“ABNORMALLY LOWEST BIDS IN PUBLIC CONSTRUCTION WORKS”

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“ABNORMALLY LOWEST BIDS IN PUBLIC CONSTRUCTION WORKS”

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ABSTRACT

ABNORMALLY LOWEST BIDS IN PUBLIC CONSTRUCTION WORKS

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The purpose of this thesis is to determine the importance of abnormally low tenders for Turkey, understand the problems created by abnormally low tenders, find reasons of them, develop various methods in reducing abnormally low tender problem and determine the most appropriate method. In this thesis, reasons of abnormally low tenders in Europe and Turkey were investigated. Various recommendations were developed for solving the problem and validity of these solutions was investigated. Different results were obtained due to the different social structure of countries. Besides, abnormally low tender evaluation questionnaire was used to find reasons of abnormally low tenders in Turkey. This questionnaire reached to 430 firms or people and by detailed analysis of questionnaire, reasons of abnormally low tenders were found out and some solution methods were proposed.

Keywords: Abnormally Low Tenders, Conceptual Cost, E-procurement

ÖZ

YAPIM İŞLERİNDE AŞIRI DÜŞÜK TEKLİFLER

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Bu tezin amacı aşırı düşük tekliflerin Türkiye için öneminin belirlenmesi, bu tekliflerin yarattığı problemleri anlamak, onların sebeplerini bulmak, aşırı düşük teklif sorununun azaltılabilmesi için çeşitli metotlar geliştirebilmek ve en uygun modeli bulmaktır. Bu tezde Avrupa ve Türkiye'deki aşırı düşük teklif sebepleri araştırılmıştır. Problemi çözmek için çeşitli öneriler geliştirilmiştir ve bu önerilerin geçerliliği araştırılmıştır. Sonuçlar her ülkenin sosyal yapısına göre değişiklik göstermiştir. Bu çalışmada ayrıca Türkiye'deki aşırı düşük teklif sebeplerini bulmak için aşırı düşük teklif anketi kullanılmıştır. Bu anket Türkiye genelinde 430 firmaya veya kişiye ulaşmış olup, anketin detaylı analizi sonucu aşırı düşük tekliflerin sebepleri ortaya çıkmıştır, çeşitli çözüm metotları önerilmiştir.

Anahtar Kelimeler: Aşırı Düşük Teklifler, Yaklaşık Maliyet, E-ihale

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LIST OF ABBREVIATIONS

ABBREVIATIONS

ALT	: Abnormally Low Tender
BCR	: Beyond-Contractual Reward
CPV	: Common Procurement Vocabulary
CV	: Curriculum Vitae
DG	: Directorate General
EC	: European Community
EEC	: European Economic Community
EMAT	: Economically Advantageous Tender
E-Procurement	: Electronic Procurement
EU	: European Union
FIEC	: European Construction Industry Federation
İNTES	: Turkish Construction Industrialists Employers' Union
LIT	: Italian Lira
LN	: Logarithm Natural
PPA	: Public Procurement Authority
PPL	: Public Procurement Law
PPP	: Public Private Partnership
UK	: United Kingdom
USA	: United States of America
USL	: Local Health Authority
YTL	: New Turkish Lira

CHAPTER 1

INTRODUCTION

In Turkey, construction industry has been continuously developing for the last decades. Particularly, the development gained speed due to both increase on the number of investors in the area and rise of participation rate of local contractors on international tenders within last two years. Every country has its own construction standards and some, are much better prepared than Turkish standards. In order to catch up those countries, these standards should be followed properly, and contractors should gain experience. In Turkey, experience is measured by completed works.

Turkish public procurement system faces several problems concerning the tendering methods in construction industry. Indeed, every system was anyhow abused. In Turkey, average method and scoring system was used under the Law 2886. And now, a similar system is used in European Union (EU) namely price discounting model.

Unfortunately the system was ceased due to corruption and abuses and eventually *the discount system* (highest discount wins the tender) is re-adopted. In 2003, Law 2886 was voided due to its deficiencies and instead 4734 Public Procurement Law was entered into force.

