsible for submitting the annual programmes/business plan and the six monthly progress reports including detailed financial statements, for approval to the European Commission's Representation to Turkey and to TOBB.

In the course of project implementation, responsibility was progressively transferred to the Turkish Director in preparation for February 2006 when all EU technical assistance does no longer continue.

2.1.4. Project Activities

The Business Centers (BCs) were established to provide demand driven based services for Small and Medium-sized companies as well as for start-up entrepreneurs in their regions. After an initial market research study conducted in the three BC regions, the following were identified in terms of advisory and training services needed:

- Business planning
- Strategic management and general management
- Marketing
- Marketing plan implementation
- Export development support
- Financial management and accounting
- Project finance
- Quality management systems implementation
- Start-up support

The services are normally provided on an individual company basis but if a number of companies express similar needs joint activities ensure access to proper tools due to economy of scale.

Furthermore, the BCs also act as information providers regarding Turkish or donor financed credit lines available or other business related maters.

2.1.5. Description of Main Activities

The management structure of the BCs is designed to ensure a strong regional influence in each individual Center. This regional influence, together with the demand-driven nature of the Centers, ensures that the services offered are fully adapted to the needs of local companies, which are likely to differ substantially from region to region.

The business support services of the Centers, provided on demand, assist the entrepreneur in the whole cycle of business improvement, from identification of problems to instalment/implementation of an improvement plan.

As far as individual advisory services are concerned, the Centers are able to provide the following:

a. Quick scan
   A general review to make an overall assessment of the company.

b. Diagnostic review
   To undertake a more in-depth review and provide recommendations and plans for improvement.

c. Implementation of recommendations (from the diagnostic review)
   To provide in-company assistance in implementation of the recommendations and plans prepared under b. above.

d. Follow-up
   A proper follow-up mechanism installed to enable both the company and the Center to fully benefit from experience gained when implementing improvement plans and recommendations.

In addition to this individual counseling, the Center provides training, information service or other support activities on a group basis, if a sufficient number of companies need support in similar topics. Furthermore, each BC is able to link individual or groups of companies to other service providers/SME support projects.

Upgrading consultancy services

Initially, the services offered by the Centers to individual enterprises were provided with a strong input from EU experts and as the case may be from local experts. By the end of the project the EU experts are expected to leave and all the services will be provided by the BC staff and local experts.

Internationalization

The Business Center assists SMEs in facilitating their entrance and further development on the EU and Mediterranean markets. The services provided promote export activities and the formation of linkages between Turkish and EU or Mediterranean companies. A primary task

of the Center is to provide information on both EU-Turkey commercial policies like the Customs Union provisions and rules and regulations affecting trade and other international business relations with the other Mediterranean Partners.

The Centers also assist individual companies with capacitating themselves for international markets, including advice on product quality, design, pricing, marketing, timely supply and quantity of production etc.

In a subsequent phase, tools have been used to link up with international networks promoting the company, its products, seeking investment possibilities, joint venture opportunities etc. The Centers have use existing matchmaking instruments at individual and collective levels.

Relations to other SME development activities

In addition to the two major areas of activity described above, the Centers have also provided expertise and rendered limited services in very specific areas affecting the performance of local SMEs. These so-called 'windows' projects have focused on strategic areas specific to the region.

In addition to direct services to companies the BCs have also played a role vis-à-vis primarily other EU funded projects. With its central role in the comprehensive SME support programme approach (as described above), the Business Centers are ideally placed to undertake the necessary co-ordination between other networking business organizations.

Payment for services

The EC-support is gradually declining during the course of the project in order to reach full self-support at the end. This implies that there is a need to seek support from local organizations, public as well as private, as well as fees being paid for the services rendered by the Centers. The Centers have established fee policies in accordance to regional conditions and market perceptions, which they have applied throughout the project duration. In addition, they have searched other sources of finance and developed sustainability models to be fully used after project completion.

Description of experts and staff for each Center

Co-Directors

Initially, both the EU and Turkish Co-Directors had full responsibility for all general administrative and financial matters of the individual Center. The co-directors interacted with the consultative committee and reported to the TAC Project Director.

Long-term senior experts

During the first two phases of the project, the TAC provided to each Center two long-term advisors, one of whom was nominated as European Co-Director. After the first 20 months of operation, as originally planned only one long-term advisor stayed on. The European Co-Directors were in the Business Centers until April 2005.

Long-term junior experts

For the first two phases, two junior long-term advisors of the TAC were attached per Center. After the first 20 months of operation, one junior expert has remained, in principle, for the total project time.

Short-term experts

Until April 2005, the TAC provided short-term experts to each Center. The short-term experts have transferred their technical know-how to the local expert staff by providing on-the-job training and coaching, assisting with the development of services and products and introducing the staff to relevant international networks and trade and investment promotion mechanisms and institutes.

Business Service Managers

Originally, a total of six in-house consultants / project managers, called business service managers (BSM), were appointed in each Center. Each BSM was responsible for designated business areas, namely business management and business growth, quality management systems, finance, export development, IT and information services and start-up/marketing. Starting in January 2005, two to three additional BSMs were hired, depending on the Center, to include a training BSM as well as other BSMs supporting existing departments.

Since the beginning of the project, the development of the local team has been a priority. The aim has been to ensure that the skills and knowledge necessary in order to fully operate the

Center after project completion were transferred and absorbed by the individual team members. On-the-job-coaching by the TAC (both long and short term) has formed an integral part of the input provided by the project.

In addition to the BSM, the local expert staff has also consisted of out-sourced local short term experts. Depending on the region and the availability of experts with the required skills, the local experts may have also received training and coaching form project resources.

Office Support Staff

Office support staff has also been attached to the project for the provision of supporting activities in the field of project development, administrative activities and general office management. The experts and support staff of the Centers have been paid out of the EC contributions.

CHAPTER III

3. INTRODUCTION TO PERFORMANCE MEASUREMENT WITH AHP and DEA

3.1. Introduction

Clearly a principal objective of performance measurement is to enhance various notions of efficiency. In this popular manifestation performance measurement leads to league tables but within the context of performance management that is only the starting point of an exercise in performance measurement. Further detailed analysis and possibly inspection of the best and worst performers is then necessary in order to understand the production process and derive useful information which may help both the worst and the best performers to make further improvements in efficiency.

The modern management techniques are allowing management to understand their situation with sound results. In this chapter AHP and DEA will be presented in order to understand the level of performance of 3 Business Centers.

3.2. Introduction to Analytic Hierarchy Process (AHP)

The analytic hierarchy process (AHP) is a multi-attribute modeling methodology which was first developed and applied by Saaty [1]. AHP is designed to solve complex problems involving multiple criteria. The process requires the decision maker to provide judgments about the relative importance of each criterion and then specify a preference on each criterion for each decision alternatives.

The importance of decision making in human judgments have increased. The Analytic Hierarchy Process (AHP) is a powerful and flexible decision making process to help people set priorities and make the best decision when both qualitative and quantitative aspects of a decision need to be considered. By reducing complex decisions to a series of one-on-one comparisons, then synthesizing the results, AHP not only helps decision makers arrive at the best decision, but also provides a clear rationale that it is the best [14].

The typical AHP model should include Objective, Criteria and Alternatives shown in Figure 3.1

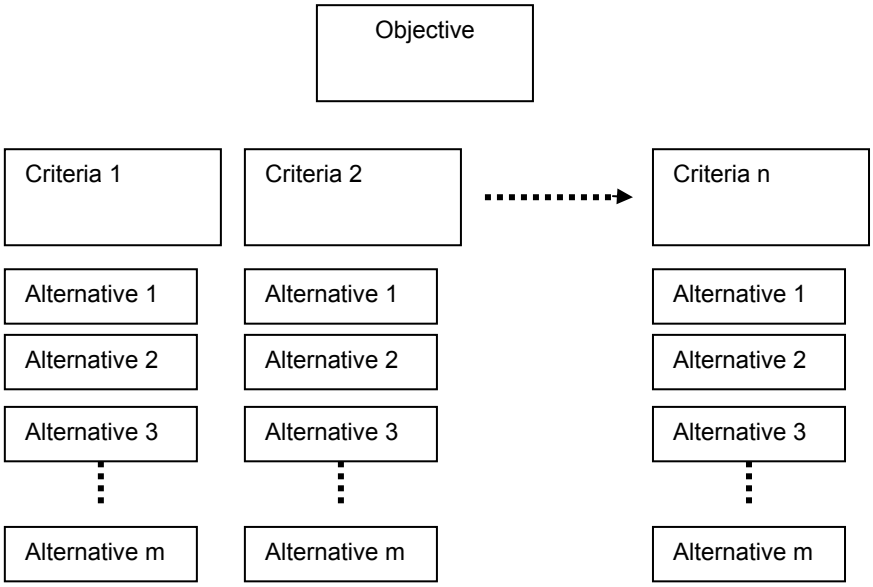

Figure 3.1 Typical AHP Model

Mathematically, the objective is to determine the non-negative weights w_i of the criterion c_i for $i = 1$ to n, where n is the number of criteria. If the weights $w = (w_1, ..., w_n)$ were known, then the relative importance of the criteria ci as compared to cj would be the ratio w_i / w_j. The basic idea of AHP is precisely to proceed from a pairwise comparison of the criteria and to evaluate the weights through a special procedure.

In an empirical study of preferences, one might in principle be content to make comparisons of all criteria with only the first criteria for instance. In this way one would find empirical weight ratios w_i / w_1 for $i = 1$ to n. These values only define the weight w up to an overall factor, and it is therefore always possible to represent the vector w by a normalized vector, e.g. by imposing:

$$\sum_i w_i = 1 \tag{3.1}$$

Clearly, there is no particular reason to choose the criterion c_1 as a reference, any of the criteria could form the basis for a comparison with the others because of the underlying permutation symmetry of the criteria. Combining all n possible pairwise column vectors into a matrix A in the following way

$$A=\begin{bmatrix} w_1/w_1 & w_1/w_2 & w_1/w_3 & \dots & w_1/w_n \\ w_2/w_1 & & & \dots & \\ w_3/w_1 & & & \dots & \\ . & & & \dots & \\ . & & & \dots & \\ w_n/w_1 & & & \dots & w_n/w_n \end{bmatrix} \tag{3.2}$$

one arrives at the starting point of the Saaty analysis. The elements of the matrix *A* have the special property

$$a_{ij} = 1/a_{ji} \text{ for all } i \text{ and } j, \tag{3.3}$$

from which follows that the diagonal elements are unity and the upper-right and lower-left triangular blocks are reciprocal. It is easy to see that w is a right eigenvector of the matrix *A* with eigen value *n*:

$$A_W = n_w \tag{3.4}$$

The matrix A /n is simply a projection operator on the one dimensional space defined by the vector w. In fact, the column vectors of A are proportional as a consequence of representing n perfectly consistent comparisons with reference to each of the criteria. [15]

In the most common Saaty approach, a linear scale 1,2,3....,9 for the pairwise comparisons is used to quantify how much more important a criterion is compared to another one. The value 1 for instance means equally important and 9 means much more important. If the criterion is less important than another one, then the inverse preferences 1,1/2,1/3,...,1/9 are used as can be seen in Table 3.1

Table 3.1 Scale of Importance

Intensity of Importance	**Definiton**
1	Equal importance
3	Moderate importance
5	Strong importance
7	Very strong importance
9	Extreme importance
2,4,6,8	For comprise between the above values

Clearly the choice of a linear scale and the maximum value is somewhat arbitrary but this is simply a reflection of the general problem of quantifying preferences in multi-attribute decision models. It is quite reasonable to use a bounded positive evaluation scale, i.e. no infinite preferences are allowed. Therefore all the elements of the matrix A are finite and positive.

However, the use of a linear scale creates an immediate inconsistency in the AHP approach. Consider for example a situation with 3 different criteria and a value scale with possible values 1/3, 1/2, 1, 2, 3. Suppose that one tries to value the criteria in a close and increasing value sequence with a matrix A of the form:

$$A = \begin{bmatrix} 1 & 1/2 & 1/3 \\ 2 & 1 & 1/2 \\ 3 & 2 & 1 \end{bmatrix}$$

It is seen that the matrix column vectors are not proportional as in the perfectly consistent matrix shown above. This happens in spite of trying as well as possible to provide consistent answers in each of the pairwise comparisons based on criterion 1, 2, and 3, repsectively.

Scale starts with 1 (equal importance) and ends with the maximal preference. A consistent scale is thus defined by only two independent parameters, the number of different preferences and the maximal preference. When the standard linear scale is used, arguments of a somewhat psychological nature are often given for using precisely 9 possible preferences (i.e. J=8) and to take the maximal preference to be 9 as well.

The standard AHP approach assumes that we are provided with answers to precisely $n(n\text{-}1)/2$ questions, in other words, we have an empirical input of pairwise comparisons corresponding in the left-lower triangular part of a comparison matrix A. Since a criterion compared to itself gives the ratio unity and the diagonal elements of the matrix are therefore all 1.

In the standard approach, one does not ask for both a comparison of ci with cj and of cj with ci because answers are assumed *a priori* to be consistent, i.e. aij = 1/aji, i.e. the upper triangular part is inverse symmetric. In principle, however, this assumption is not required for

the logic of the approach, meaning that it would be possible to ask $n(n\text{-}1)$ comparison questions in the empirical study.

The standard AHP approach proceeds by remarking that the empirical matrix A most likely will have inconsistencies in the sense of its columns not necessary being proportional. Thus equation (4) will not necessarily be satisfied. Saaty proposed to find the weight vector w as an eigenvector solution of the equation:

$$A_W = \lambda \max w \tag{3.5}$$

where λmax is the maximal eigenvalue of A. It may be shown that λmax≥n. The deviation of the maximal eigenvalue from n in the perfectly consistent situation is used to define a consistency ratio

$$CR = CI / RI \tag{3.6}$$

where the consistency index CI is defined by ;

$$CI = (\lambda \max - n)/(n-1) \tag{3.7}$$

and RI is a number found by averaging CI over a large number of random A matrices. A consistency ratio CR which is smaller than 0.1 is normally considered to be acceptable since this is "close" to the situation λmax = n when then pairwise comparison matrix A is totally consistent. A standard consistency cut-off of 0.1 is often applied by only retaining empirical data which feature a consistency ratio below 0.1. The Table 3.2 shows n-RI values.