Nowadays, the main problem of construction sector and tendering methods is abnormally low tenders (ALTs). This problem, in fact, existed for years but is officially recognized by the Law 4734. Despite the attempts to solve it, unfortunately the problem still exists.

In 4734 Law, 4 tender procedures are defined. One of the tender procedures is open procedure, which everyone can bid in that procedure. Also threshold amount is defined as the value that specifies participation of international tenderers to Turkish tenders. Tenders below threshold amount may not open to international tenders if contracting authorities establish some provisions to tender documents with regard to only domestic tenderers participate in tenders. According to statistics (PPA, 2005c, 2006e, 2007) of Public Procurement Authority (PPA), in 2006 public works were %13 of total tenders. The most of these tenders were below threshold amount and %94 of public works tenders were open procedures. In the competitive bidding system, price is the decisive criterion, so contractors may win the bid by tendering ALT, accidentally or deliberately (Grogan, 1992). The proportion of contract price to the conceptual estimate was %78 in 2006 and it was the lowest ratio between the other types of tenders. That situation showed that competition was at the highest in public works. Table 1 shows quantities of tenders according to last 3 years and Table 2 shows the prices of conceptual cost and contract of public works below.

Table 1: Quantity of Public Works Tenders for 3 years

Quantity/Years	**2006**	**2005**	**2004**
Public Works (PW)	18.405	15.836	9.439
Total Tenders (TT)	137.857	115.639	95.105
PW/TT	%13	%14	%10
Open Procedures in PW (OP)	17.391	15.078	8.817
OP/PW	%94	%95	%93

Abnormally low tenders are occasionally seen in lump-sum type contracts in open procedures. That is one of reason that the ratio between contract price and conceptual cost. ALTs are determined by a formulae, which will be explained on

chapter 5, considering mean value of contract prices and conceptual cost. According to the formulae, increase in mean of contract prices results in ALT limit to remain same from certain level. So that, from the Table 2, the %5 increase ratio from 2005 to 2006 (CPO/CCO) could be an indication of decrease in ALTs. However it was questionable that how accurate the conceptual cost of public authorities was.

Experience gained from works and prices of completed works remained low because mostly all of the tenders were below threshold point. In addition to that, companies which could not win tenders because of ALTs, tend to search for work opportunities in foreign countries. These firms have a higher probability of bankruptcy because they can fail without adequate experience or even can not win a tender because of inadequate financial standards. For that reasons, ALT problem should be solved as soon as possible, in Turkey.

Table 2: Conceptual Cost and Contract Price of Public Works Tenders

Prices(x1000 YTL)/Years	**2006**	**2005**	**2004**
Contract Price (CP)	11.183.943	10.194.005	3.977.742
Conceptual Cost (CC)	14.127.657	13.808.122	5.415.793
CP/CC	%79	%74	%73
Contract price of OP (CPO)	10.211.164	9.458.357	3.585.918
Conceptual cost of OP (CCO)	13.075.556	12.963.998	4.983.030
CPO/CCO	%78	%73	%72
Contract price of RP (CPR)	221.414	217.015	76.831
Conceptual cost of RP (CCR)	238.072	250.262	86.849
CPR/CCR	%93	%87	%88
Contract price of NP (CPN)	751.365	518.633	314.992
Conceptual cost of NP (CCN)	814.030	593.862	345.914
CPN/CCN	%92	%87	%91

Where;
RP: Restricted procedure, NP: Negotiated procedure

The aim of this study is to examine the abnormally low tender problem in Turkey and to find the most adequate solution in order to minimize the problem. For that reason, firstly a thorough literature review on abnormally low tenders was carried out. Turkey is a candidate country that on the path of being a full member of EU. Thus, especially ALT problem in EU, the reasons behind, recommendations to solve the problem will be evaluated together with Turkey's policies and researches on the issue. Consequently, the reasons behind abnormally low tenders were determined with the help of a questionnaire about ALTs. Recommendations will be made throughout this study in order to reduce the negative impact of abnormally low tenders in Turkish construction industry, and thus solve the problem.

CHAPTER 2

LITERATURE REVIEW

Literature review was performed on the subject of abnormally low tenders to observe which was carried out previously in order to define, solve and find out the reasons of the problem; identify certain significant factors that would reduce the consequences of abnormally low tenders. The past recommendations will help analyze ALT problem in an organized manner.

2.1 Previous ALT Researches

In EU, any citizen can claim clarification about his complaint from national courts. If national court could not give a decision, it can take the complaint to the European Court of Justice. Every complaint that is taken with European Court of justice is named as case. In October 1997, the case no: C-304/96 was concluded. With that case, it was concluded that ALT could not be rejected without demand of explanation according to EU Laws and directives, even if national Law permitted.

In the EU, the staff of the main institutions (Commission, Council and Parliament) are organized into a number of distinct departments, known as Directorates-General (DGs), each of which is responsible for specific tasks or policy areas. DG III is about economic policy and financial markets. Its main responsibility is to encourage the development of Economic and Monetary Union (single market with a common currency) both inside and outside the European Union, by advancing economic policy coordination, conducting economic surveillance and providing policy assessment and advice (Wikipedia, 2007). In May 1999, Directorate General (DG III) working group published a report regarding abnormally low

tenders. In that report the adverse effects of ALTs, reasons of submitting ALTs, reasons of acceptance of ALTs, some recommendations for prevention, detection, elimination of ALTs were mentioned. Also EMAT (Economically Most Advantageous Tender) scoring system was proposed on the basis of best quality and value for the client.

In April 2003, Calveras, Ganuza, and Hauk showed that the usage of surety bonds reduced and sometimes eliminated the abnormally low tender problem. Surety bond is a guarantee in which the surety company guarantees that the contractor will perform the obligation stated in the bond (Calvares *et al.*, 2003). Performance bonds are one of the types of surety bonds. Performance bonds are a guarantee of the contracting authority that contractor completes the contract on time and at contract price. If the performance bond is used with surety bonds, there will be some options that completing the contract itself, selecting a new contractor or allowing the sponsor to complete the work with surety bonds. In practice sureties are required to have enough capital to meet their bonding liabilities (Calvares *et al.*, 2003). According to Calvares et al. (2003), the reasons of abnormally low tenders were as follows:

- Expectation of renegotiating the contract later on when it would be costly for sponsor to replace the existing company.
- Taking a risky strategy for survival of a company that in a bad financial state.
- Protection of firms which went bankrupt by limited liability (bankruptcy Laws).

In Turkey, generally banks give performance bonds, however there are no surety companies. In USA, surety companies, which are also called sponsor firms, can give surety bond as performance bond. Taking a risky strategy for survival of a firm was also a reason mentioned on DGIII report about ALTs. However other reasons of ALTs and solutions recommended were different when compared to

DGIII report. It is thought that was due to different Law and social conditions in EU and USA.

In August 2003, DG III working group published a report about economically most advantageous tender. That report was based on the report of ALTs in 1999, which would be solution of ALTs. The content of that report was EMAT mechanism and recommendations for the prevention, detection, elimination of ALTs.

In January 2004, EU issued two directives, which were 2004/18/EC and 2004/17/EC into force. 2004/18/EC is the directive of public works, public supply and public services. The general definition of ALTs, necessity of written explanations and their conditions are given in that directive. 2004/17/EC was utilities directive which was related with water, energy, transportation. E-procurement was added to the new directives. By this type of procurement, tenders could be accessed via internet.

In April 2004, Commission of European Communities published green paper about public private partnerships (PPP). PPP is the desire to benefit more in public life from know-how and working methods of the private sector. The risks are distributed between public partner and private partner. In Europe, generally abnormally low tenders are encountered by PPPs.

In July 2004, FIEC (European Construction Industry Federation) contributed the green paper on PPPs and Community Law on Public Contracts and Concessions. According to the FIEC, it is essential to encourage PPPs and award them in the tender with the principles of the most economically advantageous tender at EU level. The other findings in 2004 are as follows:

- In EU, non-price factors are considered in construction tenders in terms of the Economically Most Advantageous Tenders.
- In evaluation of economically most advantageous tender, the weight factors for price and non-price factors were developed. Price Discounting Model and Prior Overall Weightening Model were proposed.

In October 2004, case 247/02 was concluded. It was understood from the decision that contracting authority could choose between lowest price or economically most advantageous tender.