Table 3.2. n -RI values

n	3	4	5	6	7	8
RI	0.58	0.90	1.12	1.24	1.32	1.41

3.3. Introduction to Data Envelopment Analysis (DEA)

Data envelopment analysis (DEA) is a method for measuring comparative or relative efficiency. It is said relative efficiency because its measurement by DEA is with reference to some set of units which are compared with each other [16]. That is why DEA is not an absolute efficiency measurement.

Every instance of comparative performance measurement begins with implicitly, if not explicit, definition of the unit of assessment. The unit of assessment is the entity that is proposed to compare on performance with other entities of its kind. Such entities can for example be schools, bank branches or companies. The unit of assessment uses a set of resources referred to as *inputs* which it transforms into a set of outcomes referred as to *outputs.* The unit of assessment term was adopted by Charnes [17] to Decision Making Unit (DMU). The DMU should be homogeneous entities in the sense that they use the same resources to produce the same outcomes albeit in varying amounts.

In DEA the resources are typically referred to as "inputs" and the outcomes as "outputs". A DMU transforms inputs to outputs in a process depicted in Figure 3.2.

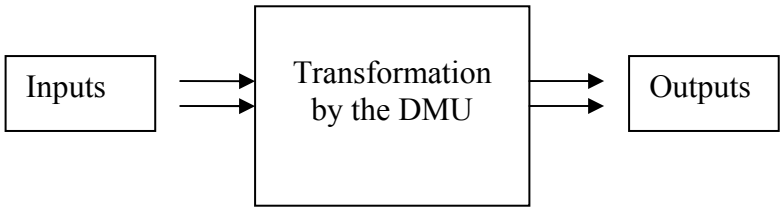

Figure 3.2.A DMU Transforms Inputs into Outputs

The identification of the inputs and the outputs in an assessment of DMUs is as difficult as crucial. The inputs should capture all resources which impact the outputs. Environmental factors which impact the transformation of resources into outcomes should also be reflected in the inputs or the outputs depending on the direction of that impact [16].

It is easy to calculate efficiency when there is one input and output but combining the relations between multiple inputs and outputs is possible with linear programming. In linear programming constraints and aim (maximize or minimize) should be identified. DEA enables

to provide efficiency score through linear programming when there are multiple inputs and outputs [18]. According to schematic representation, the units which are under the line are efficient unit. This line called Efficiency Frontier Figure 3.3 which defines the maximum combinations of outputs that can be produced for a given set of inputs.

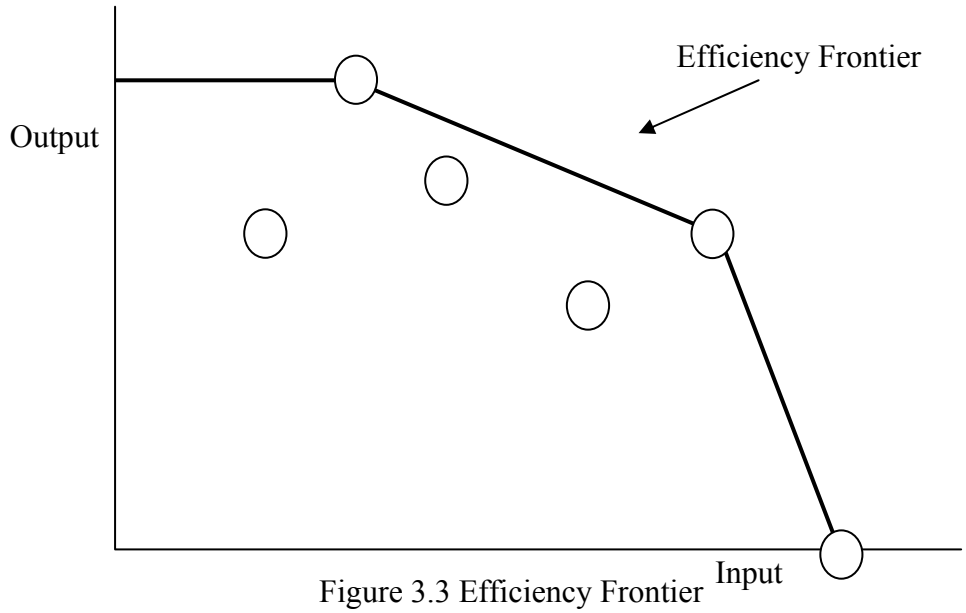

Figure 3.3 Efficiency Frontier

Data envelopment analysis (DEA) is receiving increasing importance as a tool for evaluating and improving the performance of manufacturing and service operations. It has been extensively applied in performance evaluation and benchmarking of schools, hospitals, bank branches, production plants, etc. [19].

DEA is a multi-factor productivity analysis model for measuring the relative efficiencies of a homogenous set of decision making units (DMUs). The efficiency score in the presence of multiple input and output factors is defined as:

$$Efficiency = \frac{weighted\ sum\ of\ outputs}{weighted\ sum\ of\ inputs} \tag{3.8}$$

Assuming that there are *n* DMUs, each with *m* inputs and *s* outputs, the relative efficiency score of a test DMU *p* is obtained by solving the following model proposed [19]:

$$\max \frac{\sum_{k=1}^{s} v_k y_{kp}}{\sum_{j=1}^{m} u_j x_{jp}}$$

$$s.t \frac{\sum_{k=1}^{s} v_k y_{ki}}{\sum_{j=1}^{m} u_j x_{ji}} \leq 1 \qquad \forall i$$

$$v_k, u_j \geq 0 \qquad \forall k, j, \tag{3.9}$$

where

k = 1 to s,

j = 1 to m,

i = 1 to n,

y_{ki} = amount of output k produced by DMU i,

x = amount of input j utilized by DMU i,

v = weight given to output k,

u_j = weight given to input j.

The fractional program shown as (2) can be converted to a linear program as shown in (3). For more details on model development see Charnes et al.[17].

$$\max \sum_{k=1}^{s} v_k y_{kp}$$

$$s.t \sum_{j=1}^{m} u_j x_{jp} = 1 \tag{3.10}$$

$$\sum_{k=1}^{s} v_k y_{ki} - \sum u_j x_{ji} \leq 0 \qquad \forall i$$

$$v_k, u_j \geq 0 \qquad \forall k, j.$$

The above problem is run *n* times in identifying the relative efficiency scores of all he DMUs. Each DMU selects input and output weights that maximize its efficiency score. In general, a DMU is considered to be efficient if it obtains a score of 1 and a score of less than 1 implies that it is inefficient.

3.4. Integration of AHP and DEA

In literature there are some studies which integrate AHP and DEA. Sinuany-Stern extended the DEA analysis beyond the mere classification of efficient/inefficient to a full ranking, by incorporating AHP [20]. Shang and Sueyoshi used an accounting procedure to determine the DMU inputs. To determine DMU outputs, they used an AHP model to examine non-monetary criteria associated with corporate goals and long term objectives and used the simulation model to analyze the tangible benefits [11]. Taho and Yang also used AHP/DEA model integration in order to solve layout problem [12]. The study aims to identify the best layouts. In the study qualitative data is converted to quantitative data.

In this thesis the AHP/DEA integration is also used in order to evaluation the performance of BCs. In the Business Centers there are numbers of data both qualitative and quantitative. In the performance evaluation, conditions are important. In order to understand in which conditions the Business Centers are performing would be more meaningful when the performances evaluated. It is not a surprise a water seller sells his water during the football match comparing to selling in a street. The external conditions might have an important role on the performance. But these external effects don't have always numerical value. Especially if performance evaluation is done with numerical value, qualitative data can be converted to numerical values. In this thesis some inputs are considered as external inputs which don't have numerical values. In order to overcome this, AHP is applied when DEA requires numerical value. The figurative illustration of the integration is explained in Figure 3.4.

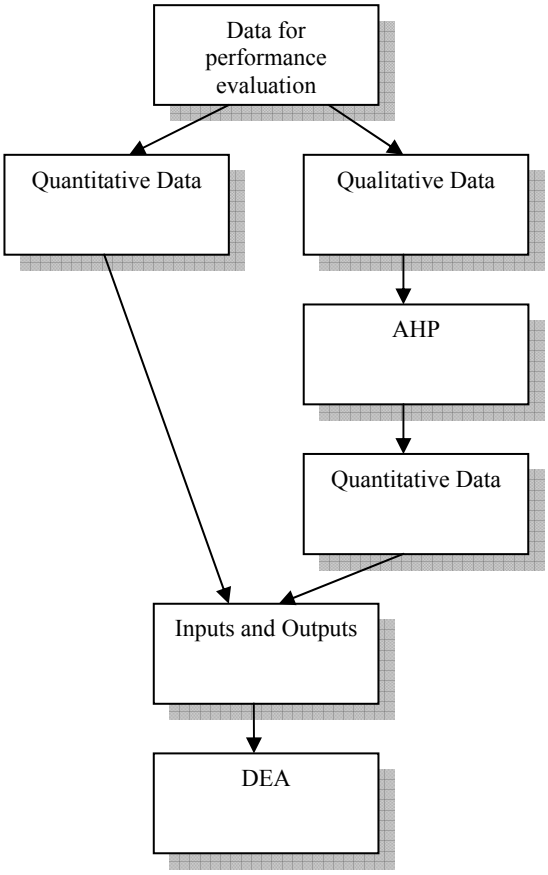

Figure 3.4 Integration of AHP/DEA Model for the Thesis

3.5. Scope of the Performance Evaluation

In this thesis identification of scope will be based on outside environment, management approach and time frame.

Business Centers are established in different regions which have different economic, social, and cultural structures. The external environment has enormous effect on the Business Centers' operations and performance since they are in different environment. In the following section of this thesis External environmental factor will be elaborated due to understand in what extend Business Centers should be evaluated.

The other aspect which should also be taken into account is that Business Centers' management approach is divided into 3 levels. These are: Strategic, Tactic and Operational (see Figure 3.5.)

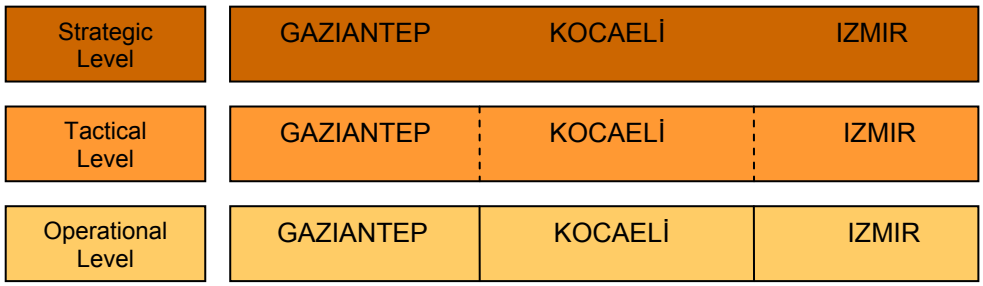

Figure 3.5 Business Centers' Management Approach

The strategic level represents the Business Centers' project strategy. In this level 3 Business Centers act together. All the decision making and strategies are applicable and adoptable by all of them. The output from the Strategic level will be representative of the result of the Business Centers Project.

In the Tactic level, each Business Center has the same approach; for example the system for delivering consulting or training is the same. The centers can follow the same procedures.

In the Operational level, each Business Center is independent from each other. At this level each Business Center can address the needs which arise from the market which have different features.

In this thesis, performance evaluation of the Business Centers will be carried out according to the strategic level and the period March 2003 to November 2004 will be the scope of the study.

3.6. Generic Model Development

One of the main objectives of performance measurement is to enhance various notions of efficiency. In this popular manifestation performance measurement leads to league tables but within the context of performance management that is only the starting point and exercise in performance measurement. Further detailed analysis and possibly inspection of the best and of the worst performance is then necessary in order to understand the service or production

process and derive useful information which may help both the worst and the best performance to make further improvements in efficiency.

AHP and DEA are well known decision making tools to help management for understanding the operations and results of the activities. AHP and DEA can be applicable alone or they can be integrated in order to make better decisions.

As it is known DEA is a very useful decision making tool in order to measure relative efficiency.

On the other hand, in order to get meaningful result out of the DEA, it is very important to choose inputs and outputs properly. In all organizations, numbers of inputs and outputs can easily be identified but the important thing is that those inputs and outputs should be well thought.

AHP is also a well known decision making tool in multiple selections. AHP helps the user to put criteria in order to make decisions. In this thesis AHP will be used in order to assign numerical values to some inputs and/or outputs in other words qualitative data will be transformed into quantitative data.

Although Business Centers are operating in the same structure, each Business Center's input level is different from the others. The reason why is that in some Business Center staff has changed during the evaluation time interval.

In light of above explanations, the proposed generic model is as follows in Figure 3.6;

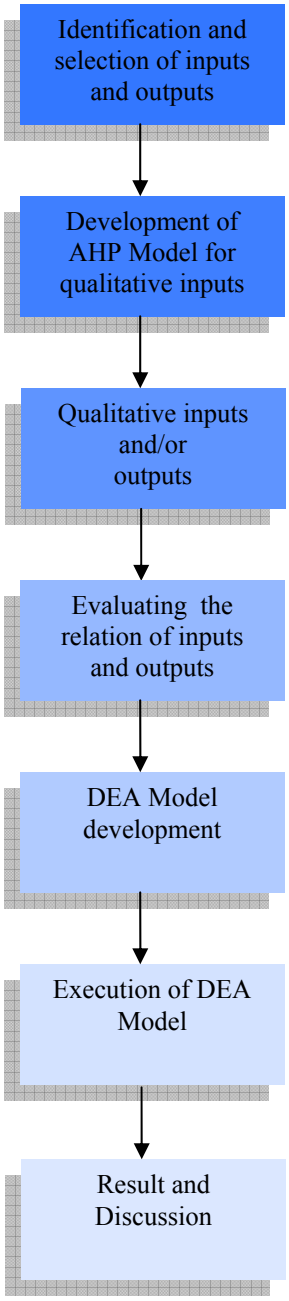

Figure 3.6 Generic Model

3.7. Identification of Inputs

Business Centers are acting as service companies in three different regions, but with the same resources. In service companies, the main production is done by people. In Business Centers there are different groups of people who are in charge of different operations. The services to Small and Medium Size Enterprises (SMEs) are given by involving different positions.