According to a study by Lo et al. (2007), the competitive bidding system is to blame for abnormally low bids, which are considered to be one of the main causes of poor project quality. System dynamics were adopted in this study in order to develop a contractor's pricing model with consideration of the dimensions of cost, market competition and BCR (Beyond-Contractual Reward). It has been found that the equilibrium market price is significantly associated with BCR, which is assumed to be determined by the strictness of the owner's construction management, including both soundness of contract and tightness of construction supervision.

Public Works and Government Services Canada published general instructions for bidder’s document in 2007. According to these instructions, Canada might accept or reject any bid, no matter it is the lowest or not, because performance evaluation is made by considering the quality of workmanship, completion period of the work, project health and safety management. After the evaluation, if the performance of a certain contractor is determined to be unsatisfactory, it will be suspended from bids for an unlimited period of time.

2.2 Previous ALT Researches in Turkey

In January 2003, 4734 Public Procurement Law was entered into force. By this Law, abnormally low tenders and inquiry for them were defined. The tender commission demanded documents about economy of work, advantageous conditions and originality of work for the inquisition.

In October 2003, Gencer compared 4734 Public Procurement Law to 2886 Public Tender Law. From this comparison, the deficiencies of 2886 Law could clearly be seen. One of the important differences was the awarding criterion. In 2886 Law, the winning bid was the suitable one for selection. The notification was published about the criteria for selecting the suitable bid. However, in application of 4734 Law, winning bid is the lowest bid that provides economic, finance and technical sufficiency.

In 2004, Oğuz (2004a) gave a speech about abnormally low tenders. In that speech, some reasons of ALTs, negative effects of ALTs, proposition of ALT limit formulae were mentioned.

In May 2004, on the I. International Symposium about Public Procurement, Gökçe (2004) talked about the inquiry procedure of abnormally low tenders. According to him, when the contracting authority was not sure about its own conceptual estimate, it hesitated to intervene to the lowest bid. So, it awarded abnormally low tender as the winner. Another reason of awarding the lowest bidder was the benefit of treasury.

Oğuz (2004b) stated that the secrecy of the conceptual estimate was infringed. If the conceptual estimate was known, the contracting authority must have taken precautions and given punishments to ALTs. He said that the conceptual estimate was not found by considering the market conditions. He also talked about a notification that would be published later. In that notification, the limit value of

the abnormally low tender would be found by a formula. Bids below this limit would be inquired.

Piga (2004) mentioned about E-procurement, transparency. He said "Probably because with the centralization the fixed cost of acquiring the material for electronic procurement is much lower". About the transparency, he stated, they did not want transparency that distorted competition and favored collusion.

Özgen (2004) talked about what was done and would be done to have E-procurement in Turkey. He pointed that, if the E-procurement system was used properly, competition and transparency problems could be solved. The most important aim of the E-procurement was decreasing the difference between the real cost and conceptual cost of a bid to zero.

Eren (2004) mentioned about international tenders. Generally both in Europe and Turkey the appropriate bid was the lowest bid. Europe applied the same Public Procurement Law with Turkey, but they put the pre-qualification conditions carefully.

According to point of view by Şahin (2004), a proper control mechanism should be used for solving the problem of abnormally low tenders.

In 2005, Gök stated that for solution of abnormally low tenders, contractors should have behaved responsible and realistic in the preparation of bids. Tender documents should have been examined comprehensively by using every kind of technical and engineering capabilities.

There are a lot of unions, entities, chambers dealing with construction industry. One of them is Turkish Construction Industrialists Employer's Union (İNTES). INTES follows technical developments in construction industry; make investments with private and public sectors; protects economic, professional,

administrative and social rights of members. Also, it makes researches about construction industry problems and recommends solutions. In October 2005, İNTES published a report on construction sector problems. According to the report, contracting authorities have hesitates in terms of awarding abnormally low tenders because of inquisition.

In April 2006, Sağlam said when lower price was faced in EU; they were looking whether there was a social policy deficiency behind that.

Sagun (2006) talked about E-procurement. Two basic effects of that were transparency and effectiveness. She investigated the decrease proportion of prices due to E-procurement in EU. By considering those statistics she pointed out there was a benefit for contracting authorities by procurement of good quality product cheaper. She also mentioned about the usage and advantages of E-procurement.

Özdemir (2006) supported PPPs. It is recommended by her that the partnership period should last between 30 to 50 years so completion of project could be achieved without taking political risks.

In October 2006, Şimşek mentioned about the reasons to change 2886 Law. Also he listed important criticisms of EU to the 4734 Law. The other findings of him are as follows:

- It is determined that the inquisition of abnormally low tenders, which was the 38th article of Public Procurement Law, was not applied instead, the bid was given to the lowest bidder in practice.
- Technical solutions on the explanation of exceptionally favorable conditions should include technical explanations about how the production was implemented in accordance with project and technical specifications.
- The bidders should prove exceptionally favorable conditions to complete the work on budget.

CHAPTER 3

PUBLIC PROCUREMENT LAW

As it is known Turkey is a candidate of EU. In EU, there are some principles like transparency and fair competition. In order to conform to the EU standards, it was necessary to change the existing tender Law and make a Law that meets the EU standards. The reasons to change the existing Law and comparison with the new Law, which is Public Procurement Law, will be mentioned in this chapter. However, according to EU, even the new Law did not fully meet the standards. The demands by EU to new Procurement Law will also be mentioned.

3.1 Reasons for new Procurement Law

In Turkey, within the period of 1984 – 2003, 2886 Public Tender Law was in force and formed the Public Procurement System. 2886 Public Tender Law mainly concerned on public works. The procurement of goods and services, consultation service was not arranged. The Public Procurement System had many drawbacks such as inappropriateness for international and modern developments, and corruptions that affected public. 2886 Public Tender Law could not meet the requirements of changing and developing conditions of present day, stayed insufficient to handle obscures in practice, did not cover all of public enterprises, did not parallel to EU and international tender applications. For these reasons, a new detailed wide – ranging Law was necessary for public tenders. Besides, procurement, service, construction, hiring and conveyance works were related with public expense; sale, renting, trade, real rights other than ownership were related with public income, so arrangement of different nature works on same Law, caused troubles (PPL General Reason). The other reasons that why 2886 Public Tender Law has been changed are (Şimşek, 2006):

a) Transparent tender rules parallel to international development rules could not have been applied,
b) International competitiveness could not have been encouraged,
c) Contracting authorities discriminated while awarding the contract,
d) Confidence for tenderers could not have been created,
e) Authority for Public Procurement did not exist,
f) There was inadequate information of public about usage of public resources.

4734 Public Procurement Law (PPL) consists of arrangements about the articles mentioned above. This Law was promulgated in 1st January 2003. The main purposes of the Law are to constitute a public procurement system that is open to public control, competition; to provide efficient usage of public resources; transparency, equal treatment, confidentiality in tenders and also to consider past experiences of Turkey and international Public Procurement norms. There was a need for an authority that applies the rules stated in 4734 Public Procurement Law. Public Procurement Authority (PPA) was constructed to perform the Law. It prepares and improves tender regulations; stores and publishes tender statistics; records abandoned firms; makes presentations and seminars in order to train public and private sector.

Other reason to change the Law was inappropriateness of proper cost determination. Two methods were applied in order to determine appropriate cost. Until 1998, contract was awarded to whom made the highest discount. No lower limit was specified for that discount. When discount became too far from appropriate one, works were completed without proper quality. The second method was specifying the most appropriate cost by rating tenders. However, the point system used for method caused problems. 94 point out of 100 was specified clearly but the remaining 6 point was left to the discretion of tender commission. In some tenders, remaining part made some firms or people in an advantageous position consciously or unconsciously (İnci and Ergönül, 2005)

3.2 Comparison of 2886 Public Tender Law and 4734 Public Procurement Law

4734 Public Procurement Law was formed by considering the tender system in EU. The 2886 Law did not meet the improving conditions about tenders and also was not sufficient for deficiencies in practice. These two Laws were compared on several main issues in order to have a general opinion about them and see their advantages and deficiencies.