People who are working in the BCs can be classified as;

- Business Center Director (BCD): who is in charge of strategy formulation and decision making,
- EU Co-Director (EUD): who is responsible for delivering technical assistance to BCD,
- EU Long Term Experts (EULTE) :who are assisting the EUD and BCD,
- Business Service Managers (BSM) : who are responsible for customer relations, service identification, proposal preparation, managing and involving in consultancy projects,
- International Short Term Experts (INT STE): who are international consultants working with BSMs
- Local Short Term Experts (L STE) : who are local consultants working with BSMs
- Office Support Staff (OSS): who are in charge of administrative affairs of Business Centers.

In all organizations every unit/entity which is contributing to outputs can broadly be described as input and vice versa.

The human resource is extremely important for Business Centers when these are considered as service organization. In the Business Center's team, all staff has less or much contribution to outputs. Since Office Support Staff is always busy with administrative issues it can be neglected as input for this thesis.

In addition to the Business Center team there are other instruments which help Business Centers' staff in order to deliver the services. These are: cars available, numbers of computers, speed of internet, proximity of the Business Centers' offices to the service area during the period of evaluation. Since number of cars, computers and radius of service area which is 150 km are the same for the 3 Business Centers they would not affect the efficiency. Also office areas don't have high contribution to output according to Business Centers' staff.

Besides the inputs described above, there are also external effects that can be described as inputs. One of this is Market Potential which allows staff to execute their tasks and generate output. It can be imagined that even when staff resource is high in one Business Center, if market potential is not so high these staff would not generate much outputs. That is why Market Potential can be chosen as input.

Even if the Business Centers are acting as independent entities they still have great support by their Local Beneficiary. It is one of the key input as well the level of support for each Business Centers.

Identified Inputs

- Business Center Director (BCD)
- EU Co-Director (EUD)
- EU Long Term Experts (EULTEs)
- Business Service Managers (BSMs)
- International Short Term Experts (Int STEs)
- Local Short Term Experts (Local STEs)
- Market Potential
- Local Beneficiary Support

3.8. Identification of Outputs

Business Centers are acting as development institutions and consulting companies whose income generation is done by consulting, counseling, training and information services. The results of Business Centers' activities are consulting, counseling, training and information services. One of the Business Centers' objectives is to reach 1200 clients. The training activities also have important role to develop skills for Small and Medium Size Enterprises (SMEs). When we consider all the information above mentioned Pre-Identified Inputs and Outputs can be listed as follows;

Identified Outputs

- Number of clients served

- Number of consulting services delivered
- Number of counseling services delivered
- Number of participants to trainings
- Number of companies participated to trainings
- Number of training programmes organized
- Income Generated

3.9. Development of AHP Model

In this thesis AHP is going to be used in order to transform qualitative data into quantitative data for DEA. In the previous section, inputs and outputs have been identified. As a result there are two inputs – Market Opportunity and Local Beneficiary Support - which are qualitative. In other words these inputs don't have numerical values. As it was explained before, in order to perform DEA, inputs and outputs should have numerical values. At this stage, Business Centers' staff has been asked to give numerical values. It could have been easier if we had had two Business Centers. Then it could have been said that Business Center X is twice as strong in terms of Market Potential and has half support in terms of Local Beneficiary Support comparing with Business Center Y. But since in this thesis 3 Business Centers are going to be evaluated, Business Centers' staff could not express themselves clearly.

In addition to this, it is also important what people understand from Market Opportunity and Local Beneficiary Support. This is another challenge for this thesis. Clearly there should be common understanding about Market Opportunity and Local Beneficiary Support. In order to clarify this it has been asked to Business Centers' staff to reach common criteria for Market Opportunity and Local Beneficiary Support.

In the following sections it will be seen how these qualitative information could be converted into quantitative information by using AHP.

3.9.1. Establishment of the Structural Hierarchy

This step allows a complex decision to be structured into a hierarchy descending from an overall objective to various 'criteria', 'sub-criteria', and so on until the lowest level. The objective or the overall goal of the decision is represented at the top level of the hierarchy. The criteria and sub-criteria contributing to the decision are represented at the intermediate levels. Finally, the decision alternatives or selection choices are laid down at the last level of the hierarchy. The typical AHP model should include Objective, Criteria and Alternatives as Figure 3.1

In this thesis structural hierarchies will be designed according to Figure 3.1 for inputs Market Potential and Local Beneficiary Support which are going to be used in DEA as numerical inputs.

3.9.1.1. Establishment of the Structural Hierarchy for Market Potential

Successful businesses have knowledge about their customers and their competitors. Acquiring accurate and specific information about your customers and competitors is a critical first step in market investigation. The market impacts and directs all aspects of the company's activities and ultimately will lead to success or failure of the business. It is clear that all organizations are affected by market situation. Market potential means that a business can get share from a market.

In a competitive business environment organizations are getting benefit from consulting (external help which also includes training, information...etc) services. Due to economic, cultural and educational differences the perception of consulting (external help) depends on the region. When we look at the SMEs which are based in İzmir, Kocaeli and Gaziantep, there is a different perception of consulting companies. Taking a step from that point, the following criteria has been decided in order to see what numerical value will be gained from Gaziantep, Kocaeli and İzmir Business Centers.

All Business Centers are in different locations. The specific location has an enormous effect on business. Even if an organization operates with its best if there is no market contribution to success this organization would be dedicated as not performing organization. In this thesis Market Potential was taken into account as input to Business Centers' activities. But then the

question has arised that what is market potential. According to the brain storming phase with Business Cenres' staff, four criteria were identified, as follows:

- Willingness to pay to consulting companies: This criterion refers to if SMEs are willing to pay in a location which there is one Business Center, the chance of selling the service would be higher.
- Existence of consulting companies : Simply this criteron refers to competion with other consulting companies. That is why number of consulting companies with experience were taken into account.
- Awareness of benefits of consulting: This criterion refers to continuity of service providing.
- Numbers of SMEs : This criterion refers to the potential portfolio of Business Centers

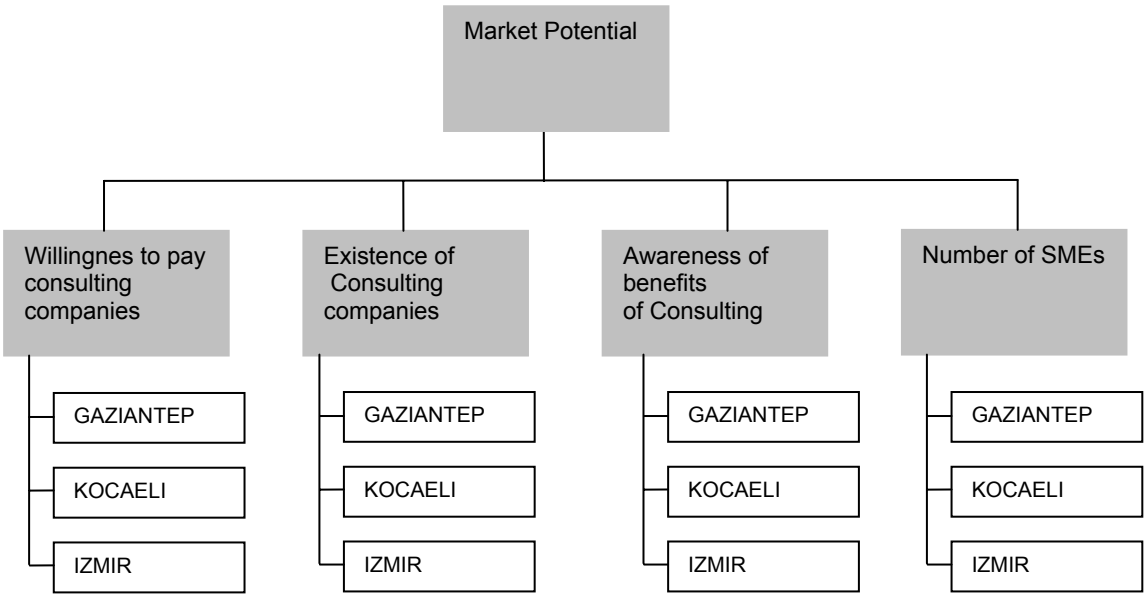

Figure 3.7 Structural Hierarchy for Market Potential for 3 Business Centers

After the identification of criteria, structural hierarchy was developed - see Figure 3.7. In this way, AHP can provide the result about Market Potential for 3 Business Centers and the result will have level of preference in terms of numerical value.

3.9.1.2. Establishment of Structural Hierarchy for Local Beneficiary Support

Business Centers project is one of the European Union projects. According to the European Union, the Local Beneficiary, which is also called Stakeholder, has an important role for the project in order to reach success.

In the Business Centers project the Local Beneficiaries have committed to support the Business Centers. When the Business Centers were established in 2002, the local beneficiaries took an important role. They introduced the Business Centers to local business environment and were actively involved in the preparation of the Business Centers. The local Beneficiaries in Gaziantep, Kocaeli and İzmir have also committed to the sustainability of the Business Centers when the project is finished. From this aspect local beneficiaries have an important effect on the Business Centers. Simply, the local beneficiaries are being catalysts in the operation of the Business Centers. That is why local beneficiaries have also effect on the performance of the Business Centers.

As it is obvious all local beneficiaries in Gaziantep, Kocaeli and İzmir have a huge contribution to the Business Centers, but in order to measure precisely the efficiency of the Business Centers, Stakeholder Support will be considered.

In order to understand which local beneficiary has more support over another, the criteria should be set. According to the Business Centers Project, local beneficiaries' support is emerging in three ways. First of all, all local beneficiaries should support the Business Centers financially as a local contributor. All beneficiaries had different financial contribution during the period of March 2003 –November 2004 which is the period for which the performance evaluation will be carried out.

The Project's success is also related with political support. In Gaziantep, Kocaeli and İzmir Business Centers, the local beneficiaries have introduced the Business Centers to their members. In all communication efforts, the local beneficiaries have supported the activities of the Business Centers. That is why the second criteria were identified as political support by the Business Centers' staff.

Even if the three Business Centers have their own premises, during the performance evaluation period, logistic support of the local beneficiaries was different. For example, in the Gaziantep Business Center, the training programmes were given in the Chamber of Commerce's seminar room. Also in Kocaeli Business Center premises were given by the Chamber of Industry. That is why logistic support was also chosen as criteria. According to these three criteria the following structural hierarchy was established - see Figure3.6.

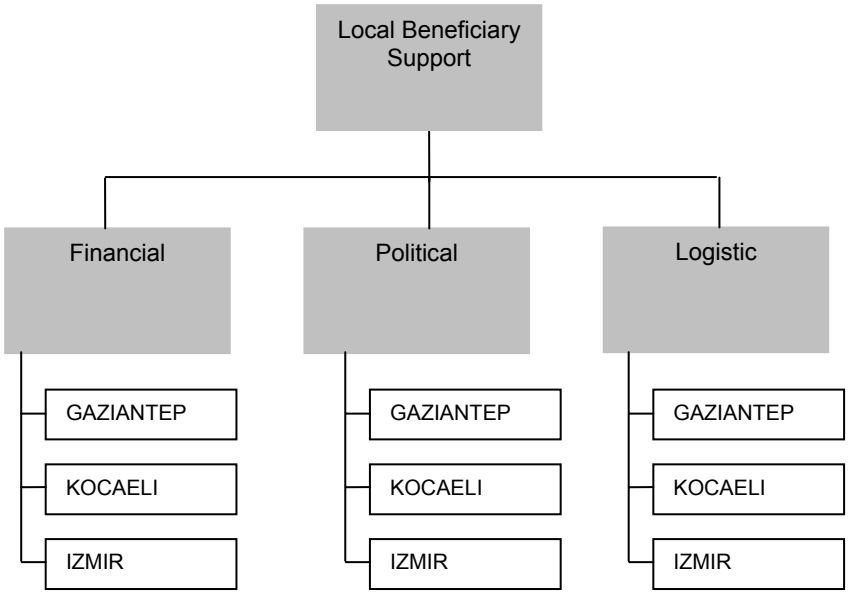

Figure 3.8 Structural Hierarchy for Local Beneficiary Support for 3 Business Centers

3.9.2. Establishment of Comparative Judgments

Once the hierarchy has been structured, the next step is to determine the priorities of elements at each level (*'element'* here means every member of the hierarchy). A set of comparison matrices of all elements in a level of the hierarchy with respect to an element of the immediately higher level are constructed so as to prioritize and convert individual comparative judgments into ratio scale measurements. The preferences are quantified by using a nine-point scale. The meaning of each scale measurement is explained in Table 3.1. The pair-wise comparisons are given in terms of how much element is more important than the other element.

3.9.3. AHP Calculations

In this section AHP Calculations' steps will be done manually. For the rest of the calculation an Excel Sheet will be utilized which will also be explained. In order to start computing the AHP Model, brain storming was held with Business Centers' staff. Saaty recommends that people who are going to establish the pairwise comparison matrix should know about the subject [21].The participants had different views but all of them closely know each Business Center and outside environmental factors. Pairwise comparisons are fundamental building blocks of AHP. In establishing the priorities for the three Business Centers in terms of Willingness, Existence, Awareness and SMEs for Market Potential and Financial, Political and Logistic for Beneficiary Support, staff of the Business Centers stated their opinions.

AHP uses an underlying scale (see in Table 3.1) with values 1 - 9 to rate the relative preferences for two items.

In order to give step by step solution firstly Market Potential Calculation with AHP is going to be done. For the Local Beneficiary Support calculations have been done in spreadsheet.

Step 1 Pairwise comparison matrix was generated according to Business Centers' staff view and average of each importance value put into pairwise comparison matrix, Table3.3.

Table 3.3 Pairwise Comparison Matrix for Market Potential

	Willingnes	Existence	Awareness	SMEs
Willingnes	**1**	2	1/ 6	4
Existence	½	**1**	1/ 6	3
Avareness	6	6	**1**	6
SMEs	¼	1/3	1/6	**1**

Step 2 Fractions to decimals

In order to make the calculations, the variables / criteria names are removed and fractions are converted to decimals;

$$\begin{bmatrix} 1{,}0000 & 2{,}0000 & 0{,}1667 & 4{,}0000 \\ 0{,}5000 & 1{,}0000 & 0{,}1667 & 3{,}0000 \\ 6{,}0000 & 6{,}0000 & 1{,}0000 & 6{,}0000 \\ 0{,}2500 & 0{,}3333 & 0{,}1667 & 1{,}0000 \end{bmatrix}$$

Step 3 Squaring the Matrix

$$\begin{bmatrix} 1{,}0000 & 2{,}0000 & 0{,}1667 & 4{,}0000 \\ 0{,}5000 & 1{,}0000 & 0{,}1667 & 3{,}0000 \\ 6{,}0000 & 6{,}0000 & 1{,}0000 & 6{,}0000 \\ 0{,}2500 & 0{,}3333 & 0{,}1667 & 1{,}0000 \end{bmatrix} \begin{bmatrix} 1{,}0000 & 2{,}0000 & 0{,}1667 & 4{,}0000 \\ 0{,}5000 & 1{,}0000 & 0{,}1667 & 3{,}0000 \\ 6{,}0000 & 6{,}0000 & 1{,}0000 & 6{,}0000 \\ 0{,}2500 & 0{,}3333 & 0{,}1667 & 1{,}0000 \end{bmatrix}$$

In order to calculate the martrix square, each row should be multiplied by each column.

The first row and first column calculation A_{11}

= (1,0000*1,0000)+(2,0000*0,5000)+(0,1667*6,0000)+(4,0000*0,2500)

$A_{11} = 4{,}0002$

With the same calculation the following results are obtained
$A_{12} = 6{,}3334$
$A_{13} = 1{,}3336$
$A_{14} = 15{,}0002$
$A_{21} = 2{,}7502$
$A_{22} = 4{,}0001$
$A_{23} = 0{,}9169$
$A_{24} = 9{,}0002$
$A_{31} = 16{,}5000$
$A_{32} = 25{,}9998$
$A_{33} = 4{,}0006$
$A_{34} = 54{,}0000$
$A_{41} = 1{,}6669$
$A_{42} = 2{,}1668$
$A_{43} = 0{,}4306$
$A_{44} = 4{,}0001$

Result of the Matrix A is;

$$\begin{bmatrix} 4{,}0002 & 6{,}3334 & 1{,}3336 & 15{,}0002 \\ 2{,}7502 & 4{,}0001 & 0{,}9169 & 9{,}0002 \\ 16{,}5000 & 25{,}9998 & 4{,}0006 & 54{,}0000 \\ 1{,}6669 & 2{,}1668 & 0{,}4306 & 4{,}0001 \end{bmatrix}$$

Step 4 Computing the first eigenvector to four decimal places

After summation of each row itself total summation of each rows' total found. If we divide each row's total to total summation of rows' summation it will be normalized.

$$\begin{bmatrix} 4{,}0002 + 6{,}3334 + 1{,}3336 + 15{,}0002 \\ 2{,}7502 + 4{,}0001 + 0{,}9169 + 9{,}0002 \\ 16{,}5000 + 25{,}9998 + 4{,}0006 + 54{,}0000 \\ 1{,}6669 + 2{,}1668 + 0{,}4306 + 4{,}0001 \end{bmatrix} \begin{matrix} = 26{,}6674 \\ = 16{,}6674 \\ = 100{,}50074 \\ = \underline{8{,}26440} \\ 152{,}0995 \end{matrix} \begin{bmatrix} 0{,}1753 \\ 0{,}1096 \\ 0{,}6608 \\ 0{,}0543 \end{bmatrix}$$

The result is called eigenvector $\begin{bmatrix} 0{,}1753 \\ 0{,}1096 \\ 0{,}6608 \\ 0{,}0543 \end{bmatrix}$

Step 5 The process starting from Step 2 must be iterated until the eigenvector solution does not change from the previous iteration. The square of the first matrix was;

$$\begin{bmatrix} 4{,}0002 & 6{,}3334 & 1{,}3336 & 15{,}0002 \\ 2{,}7502 & 4{,}0001 & 0{,}9169 & 9{,}0002 \\ 16{,}5000 & 25{,}9998 & 4{,}0006 & 54{,}0000 \\ 1{,}6669 & 2{,}1668 & 0{,}4306 & 4{,}0001 \end{bmatrix}$$

Now this matrix must be squared;

$$\begin{bmatrix} 4{,}0002 & 6{,}3334 & 1{,}3336 & 15{,}0002 \\ 2{,}7502 & 4{,}0001 & 0{,}9169 & 9{,}0002 \\ 16{,}5000 & 25{,}9998 & 4{,}0006 & 54{,}0000 \\ 1{,}6669 & 2{,}1668 & 0{,}4306 & 4{,}0001 \end{bmatrix} \begin{bmatrix} 4{,}0002 & 6{,}3334 & 1{,}3336 & 15{,}0002 \\ 2{,}7502 & 4{,}0001 & 0{,}9169 & 9{,}0002 \\ 16{,}5000 & 25{,}9998 & 4{,}0006 & 54{,}0000 \\ 1{,}6669 & 2{,}1668 & 0{,}4306 & 4{,}0001 \end{bmatrix}$$

The result is;

$$\begin{bmatrix} 80{,}4274 & 117{,}8449 & 22{,}9363 & 249{,}0224 \\ 52{,}1324 & 76{,}7585 & 14{,}8789 & 162{,}7669 \\ 293{,}5277 & 429{,}5249 & 85{,}1015 & 913{,}5445 \\ 26{,}3999 & 39{,}0881 & 7{,}6549 & 83{,}7599 \end{bmatrix}$$

Followed by Step 4,

$$\begin{bmatrix} 80{,}4274 + 117{,}8449 + 22{,}9363 + 249{,}0224 \\ 52{,}1324 + 76{,}7585 + 14{,}8789 + 162{,}7669 \\ 293{,}5277 + 429{,}5249 + 85{,}1015 + 913{,}5445 \\ 26{,}3999 + 39{,}0881 + 7{,}6549 + 83{,}7599 \end{bmatrix} \begin{matrix} = 470{,}2307 \\ = 306{,}5367 \\ = 1721{,}6986 \\ = \underline{156{,}9028} \\ 2655{,}3688 \end{matrix} \begin{bmatrix} 0{,}1771 \\ 0{,}1154 \\ 0{,}6484 \\ 0{,}0591 \end{bmatrix}$$

Second eigenvector is obtained

$$\begin{bmatrix} 0{,}1771 \\ 0{,}1154 \\ 0{,}6484 \\ 0{,}0591 \end{bmatrix}$$

Step 6 Comparing the Eigenvectors obtained from first and second iteration.

$$\begin{bmatrix} 0{,}1753 \\ 0{,}1096 \\ 0{,}6608 \\ 0{,}0543 \end{bmatrix} - \begin{bmatrix} 0{,}1771 \\ 0{,}1154 \\ 0{,}6484 \\ 0{,}0591 \end{bmatrix} = \begin{bmatrix} -0{,}0018 \\ -0{,}0058 \\ +0{,}0124 \\ -0{,}0048 \end{bmatrix}$$

Iteration1 Iteration2 Difference

When it is looked at the difference between first and second eigenvectors, the difference is quite high. So, the iteration process should be continuing until finding no difference or acceptable difference.

The final matrix is below;

$$\begin{bmatrix} 80{,}4274 & 117{,}8449 & 22{,}9363 & 249{,}0224 \\ 52{,}1324 & 76{,}7585 & 14{,}8789 & 162{,}7669 \\ 293{,}5277 & 429{,}5249 & 85{,}1015 & 913{,}5445 \\ 26{,}3999 & 39{,}0881 & 7{,}6549 & 83{,}7599 \end{bmatrix}$$

After the process of matrix square and the normalization, the third eigenvector is obtained as follows;

$$\begin{bmatrix} 0{,}1771 \\ 0{,}1154 \\ 0{,}6484 \\ 0{,}0591 \end{bmatrix} - \begin{bmatrix} 0{,}1769 \\ 0{,}1151 \\ 0{,}6492 \\ 0{,}0588 \end{bmatrix} = \begin{bmatrix} +0{,}0002 \\ +0{,}0003 \\ -0{,}0008 \\ +0{,}0003 \end{bmatrix}$$

Iteration2 Iteration3 Difference

As it can be seen, still there is a difference. That is why it needs to continue. After the same process the result of the fourth eigenvector is;

$$\begin{bmatrix} 0{,}1769 \\ 0{,}1151 \\ 0{,}6492 \\ 0{,}0588 \end{bmatrix}$$

When it is looked at the result comparison there is no difference.

$$\begin{bmatrix} 0{,}1769 \\ 0{,}1151 \\ 0{,}6492 \\ 0{,}0588 \end{bmatrix} - \begin{bmatrix} 0{,}1769 \\ 0{,}1151 \\ 0{,}6492 \\ 0{,}0588 \end{bmatrix} = \begin{bmatrix} 0{,}0000 \\ 0{,}0000 \\ 0{,}0000 \\ 0{,}000* \end{bmatrix}$$

Iteration3 Iteration4 Difference

As a result the Eigenvector for the Market Potential is;

$$\begin{bmatrix} 0{,}1769 \\ 0{,}1151 \\ 0{,}6492 \\ 0{,}0588 \end{bmatrix}$$

Step 7 Consistency

A key step in AHP is the establishment of priorities through the use of the pairwise comparison procedure as described before. An important consideration in terms of the quality of the ultimate decision relates to the *consistency* of judgments that the decision maker demonstrated during the brainstorming sessions for pariwise comparison matrix establishment.

It should be realize that perfect consistency is difficult to achieve and that some lack of consistency is expected to exist in almost any set of pariwise comparisons. To handle the consistency question, AHP provides a method for measuring the degree of consistency among the pairwise judgments provided by decision makers. If the degree of consistency is unacceptable, the decision maker should reconsider and possibly revise the pairwise comparison judgments before proceeding with the analysis. During the brainstorming session consistency had been checked out and inconsistencies were eliminated for this thesis.

AHP provides a measure of the consistency of pairwise comparison judgments by computing a consistency ratio. This ratio is designed in such a way that values of the ratio exceeding 0.10 are indicative of inconsistent judgments; in such cases; the decision maker probably wants to revise the original values in the pairwise comparison matrix.
In order to calculate the consistency we need, the first parirwise comparison matrix and the final eigenvector should be multiplied;

$$\begin{bmatrix} 1{,}0000 & 2{,}0000 & 0{,}1667 & 4{,}0000 \\ 0{,}5000 & 1{,}0000 & 0{,}1667 & 3{,}0000 \\ 6{,}0000 & 6{,}0000 & 1{,}0000 & 6{,}0000 \\ 0{,}2500 & 0{,}3333 & 0{,}1667 & 1{,}0000 \end{bmatrix} \times \begin{bmatrix} 0{,}1769 \\ 0{,}1151 \\ 0{,}6492 \\ 0{,}0588 \end{bmatrix}$$

Pairwise-comparison matrix Eigenvector

$$= \begin{bmatrix} 0{,}1769 & 0{,}2302 & 0{,}1082 & 0{,}2352 \\ 0{,}0885 & 0{,}1151 & 0{,}1082 & 0{,}1764 \\ 1{,}0614 & 0{,}6906 & 0{,}6492 & 0{,}3528 \\ 0{,}0442 & 0{,}0384 & 0{,}1082 & 0{,}0588 \end{bmatrix}$$

The weighted sum of each row calculated as below;

$$\begin{bmatrix} 0{,}1769 + & 0{,}2302 + & 0{,}1082 + & 0{,}2352 \\ 0{,}0885 + & 0{,}1151 + & 0{,}1082 + & 0{,}1764 \\ 1{,}0614 + & 0{,}6906 + & 0{,}6492 + & 0{,}3528 \\ 0{,}0442 + & 0{,}0384 + & 0{,}1082 + & 0{,}0588 \end{bmatrix} = \begin{vmatrix} 0{,}7505 \\ 0{,}4882 \\ 2{,}7540 \\ 0{,}2496 \end{vmatrix}$$

Weighted sum vector

Then each row of weighted sum vector divides by each row of eigenvector as below;

$$\begin{bmatrix} 0{,}7505 \\ 0{,}4882 \\ 2{,}7540 \\ 0{,}2496 \end{bmatrix} \div \begin{bmatrix} 0{,}1769 \\ 0{,}1151 \\ 0{,}6492 \\ 0{,}0588 \end{bmatrix} = \begin{bmatrix} 0{,}7505 / 0{,}1769 \\ 0{,}4882 / 0{,}1151 \\ 2{,}7540 / 0{,}6492 \\ 0{,}1496 / 0{,}0588 \end{bmatrix} = \begin{bmatrix} 4{,}2425 \\ 4{,}2411 \\ 4{,}2421 \\ 4{,}2448 \end{bmatrix}$$

The result vector's rows summed and divided by numbers of rows in order to calculate λmax;

$$\lambda \max = (4{,}2425 + 4{,}2411 + 4{,}2421 + 4{,}2448) / 4$$
$$= 4{,}2426$$

In order to calculate CI (Consistency Index) the Equation (3.2.7) is used.

$$CI = (\lambda \max - n) / (n - 1)$$
$$CI = (4{,}2426 - 4) / (4 - 1)$$
$$CI = 0{,}080875$$

According to Table3.2,

For n=4, RI=0,9

Then Consistency Ratio (CR), Equation (3.2.6);

$$CR = CI / RI$$
$$CR = 0{,}080875 / 0{,}90$$
$$CR = 0{,}09$$

Since CR $\leq 0{,}10$ the Parirvise Comparison Matrix is consistent.

Step 8 Result

Since the pairwise comparison matrix is consistent, the eigenvector is accepted as a result for this hierarch. Then eigenvector gives the priorities for the Market Potential, as follows in Table3.4

Table 3.4 Eigenvector for Market Potential Criteria

Willingness	**0,1769**
Existence	**0,1151**
Awareness	**0,6492**
SMEs	**0,0588**

According to this result the priorities can be represented in Figure 3.9.

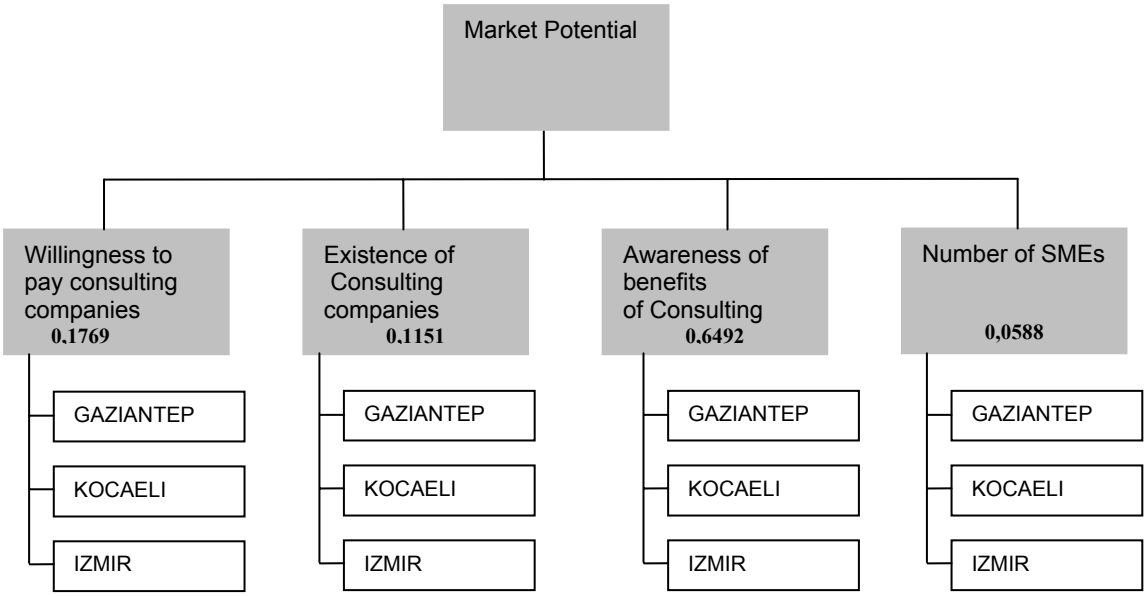

Figure 3.9 AHP Hierarchy for Market Potential with Calculated Criteria

For the rest of the AHP calculation an Excel Sheet is developed. The developed Excel Sheet can compute pairwise comparison matrix considering consistency.

The rates in the Excel Sheet are converted to decimal numbers. After developing the matrix of pairwise comparison, the Excel sheet can calculate the priority for each of the elements being compared.

3.9.4. Solution of AHP Model

After the establishment of AHP Hierarchy, the survey sheets have been prepared – see Appendix III.

10 Business Centers' staff who have good knowledge of the Business Centers' operations, management, external environment, and local economy from three Business Centers were invited to fill up survey sheets. The aim of the meeting was to create a common understanding of each criteria and facts in relation to each Business Center. The meeting started with a basic introduction of AHP and followed by two hierarchies for this thesis (Market Potential and Local Beneficiary Support).

For each hierarchy, brain storming was first done and later on each staff filled out their own judgements in line with their Business Center. For this reason Market Potential sheet in Appendix IV and Local Beneficiary Support sheet in Appendix V were prepared and distributed to each participant. Each element of matrices was summed and divided to 10 to find out average judgement. The spreadsheet was prepared to calculate the average value of each element. The Table 3.22 to Table 3.30 in Appendix V shows the results of each matrix according to judgements of Business Centers' staff.

According to judgments of Business Centers' staff, AHP calculation has been done by developing the Excel Sheet which is in Appendix I.

According to the calculations, ranks for inputs and outputs have been identified. (Table 3.5 and Table 3.6) The results obtained from AHP will be used in DEA.

Table 3.5 Result of AHP for Market Potential

Rank	Market Potential	Weight
1	İZMİR	0,5192
2	KOCAELİ	0,2809
3	GAZİANTEP	0,0857

Table 3.6 Result of AHP for Local Beneficiary Support

Rank	Local Beneficiary Support	Weight
1	GAZİANTEP	0,4798
2	KOCAELİ	0,2974
3	İZMİR	0,2228

3.10. Development of DEA Model

Although the DEA is a suitable method for relative efficiency measurement, inputs and outputs should be chosen with deep understanding. For example, if office area is chosen as input and income generation is chosen as output the DEA would not tell much about the

efficiency, and the result could be interpreted as, if the office area is getting larger the efficiency increases. As it can be seen, input and output relation has an important role. In this thesis this aspect has been considered and input - output relation confirmed.

In order to find out relative efficiency of Gaziantep, Kocaeli and İzmir Business Centers Warwick DEA Software is used. The limited version of software is capable of assessing only 10 Decision Making Units (DMUs) which is enough to asses 3 Business Centers.

The software has options to use a model which optimizes inputs and outputs. The Radial Model attempts a radial (or parallel) improvement.It is logical to use output maximization for this thesis since the performers are trying to do their best. In Output Maximization the radial improvement is sought in the outputs, whilst ensuring that no input increases in value. By default, the gains sought are all of equal priority, but this can be modified by the user by specifying varying radial priorities. Having maximized the radial gain, it may still be possible to make further gains in a number of inputs and outputs. A secondary optimization is performed to seek these improvements; this optimization will be based upon a prioritized sum of all inputs and outputs using target priorities.
According to AHP Model results and Business Centers database Table 3.7 has been generated for DEA. The performance measurement will be carried out for the period between March 2003 and November 2004.

Table 3.7 Input and Output Data for 3 Business Centers (March 2003 to November 2004)

Input	Gaziantep	Kocaeli	İzmir
Man-month used by BCD	86	81	56
Man-month used by EUD	85	77	50
Man-month used by EULTE	141	114	295
Man-month used by BSM	949	1045	811
Man-month used by INT STE	369	503	521
Man-month used by Local STE	1058	859	1215
Market Potential	0,0857	0,2809	0,5192
Local Beneficiary Support	0,4798	0,2974	0,2228
Output	**Gaziantep**	**Kocaeli**	**İzmir**
#of Customers Served	1221	1146	1718
#of Consulting Services	165	50	152
#of Counseling services	414	831	727
#of Participants to training	1567	1531	3375
#of Company Participants to training	337	265	839
#of training programmes	48	49	150
Income Generated during the period	158703	121164	184173

Since Warwick DEA Software is not sensible to decimal numbers Market Potential and Local Beneficiary Support's weight for 3 Business Centers will be multiplied by 10.000 in order to get accurate results.

3.11. Execution of DEA Model

The inputs and outputs entered into Warwick DEA Software, Figure 3.10

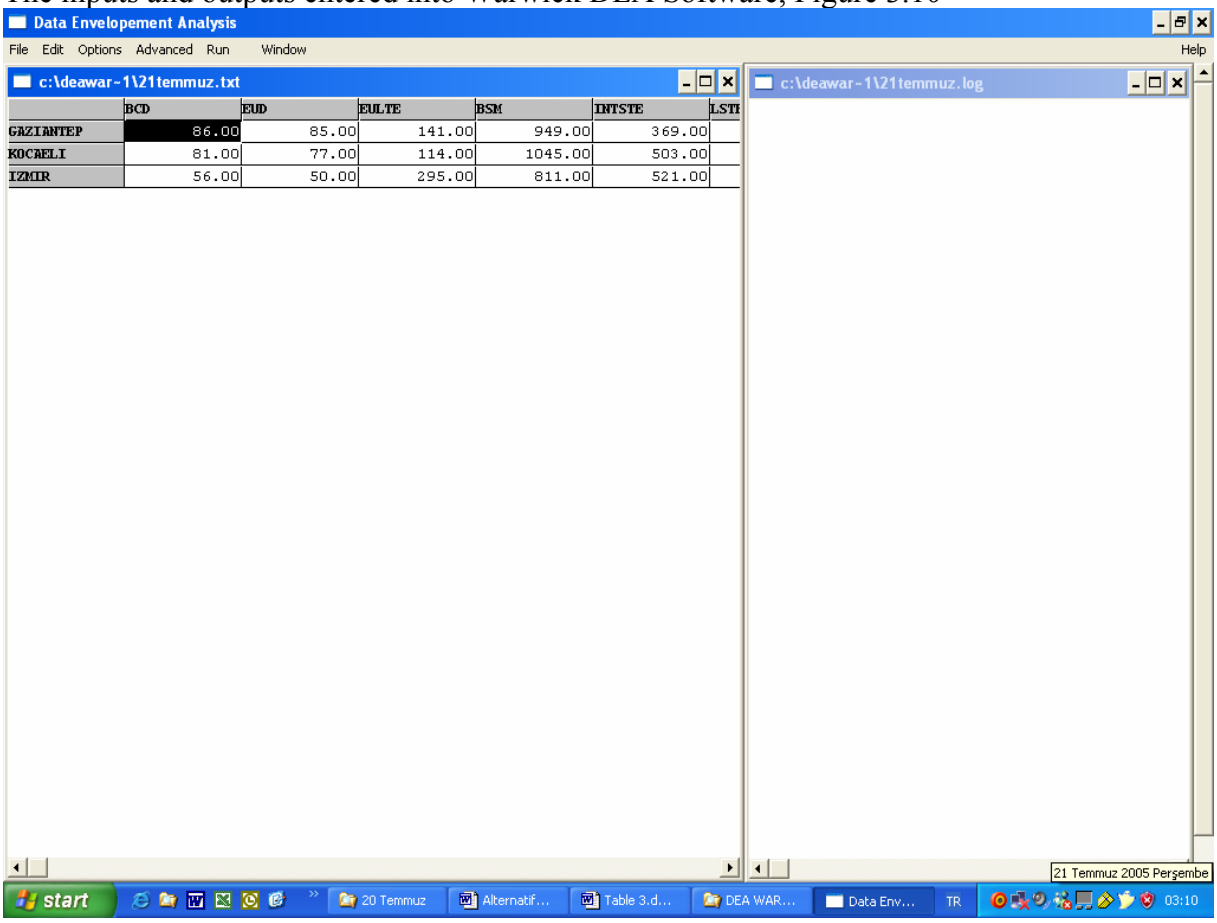

Figure 3.10 Warwick DEA Software-Data Entered

From the Options menu Radial Output has been chosen for the efficiency Figure 3.11.

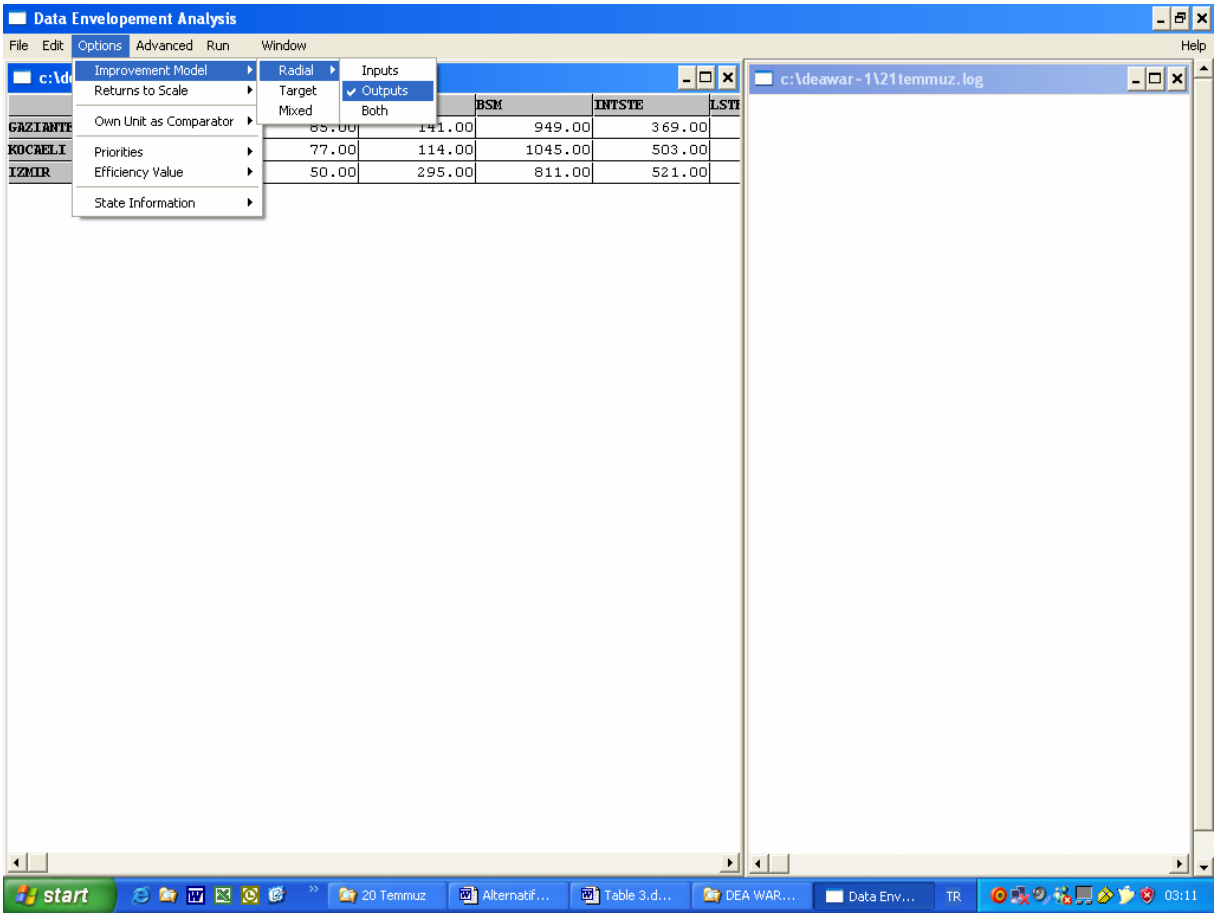

Figure 3.11 DEA Model Selections

Then Execute dialog box opened. Before running the optimizer from the Tables, Efficiencies, Peers, Targets and Weights have been selected, Figure 3.12.

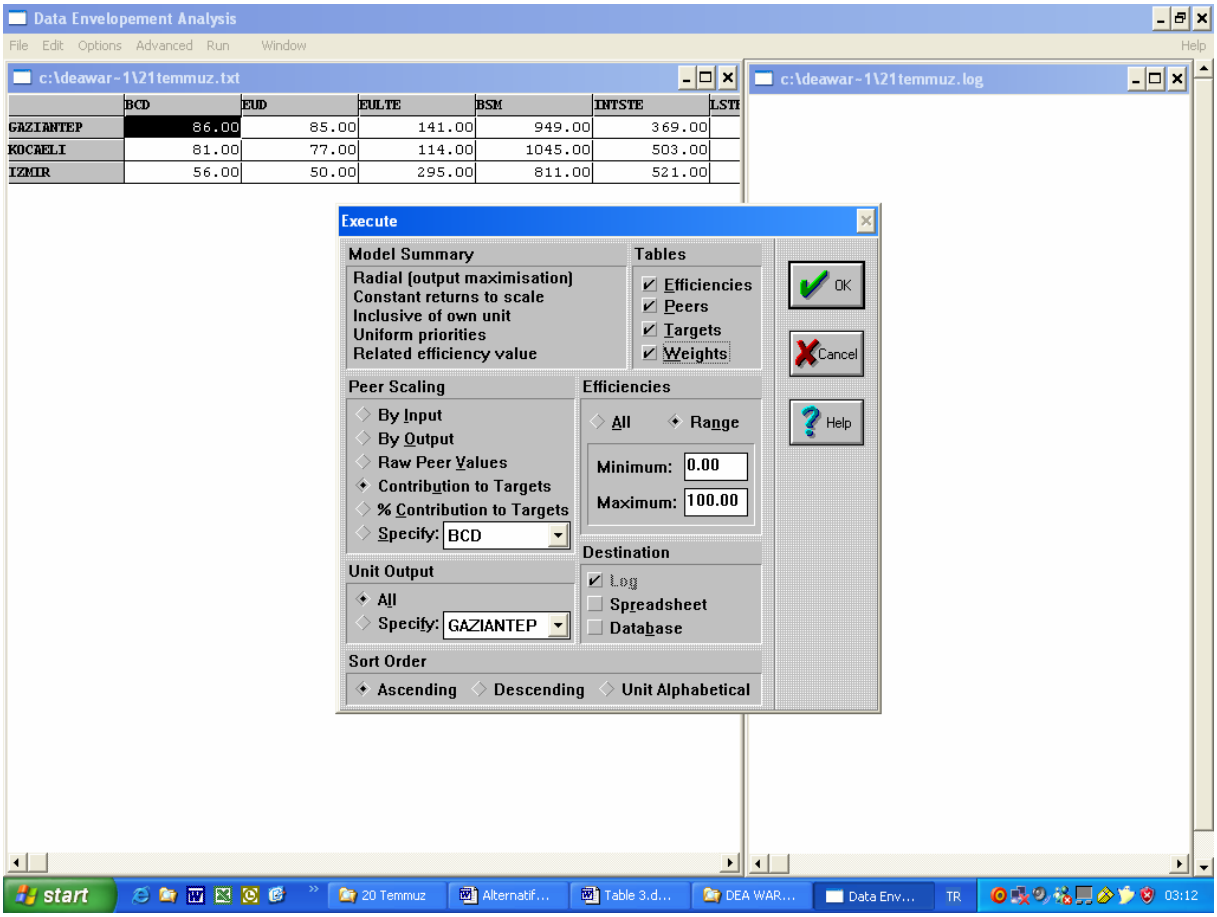

Figure 3.12 Execute Menu of DEA Warwick Software

Finally the programme has been run and results obtained in Figure 3.13.

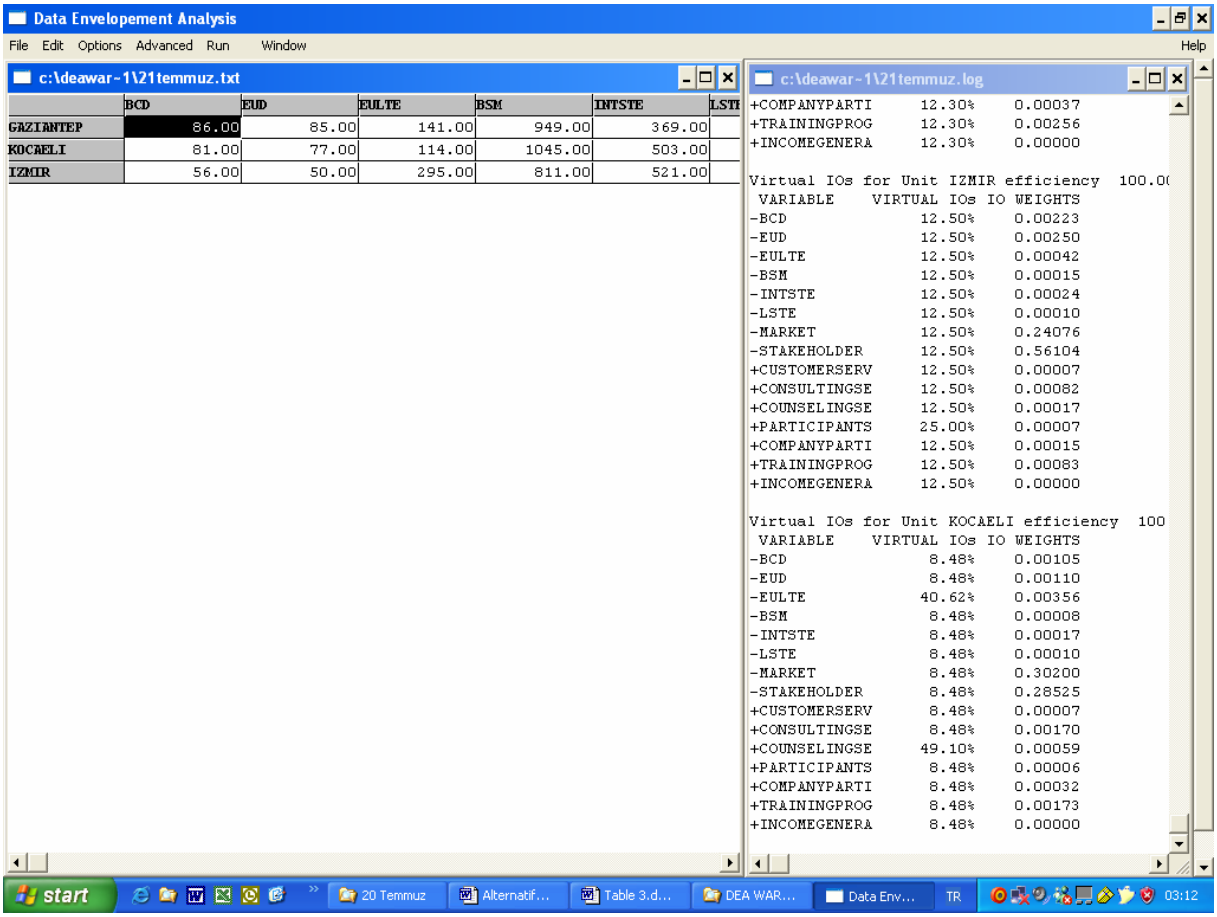

Figure 3.13 The Result View from the DEA Warwick Software

3.12. Result and Discussion

The result is generated by using DEA Warwick Software. The result is as follows;

Output maximization radial model will be used

Phase 1 Optimization with constant returns to scale

Maximize the outputs produced with input levels held

Phase 2 Optimization

Maximize secondary gains relative to the target

Tables produced for efficiencies from 0.0% to 100.0%

Tables are sorted into ascending efficiency order

Peers shown as contributions to the optimal mix

Table of efficiencies (radial)

100.00 GAZİANTEP 100.00 KOCAELİ 100.00 İZMİR

According to the result, Gaziantep, Kocaeli and İzmir Business Centers are relatively 100% efficient. This is showing us, even 3 Business Centers have different values for their inputs and outputs, they are operating well in their region.

Although Gaziantep, Kocaeli and İzmir Business Centers are relatively efficient, virtual inputs and outputs tables should be taken into account in order to extend the discussion.

A virtual input or output describes the importance attached to inputs and outputs in determining the branches efficiency rating. Virtual inputs are calculated by multiplying the value of the input with the corresponding optimal weight for the unit as given by the solution to the primal model. Similarly for virtual outputs.

"A branch whose efficiency rating is based fairly evenly on all its outputs and inputs can be said to show well-rounded performance. A 100% efficient unit with well-rounded performance is relatively efficient when all aspects of its performance are taken into account rather than just a small subset of them.".

For a 100% efficient branch the virtual outputs will add up to 100%. In the study of this thesis it is considering with 7 outputs, if an efficient branch has all its virtual outputs around 12.30%-12.50% then its efficiency rating will be based fairly evenly on all its outputs. If, by contrast, all 100% of the virtual output has been placed on one output then its efficiency rating will have been determined solely on its performance on that dimension.

When Virtual inputs/outputs are considered, inputs are on EU LTE and outputs are on counseling services for Kocaeli in Table 3.9. This means outputs of Kocaeli mainly considered as Counseling Services. This can add strength to Kocaeli which focuses on counseling services while EU LTE has lots of contribution which is not very consistent with the reality. Even if the result for Kocaeli shows that it is efficient, in reality Kocaeli should improve the quantity of services.

Gaziantep is relatively fairly distributed as can be seen in Table 3.8. comparing to Kocaeli. One of the biggest dis-advantages of Gaziantep is low market perception. In the region there are not so many consulting companies which deliver broadly consulting services. The

consulting companies in Gaziantep are mainly focusing on quality management system establishment and international marketing. Gaziantep is very successful to convert market potential's disadvantage to advantage. Business Centers can deliver services in many different areas; for example, finance, organizational structuring, production management, logistics, marketing…etc. According to the result, Gaziantep is using its inputs to produce outputs efficiently. The management in operation level for Gaziantep is considering the external environment and adding stakeholders' support to become more and more successful.

When İzmir is considered Table 3.10, inputs and outputs are fairly distributed like Gaziantep. İzmir is very strong in training. During the evaluation period 150 training programmes had been organized and total participants were 3375. The virtual input/output Table 3.10 shows also the emphasis of training related unit which is numbers of participants to training programmes. Izmir is also strong during the evaluation period in terms of other outputs.

According to these result Kocaeli's efficiency is concentrated on EU LTE as input and Counseling service as output. This might create danger for Kocaeli. Kocaeli should equally distribute its Inputs and outputs. One strategy might be diversifying the service from Counseling to other activities.

Table 3.8 Virtual IOs for Unit GAZİANTEP

Virtual IOs for Unit GAZİANTEP efficiency 100.00% radial		
VARIABLE	**VIRTUAL IOs**	**IO WEIGHTS**
-BCD	12.30%	0.00143
-EUD	12.30%	0.00145
-EULTE	12.30%	0.00087
-BSM	12.30%	0.00013
-INTSTE	12.30%	0.00033
-LSTE	12.30%	0.00012
-MARKET	13.89%	1.62121
-STAKEHOLDER	12.30%	0.25638
+CUSTOMERSERV	12.30%	0.00010
+CONSULTINGSE	26.19%	0.00159
+COUNSELINGSE	12.30%	0.00030
+PARTICIPANTS	12.30%	0.00008
+COMPANYPARTI	12.30%	0.00037
+TRAININGPROG	12.30%	0.00256
+INCOMEGENERA	12.30%	0.00000

Table 3.9 Virtual IOs for Unit KOCAELİ

Virtual IOs for Unit KOCAELİ efficiency 100.00% radial		
VARIABLE	**VIRTUAL IOs**	**IO WEIGHTS**
-BCD	8.48%	0.00105
-EUD	8.48%	0.00110
-EULTE	40.62%	0.00356
-BSM	8.48%	0.00008
-INTSTE	8.48%	0.00017
-LSTE	8.48%	0.00010
-MARKET	8.48%	0.30200
-STAKEHOLDER	8.48%	0.28525
+CUSTOMERSERV	8.48%	0.00007
+CONSULTINGSE	8.48%	0.00170
+COUNSELINGSE	49.10%	0.00059
+PARTICIPANTS	8.48%	0.00006
+COMPANYPARTI	8.48%	0.00032
+TRAININGPROG	8.48%	0.00173
+INCOMEGENERA	8.48%	0.00000

Table 3.10 Virtual IOs for Unit İZMİR

Virtual IOs for Unit İZMİR efficiency 100.00% radial		
VARIABLE	**VIRTUAL IOs**	**IO WEIGHTS**
-BCD	12.50%	0.00223
-EUD	12.50%	0.00250
-EULTE	12.50%	0.00042
-BSM	12.50%	0.00015
-INTSTE	12.50%	0.00024
-LSTE	12.50%	0.00010
-MARKET	12.50%	0.24076
-STAKEHOLDER	12.50%	0.56104
+CUSTOMERSERV	12.50%	0.00007
+CONSULTINGSE	12.50%	0.00082
+COUNSELINGSE	12.50%	0.00017
+PARTICIPANTS	25.00%	0.00007
+COMPANYPARTI	12.50%	0.00015
+TRAININGPROG	12.50%	0.00083
+INCOMEGENERA	12.50%	0.00000

The full result can be seen in Appendix II.

CHAPTER IV

4. CONCLUSION

4.1 Conclusion

This thesis is proposed for performance evaluation of the Business Centers which operate in Gaziantep, Kocaeli and Izmir regions. Business Centers have an important role in contributing to the local economy's development through their services.

Every year the European Commission is inviting institutions for its grant programmes. The Development of the Business Centers Project is one of them. The Business Centers Project's ultimate aim is to become sustainable Centers. When it is looked from this perspective this thesis would be beneficial for the Business Centers.

The main focus of the Business Centers is to help small and medium sized enterprises (SMEs). The small and medium sized enterprises, both in start-up phase and in any subsequent stage are regarded as an important obstacle for sound business conduct. The majority of small and medium sized enterprises need to upgrade general business management skills including technical, marketing and financial management. The lack of know-how relating to credit applications, coupled with weak financial and administrative knowledge is another problem to be addressed by the Business Centers Project.

An additional concern expressed by all SME organizations and the enterprises themselves relates to the upgrading of labour/staff skills. Access to tailor-made vocational training for companies has been identified as an important problem, which should be dealt with in SME support programmes.

Many enterprises seem to have sufficient potential for the development of international activities, but lack the skills and knowledge on export market demands, export marketing, design, quality standards, and financial operations etc. for engaging in successful export marketing. Furthermore, the identification of suitable business partners and investment promotion activities is often hampered due to the lack of experience, manpower, credit and know-how available. The Business Centers' services are designed according to needs of the small and medium sized enterprises. In this aspect the Business Centers Project has an

important mission for their respective regions. The good operation of the Business Centers affects also the region.

Business Centers Project is operational in Gaziantep, Kocaeli and Izmir. There are regional differences and these differences also can be seen in the enterprises. The nature of the region is affecting the operations of the Business Centers. This thesis proposes the performance evaluation of Business Centers taking into account regional differences.

Clearly a principal objective of performance measurement is to enhance various notions of efficiency. In this popular manifestation, performance measurement leads to league tables but within the context of performance management that is only the starting point of an exercise in performance measurement. Further detailed analysis and possibly inspection of the best and worst performers is then necessary in order to understand the production process and derive useful information which may help both the worst and the best performers to make further improvements in efficiency.

The Business Centers bring new stream with expertise and knowledge to local SMEs. It was important to review the performance evaluation of Business Centers since they have a catalyst role in business development for SMEs.

DEA is a well known method in order to measure relative efficiency. It can process inputs and outputs and generate meaningful results. DEA is very sensitive to inputs and outputs and even small changes in one of them might generate different results. AHP is also a well known method in decision making.

The Business Centers are established in different regions and economies. Izmir is more developed than the Gaziantep and Kocaeli regions. The different region is creating different results for companies. In the performance evaluation of the Business Centers the external environment was considered in this thesis. AHP was used in order to provide more inputs, especially those related with the external environment contribution. In order to understand the external environment which affects the Business Centers, criteria were identified according to Business Centers Project. The success of the project is depending on market conditions and local stakeholder. The market conditions are important for the Business Centers' operations since they are working as consulting companies. In the different regions there are different

numbers of SMEs, demographic features and competition. That is why market conditions are important for the performance of the Business Centers.

On the other hand, the local chambers have a big contribution to the Business Centers. The Business Centers are enjoying the prestige of the local chambers. Their financial, logistic and political support is facilitating the operation of the Business Centers, resulting in the fact that market and local stakeholder contribution were taken as inputs for the Business Centers. In the thesis, inputs and outputs were processed in DEA. In DEA, the inputs and outputs should have numerical values. In order to ensure this, two inputs (Market Condition and Local Beneficiary Support) should had had numerical values. In order to assign numerical values to these two inputs the Analytical Hierarch Process was used. The inputs which were verbally expressed were transformed into quantitative data. When establishing the hierarchy, it has been observed that criteria have enormous effect on the result. The selection of criteria was based on Business Centers Project. The result might have been completely different if there were different participants. The participants were selected carefully in order to reflect the reality. In some occasion, participants could not provide consistent judgment when pairwise comparison matrices were established. On the other hand, utilizing the Excel Sheet model ensured consistency.

Based on the entire calculation, it has been seen that Gaziantep, Kocaeli and Izmir Business Centers are working 100% relative efficiency. One of the biggest disadvantages of Gaziantep is low market perception. In the region there are not so many consulting companies which deliver broadly consulting services. The consulting companies in Gaziantep are mainly focusing on quality management system establishment and international marketing. Izmir appears like the most successful Business Center even though the three Business Centers are 100% relative efficient. Based on all calculations Kocaeli seemed there were potential risks due to focusing on counseling services. The efficiency score might have been different if inputs and outputs were selected differently. As a result, based on the selected inputs / outputs and judgments of people who participated, the result showed that the Business Centers operated well during the performance evaluation period.

2. Future Works

The proposed model for performance evaluation is based on one year relative performance of 3 Business Centers. However, organizations are like human beings which have different stage in terms of improvement. Follow up of Business Centers' performance would be useful in

order to compare each year's improvement or change. That is why the model should be used for each financial year. In addition to this, there might be some changes in terms of inputs/outputs after the EU support finishes. The income generated from the services will be used as input whereas during the EU support, incomes from the services are being allocated. For the time being nobody knows how this revenue will be used, that is why new inputs/outputs should be well thought and considered. There might also be slight change in external environment which should be considered.

The proposed model can also be improved by using weight restricted inputs/outputs in DEA. Each input/output has different effect on Business Centers' performance. For example in future the function of each staff might change for each Business Centers as a result effect on performance as well.

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APPENDIX I RESULTS OF AHP MODEL

Table 3.11 AHP Solution for Market Potential's Criteria

MARKET POTENTIAL					
	Willingnes	Existence	Avareness	SMEs	
Willingnes	**1,0000**	2,0000	0,1667	4,0000	
Existence	0,5000	**1,0000**	0,1667	3,0000	
Avareness	6,0000	6,0000	**1,0000**	6,0000	
SMEs	0,2500	0,3333	0,1667	**1,0000**	
					Eigenvector
					0,1769
					0,1151
					0,6492
					0,0588
				Total	1,0000
Consistency Calculation					
					Weighted sum vector
	0,1769	0,2302	0,1082	0,2352	**0,7505**
	0,0885	0,1151	0,1082	0,1764	**0,4882**
	1,0614	0,6906	0,6492	0,3528	**2,7540**
	0,0442	0,0384	0,1082	0,0588	**0,2496**
	0,0000	0,0000	0,0000	0,0000	**0,0000**
	0,0000	0,0000	0,0000	0,0000	**0,0000**
	4,2425				
	4,2411				
	4,2421				
	4,2448				
λ max	4,2426				
CI	0,080875				
CR	0,09	≤	**0,10**		
Iteration	3				

Table 3.12 AHP Solution for Willingness to Pay Consulting Companies

Willingness					
	Gaziantep	Kocaeli	İzmir		
Gaziantep	**1,0000**	0,2500	0,1429		
Kocaeli	4,0000	**1,0000**	0,3333		
İzmir	7,0000	3,0000	**1,0000**		
					Eigenvector
					0,0786
					0,2628
					0,6586
				Total	1,0000
Consistency Calculation					
					Weighted sum vector
	0,0786	0,0657	0,0941		**0,2384**
	0,3145	0,2628	0,2195		**0,7968**
	0,5503	0,7883	0,6586		**1,9972**
	3,0324				
	3,0324				
	3,0324				
λ max	3,0324				
CI	0,016183				
CR	0,03	≤	**0,10**		
Iteration	3				

Table 3.13 AHP Solution for Existence of Consulting Companies

Existence of Consulting Companies					
	Gaziantep	Kocaeli	İzmir		
Gaziantep	**1,0000**	0,2500	0,1667		
Kocaeli	4,0000	**1,0000**	0,5000		
İzmir	6,0000	2,0000	**1,0000**		
					Eigenvector
					0,0890
					0,3234
					0,5876
				Total	1,0000
Consistency Calculation					
					Weighted sum vector
	0,0890	0,0808	0,0979		**0,2678**
	0,3559	0,3234	0,2938		**0,9731**
	0,5339	0,6468	0,5876		**1,7683**
	3,0092				
	3,0092				
	3,0092				
λ max	3,0092				
CI	0,004601				
CR	0,01	≤	**0,10**		
Iteration	3				

Table 3.14 AHP Solution for Awareness of Benefits of Consulting Companies

Awareness					
	Gaziantep	Kocaeli	İzmir		
Gaziantep	**1,0000**	0,5000	0,3333		
Kocaeli	2,0000	**1,0000**	1,0000		
İzmir	3,0000	1,0000	**1,0000**		
					Eigenvector
					0,1692
					0,3874
					0,4434
				Total	1,0000
Consistency Calculation					
					Weighted sum vector
	0,1692	0,1937	0,1478		**0,5107**
	0,3384	0,3874	0,4434		**1,1692**
	0,5076	0,3874	0,4434		**1,3384**
	3,0183				
	3,0183				
	3,0183				
λ max	3,0183				
CI	0,009147				
CR	0,02	≤	**0,10**		
Iteration	3				

Table 3.15 AHP Solution for Number of SMEs

Number of SMEs					
	Gaziantep	Kocaeli	İzmir		
Gaziantep	**1,0000**	0,5000	0,2500		
Kocaeli	2,0000	**1,0000**	0,5000		
İzmir	4,0000	2,0000	**1,0000**		
					Eigenvector
					0,1429
					0,2857
					0,5714
				Total	1,0000
Consistency Calculation					
					Weighted sum vector
	0,1429	0,1429	0,1429		**0,4286**
	0,2857	0,2857	0,2857		**0,8571**
	0,5714	0,5714	0,5714		**1,7143**
	3,0000				
	3,0000				
	3,0000				
λ max	3,0000				
CI	0				
CR	0,00	≤	**0,10**		
Iteration	2				

Table 3.16 AHP Solution for Overall Market Potential

OVERALL AHP FOR MARKET POTENTIAL

Priorities of for the four criteria

Willingnes	**0,1769**
Existence	**0,1151**
Avareness	**0,6492**
SMEs	**0,0588**

Priority vectors for four criteria

	Willingnes	Existence	Avareness	SMEs
Gaziantep	0,0786	0,0890	0,1692	0,1429
Kocaeli	0,2628	0,3234	0,3874	0,2857
İzmir	0,6586	0,5876	0,4434	0,5714

Overall Priorities

Business Center	**Weight**
Gaziantep	**0,0857**
Kocaeli	**0,2809**
İzmir	**0,5192**

Table 3.17 AHP Solution for Local Beneficiary Support's Criteria

Local Beneficiary Support				
	Financial	Political	Logistic	
Financial	**1,0000**	0,3333	3,0000	
Political	3,0000	**1,0000**	4,0000	
Logistic	0,3333	0,2500	**1,0000**	
				Eigenvector
				0,2684
				0,6144
				0,1172
				1,0000
Consistency Calculation				
				Weighted sum vector
	0,2684	0,2048	0,3517	**0,8248**
	0,8051	0,6144	0,4689	**1,8884**
	0,0895	0,1536	0,1172	**0,3603**
	3,0735			
	3,0735			
	3,0735			
λ max	3,0735			
CI	0,036757			
CR	0,06	≤	**0,10**	
Iteration	4			

Table 3.18 AHP Solution for Financial Support

Financial Support					
	Gaziantep	Kocaeli	İzmir		
Gaziantep	**1,0000**	3,0000	1,0000		
Kocaeli	0,3333	**1,0000**	0,5000		
İzmir	1,0000	2,0000	**1,0000**		
				Eigenvector	
				0,4434	
				0,1692	
				0,3874	
				1,0000	
Consistency Calculation					
				Weighted sum vector	
	0,4434	0,5076	0,3874	**1,3384**	
	0,1478	0,1692	0,1937	**0,5107**	
	0,4434	0,3384	0,3874	**1,1692**	
	3,0183				
	3,0183				
	3,0183				
λ max	3,0183				
CI	0,009147				
CR	0,02	≤	**0,10**		
Iteration	3				

Table 3.19 AHP Solution for Political Support

Political Support					
	Gaziantep	Kocaeli	İzmir		
Gaziantep	**1,0000**	2,0000	3,0000		
Kocaeli	0,5000	**1,0000**	2,0000		
İzmir	0,3333	0,5000	**1,0000**		
				Eigenvector	
				0,5396	
				0,2970	
				0,1634	
				1,0000	
Consistency Calculation					
				Weighted sum vector	
	0,5396	0,5939	0,4903	**1,6238**	
	0,2698	0,2970	0,3269	**0,8936**	
	0,1799	0,1485	0,1634	**0,4918**	
	3,0092				
	3,0092				
	3,0092				
λ max	3,0092				
CI	0,004601				
CR	0,01	≤	**0,10**		
Iteration	3				

Table 3.20 AHP Solution for Logistic Support

Logistic Support				
	Gaziantep	Kocaeli	İzmir	
Gaziantep	**1,0000**	0,3333	2,0000	
Kocaeli	3,0000	**1,0000**	3,0000	
İzmir	0,5000	0,3333	**1,0000**	
				Eigenvector
				0,249344
				0,593564
				0,157092
				1,0000
Consistency Calculation				
				Weighted sum vector
	0,2493	0,1979	0,3142	**0,7614**
	0,7480	0,5936	0,4713	**1,8129**
	0,1247	0,1979	0,1571	**0,4796**
	3,0535			
	3,0542			
	3,0531			
λ max	3,0536			
CI	0,026811			
CR	0,05	≤	**0,10**	
Iteration	3			

Table 3.21 AHP Solution for Local Beneficiary Support

OVERALL AHP FOR LOCAL BENEFICARY SUPPORT

Priorities of for the four criteria

Financial	0,2684
Political	0,6144
Logistic	0,1172

Priority vectors for four criteria

	Financial	Political	Logistic
Gaziantep	0,4434	0,5396	0,249344
Kocaeli	0,1692	0,2970	0,593564
İzmir	0,3874	0,1634	0,157092

Overall Priorities

Business Center	**Weight**
Gaziantep	**0,4798**
Kocaeli	**0,2974**
İzmir	**0,2228**

APPENDIX II DETAILED RESULT OF DEA MODEL

Output maximisation radial model will be used
Phase 1 Optimisation with constant returns to scale
Maximise the outputs produced with input levels held
Phase 2 Optimisation
Maximise secondary gains relative to the target
Tables produced for efficiences from 0.0% to 100.0%
Tables are sorted into ascending efficiency order
Peers shown as contributions to the optimal mix

Table of efficiencies (radial)

100.00 GAZIANTEP 100.00 IZMIR 100.00 KOCAELI

Table of peer units
Peers for Unit GAZIANTEP efficiency 100.00% radial

GAZIANTEP ACTUAL		GAZIANTEP LAMBDA 1.000
86.0	–BCD	86.0
85.0	–EUD	85.0
141.0	–EULTE	141.0
949.0	–BSM	949.0
369.0	–INTSTE	369.0
1058.0	–LSTE	1058.0
0.1	–MARKET	0.1
0.5	–STAKEHOLDE	0.5
1221.0	+CUSTOMERSE	1221.0
165.0	+CONSULTING	165.0
414.0	+COUNSELING	414.0
1567.0	+PARTICIPAN	1567.0
337.0	+COMPANYPAR	337.0
48.0	+TRAININGPR	48.0
158703.0	+INCOMEGENE	158703.0

Peers for Unit IZMIR efficiency 100.00% radial

IZMIR ACTUAL		IZMIR LAMBDA 1.000
56.0	-BCD	56.0
50.0	-EUD	50.0
295.0	-EULTE	295.0
811.0	-BSM	811.0
521.0	-INTSTE	521.0
1215.0	-LSTE	1215.0
0.5	-MARKET	0.5
0.2	-STAKEHOLDE	0.2
1718.0	+CUSTOMERSE	1718.0
152.0	+CONSULTING	152.0
727.0	+COUNSELING	727.0
3375.0	+PARTICIPAN	3375.0

839.0	+COMPANYPAR	839.0
150.0	+TRAININGPR	150.0
184173.0	+INCOMEGENE	184173.0

Peers for Unit KOCAELI efficiency 100.00% radial

KOCAELI		KOCAELI
ACTUAL	LAMBDA	1.000
81.0	-BCD	81.0
77.0	-EUD	77.0
114.0	-EULTE	114.0
1045.0	-BSM	1045.0
503.0	-INTSTE	503.0
859.0	-LSTE	859.0
0.3	-MARKET	0.3
0.3	-STAKEHOLDE	0.3
1146.0	+CUSTOMERSE	1146.0
50.0	+CONSULTING	50.0
831.0	+COUNSELING	831.0
1531.0	+PARTICIPAN	1531.0
265.0	+COMPANYPAR	265.0
49.0	+TRAININGPR	49.0
121164.0	+INCOMEGENE	121164.0

Table of target values

Targets for Unit GAZIANTEP efficiency 100.00% radial

VARIABLE	ACTUAL	TARGET	TO GAIN	ACHIEVED
-BCD	86.0	86.0	0.0%	100.0%
-EUD	85.0	85.0	0.0%	100.0%
-EULTE	141.0	141.0	0.0%	100.0%
-BSM	949.0	949.0	0.0%	100.0%
-INTSTE	369.0	369.0	0.0%	100.0%
-LSTE	1058.0	1058.0	0.0%	100.0%
-MARKET	0.1	0.1	0.0%	100.0%
-STAKEHOLDE	0.5	0.5	0.0%	100.0%
+CUSTOMERSE	1221.0	1221.0	0.0%	100.0%
+CONSULTING	165.0	165.0	0.0%	100.0%
+COUNSELING	414.0	414.0	0.0%	100.0%
+PARTICIPAN	1567.0	1567.0	0.0%	100.0%
+COMPANYPAR	337.0	337.0	0.0%	100.0%
+TRAININGPR	48.0	48.0	0.0%	100.0%
+INCOMEGENE	158703.0	158703.0	0.0%	100.0%

Targets for Unit IZMIR efficiency 100.00% radial

VARIABLE	ACTUAL	TARGET	TO GAIN	ACHIEVED
-BCD	56.0	56.0	0.0%	100.0%
-EUD	50.0	50.0	0.0%	100.0%
-EULTE	295.0	295.0	0.0%	100.0%
-BSM	811.0	811.0	0.0%	100.0%
-INTSTE	521.0	521.0	0.0%	100.0%
-LSTE	1215.0	1215.0	0.0%	100.0%

-MARKET 0.5 0.5 0.0% 100.0%
-STAKEHOLDE 0.2 0.2 0.0% 100.0%
+CUSTOMERSE 1718.0 1718.0 0.0% 100.0%
+CONSULTING 152.0 152.0 0.0% 100.0%
+COUNSELING 727.0 727.0 0.0% 100.0%
+PARTICIPAN 3375.0 3375.0 0.0% 100.0%
+COMPANYPAR 839.0 839.0 0.0% 100.0%
+TRAININGPR 150.0 150.0 0.0% 100.0%
+INCOMEGENE 184173.0 184173.0 0.0% 100.0%

Targets for Unit KOCAELI efficiency 100.00% radial
VARIABLE ACTUAL TARGET TO GAIN ACHIEVED
-BCD 81.0 81.0 0.0% 100.0%
-EUD 77.0 77.0 0.0% 100.0%
-EULTE 114.0 114.0 0.0% 100.0%
-BSM 1045.0 1045.0 0.0% 100.0%
-INTSTE 503.0 503.0 0.0% 100.0%
-LSTE 859.0 859.0 0.0% 100.0%
-MARKET 0.3 0.3 0.0% 100.0%
-STAKEHOLDE 0.3 0.3 0.0% 100.0%
+CUSTOMERSE 1146.0 1146.0 0.0% 100.0%
+CONSULTING 50.0 50.0 0.0% 100.0%
+COUNSELING 831.0 831.0 0.0% 100.0%
+PARTICIPAN 1531.0 1531.0 0.0% 100.0%
+COMPANYPAR 265.0 265.0 0.0% 100.0%
+TRAININGPR 49.0 49.0 0.0% 100.0%
+INCOMEGENE 121164.0 121164.0 0.0% 100.0%

Table of virtual I/Os
Virtual IOs for Unit GAZIANTEP efficiency 100.00% radial
VARIABLE VIRTUAL IOs IO WEIGHTS
-BCD 12.30% 0.00143
-EUD 12.30% 0.00145
-EULTE 12.30% 0.00087
-BSM 12.30% 0.00013
-INTSTE 12.30% 0.00033
-LSTE 12.30% 0.00012
-MARKET 13.89% 1.62121
-STAKEHOLDER 12.30% 0.25638
+CUSTOMERSERV 12.30% 0.00010
+CONSULTINGSE 26.19% 0.00159
+COUNSELINGSE 12.30% 0.00030
+PARTICIPANTS 12.30% 0.00008
+COMPANYPARTI 12.30% 0.00037
+TRAININGPROG 12.30% 0.00256
+INCOMEGENERA 12.30% 0.00000

Virtual IOs for Unit IZMIR efficiency 100.00% radial
VARIABLE VIRTUAL IOs IO WEIGHTS

-BCD 12.50% 0.00223
-EUD 12.50% 0.00250
-EULTE 12.50% 0.00042
-BSM 12.50% 0.00015
-INTSTE 12.50% 0.00024
-LSTE 12.50% 0.00010
-MARKET 12.50% 0.24076
-STAKEHOLDER 12.50% 0.56104
+CUSTOMERSERV 12.50% 0.00007
+CONSULTINGSE 12.50% 0.00082
+COUNSELINGSE 12.50% 0.00017
+PARTICIPANTS 25.00% 0.00007
+COMPANYPARTI 12.50% 0.00015
+TRAININGPROG 12.50% 0.00083
+INCOMEGENERA 12.50% 0.00000

Virtual IOs for Unit KOCAELI efficiency 100.00% radial
VARIABLE VIRTUAL IOs IO WEIGHTS
-BCD 8.48% 0.00105
-EUD 8.48% 0.00110
-EULTE 40.62% 0.00356
-BSM 8.48% 0.00008
-INTSTE 8.48% 0.00017
-LSTE 8.48% 0.00010
-MARKET 8.48% 0.30200
-STAKEHOLDER 8.48% 0.28525
+CUSTOMERSERV 8.48% 0.00007
+CONSULTINGSE 8.48% 0.00170
+COUNSELINGSE 49.10% 0.00059
+PARTICIPANTS 8.48% 0.00006
+COMPANYPARTI 8.48% 0.00032
+TRAININGPROG 8.48% 0.00173
+INCOMEGENERA 8.48% 0.00000

APPENDIX III AHP SURVEY RESULTS

Table 3.22 AHP Survey Result for Market Potential's Criteria

1. Identification of priorities for Market Potential's Criteria

	Willingnes	Exsistence	Awareness	SMEs
Willingnes	1	A	B	C
Exsistence	G	1	D	E
Awareness	H	J	1	F
SMEs	I	K	L	1

	G	H	I	J	K	L	A	B	C	D	E	F
	0,5000	#DIV/0!	0,2500	#DIV/0!	0,3333	0,1667	#DIV/0!	0,1667	#DIV/0!	0,1667	#DIV/0!	#DIV/0!
Participant	A	B	C	D	E	F	G	H	I	J	K	L
1	1		3		2	5		7		5		
2	2		4		3	5		5		6		
3	2		4		4	7		5		7		
4	2		4		3	6		6		5		
5	3		3		5	8		7		5		
6	1		5		2	5		5		7		
7	3		6		1	6		5		5		
8	2		3		4	6		6		7		
9	2		5		2	7		7		6		
10	2		3		4	5		7		7		
TOTAL	2	0	4	0	3	6	0	6	0	6	0	0

Table 3.23 AHP Survey Result for Willingness to Pay Consulting Companies

Willingness to Pay Consulting Companies

	Gaziantep	Kocaeli	Izmir
Gaziantep	1	A	B
Kocaeli	D	1	C
İzmir	E	F	1

Participant	A	B	C	D	E	F
1				3	5	4
2				5	6	5
3				4	8	2
4				5	6	3
5				3	7	3
6				4	8	2
7				5	6	3
8				5	8	4
9				3	8	2
10				3	8	2
TOTAL				**4**	**7**	**3**

Table 3.24 AHP Survey Result for Existence of Consulting Companies

Existence of Consulting Companies

	Gaziantep	Kocaeli	Izmir
Gaziantep	1	A	B
Kocaeli	D	1	C
İzmir	E	F	1

Participant	A	B	C	D	E	F
1				5	7	2
2				5	6	1
3				4	7	2
4				4	6	3
5				3	7	2
6				4	5	2
7				5	5	2
8				4	6	3
9				3	5	1
10				3	6	2
TOTAL				**4**	**6**	**2**

Table 3.25 AHP Survey Result for Awareness of Benefits of Consulting Companies

Awareness of Benefits of Consulting Companies

	Gaziantep	Kocaeli	Izmir
Gaziantep	1	A	B
Kocaeli	D	1	C
İzmir	E	F	1

Participant	A	B	C	D	E	F
1				2	2	1
2				2	4	1
3				2	2	1
4				2	2	1
5				3	4	2
6				1	2	1
7				2	4	1
8				3	3	1
9				2	4	1
10				1	3	1
TOTAL				**2**	**3**	**1,1**

Table 3.26 AHP Survey Result for Number of SMEs

Number of SMEs

	Gaziantep	Kocaeli	Izmir
Gaziantep	1	A	B
Kocaeli	D	1	C
İzmir	E	F	1

Participant	A	B	C	D	E	F
1				2	3	1
2				2	5	3
3				3	2	2
4				2	3	1
5				2	4	3
6				1	4	1
7				2	4	4
8				2	5	1
9				2	6	3
10				2	4	1
TOTAL				**2**	**4**	**2**

Table 3.27 AHP Survey Result for Local Beneficiary Support's Criteria

Local Beneficiary Support's Criteria

	Financial	Political	Logistic
Financial	1	A	B
Political	D	1	C
Logistic	E	F	1

Participant	A	B	C	D	E	F
1		4	4	3		
2		4	4	2		
3		2	4	4		
4		3	5	5		
5		3	3	3		
6		2	4	2		
7		3	5	5		
8		4	4	2		
9		3	3	3		
10		2	4	1		
TOTAL	**0**	**3**	**4**	**3**	**0**	**0**

Table 3.28 AHP Survey Result for Financial Support

Financial Support

	Gaziantep	Kocaeli	Izmir
Gaziantep	1	A	B
Kocaeli	D	1	C
İzmir	E	F	1

Participant	A	B	C	D	E	F
1	4	1				2
2	5	1				3
3	2	1				2
4	3	1				1
5	3	1				2
6	2	1				1
7	3	1				4
8	4	1				2
9	2	3				2
10	2	1				1
TOTAL	**3**	**1,2**	**0**	**0**	**0**	**2**

Table 3.29 AHP Survey Result for Political Support

Political Support

	Gaziantep	Kocaeli	Izmir
Gaziantep	1	A	B
Kocaeli	D	1	C
İzmir	E	F	1

Participant	A	B	C	D	E	F
1	2	2	2			
2	1	4	2			
3	2	2	3			
4	3	2	2			
5	2	4	2			
6	2	2	1			
7	2	4	2			
8	3	3	2			
9	1	4	2			
10	2	3	2			
TOTAL	**2**	**3**	**2**	**0**	**0**	**0**

Table 3.30 AHP Survey Result for Logistic Support

Logistic Support

	Gaziantep	Kocaeli	Izmir
Gaziantep	1	A	B
Kocaeli	D	1	C
İzmir	E	F	1

Participant	A	B	C	D	E	F
1		1	4	3		
2		2	2	2		
3		4	3	4		
4		2	2	5		
5		3	2	3		
6		2	2	2		
7		1	4	5		
8		2	3	2		
9		2	4	3		
10		1	4	1		
TOTAL	**0**	**2**	**3**	**3**	**0**	**0**

APPENDIX IV AHP SURVEY SHEET FOR MARKET POTENTIAL

CRITERIA RANKING SURVEY USING ANALYTHICAL HIERARCHY PROCESS FOR MARKET POTENTIAL OF 3 BUSINESS CENTERS

This survey is aims to identify the priorites for given criteria and alternatives relatively. The survey should be filled in according to the your Buisness Center's and regional facts.

1. Identification of priorities for Market Potential's Alternatives

	Willingnes to pay consulting service	Exsistence of consulting companies	Awareness of benefits of consulting	Number of SMEs
Willingnes to pay consulting service				
Exsistence of consulting companies				
Awareness of benefits of consulting				
Number of SMEs				

2. Willingnes to pay consulting service

	Gaziantep	Kocaeli	İzmir
Gaziantep			
Kocaeli			
İzmir			

3. Exsistence of consulting companies

	Gaziantep	Kocaeli	İzmir
Gaziantep			
Kocaeli			
İzmir			

4. Awareness of benefits of consulting

	Gaziantep	Kocaeli	İzmir
Gaziantep			
Kocaeli			
İzmir			

5. Number of SMEs

	Gaziantep	Kocaeli	İzmir
Gaziantep			
Kocaeli			
İzmir			

APPENDIX V - AHP SURVEY SHEET FOR LOCAL BENEFICIARY SUPPORT

CRITERIA RANKING SURVEY USING ANALYTHICAL HIERARCHY PROCESS FOR LOCAL BENEFICIARY SUPPORT OF 3 BUSINESS CENTERS

This survey is aims to identify the priorites for given criteria and alternatives relatively. The survey should be filled in according to the your Buisness Center's and regional facts.

6. Identification of priorities for Local Beneficiary Support's Alternatives

	Financial	Political	Logistic
Financial			
Political			
Logistic			

7. Financial

	Gaziantep	Kocaeli	İzmir
Gaziantep			
Kocaeli			
İzmir			

8. Political

	Gaziantep	Kocaeli	İzmir
Gaziantep			
Kocaeli			
İzmir			

9. Logistic

	Gaziantep	Kocaeli	İzmir
Gaziantep			
Kocaeli			
İzmir			

APPENDIX VI - CONTACT INFORMATION OF BUSINESS CENTERS

GAZIANTEP EU TURKEY BUSINESS CENTER

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IZMIR EU TURKEY BUSINESS CENTER

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