The comparison was shown below:

- 2886 Law concerned with general budget and annexed budget administrations, procurement, sale, service, construction, hiring, renting and conveyance of private administrations and city halls. Contents of 4734 Law are not only content of 2886 Law but also public economic enterprises, social security institutions, funds, corporations constructed with special Laws and given public tasks and independent budget institutions. Public economic enterprises consist of two bodies which are public economic institutions and economic govern institutions.
- Conceptual cost of a tender was announced so contractors bided down by percentage of this estimate using unit prices in 2886 Law. Whereas in 4734 Law, conceptual estimate of a tender is not announced so contractors bid by lump-sum method within the public works having application projects and unit price method can be used for each item of work for the parts where application projects can not be implemented.
- The problem in 2886 Law was bidding of tenderers without investigating the project, specifications about tender; seeing the place where the project would be held. After awarding the contract, problems from either specifications or place could have been seen so, quality of work could decrease and completion of work could delay. Whereas, in 4734 Law, so that contractors specified cost, they have to see the place and read the specifications so bids could be more realistic than 2886 Law.

- In 2886 Law, government did not know the real payment for projects because of unit price based contracts, but with 4734 Law, public works generally are made by lump – sum based contracts so government knows the real payment of projects (İnci and Ergönül, 2005).
- The winner bid was the most appropriate bid which was specified according to notification announced every year. However due to 4734 Law, the winner is the economically most advantageous bid which provides economic, financial, occupational and technical sufficiency.
- According to 2886 Law, if unexpected conditions increased the contract price up to %30, contractor should finish the job with same conditions except for time. If contractor could prove that the increase was not due to his fault, amount of increase would be paid to him up to %30. If amount exceeded this percentage, contract would be terminated.
- In 4734 Law, due to the force major conditions, if there is a rise on contract price up to %10, the amount will be paid to the contractor in lump-sum tenders and up to %20 will be paid in unit price tenders. If the amount exceeds these percentages, contract would be terminated.
- Minimum amount of work experience document was the %30 of conceptual cost of the bidder whereas in 4734 Law the minimum amount should not less than %50 but not more than %100 of conceptual cost of the bidder.
- There was no article about abnormally low tenders in 2886 Law. But in 4734 Law abnormally low tenders were arranged by a special phrase "Before rejecting abnormally low tenders…"
- Turnover of contractor's license (Document given due to experience of engineers or projects completed by firms) was free so, people and firms that had not any experience about construction bought that license from owners of it by 2886 Law. That application was ceased by 4734 Law. Instead work experience document were demanded from firms or people. This work on that document must have been completed within 15 years

before the tender date. Certification of graduation can be used as work experience document but it is required that tenderers act as physical bodies. In addition to certificate of graduation, certificate of registration from associated chamber of profession or service schedule was demanded by contracting authority. (İnci and Ergönül, 2005).

- In 2886 Law, tenders were announced whether sufficient budget was available or not, so works lasted for a long time and because of inflation (İnci and Ergönül, 2005), cost more than its original cost. With 4734 Law, tenders can not be announced without sufficient budget.
- According to 2886 Law, only document showing not having tax due was demanded. For that reason, firms only paid tax due but not paid Social Security Organization for Artisans and the Self-Employed and Social Security tax. However, according to 4734 Law, all of these were demanded which must be taken within last 3 months.
- In the both of first applications of 2886 and 4734 Law, tenders were awarded to the lowest bidder, which could be considered as a flaw of Law (İnci and Ergönül, 2005).
- In 4734 Law, everyone can bid because; whoever will be able to bid for tender is not investigated. This situation causes unfair competition and sometimes works can be done by low price instead of normal price. For that reason, entities should take care of contractors whether they have basic conditions for the application of work or not. If they do not have those, documents related with the job should not be given or restricted tender rule should be applied (İnci and Ergönül, 2005).

From the special phase in the Law (4734), it can be implemented that abnormally low tenders should be rejected but for convenience contracting authorities inquire them because contractor might have found a newer and/or a cheaper technology. Under that circumstance both the contracting authority and the government would benefit from this new technique.

However, in Turkey, it was agreed by authorities that most tenders were still awarded to the abnormally low tenders. Thus, the work could not be completed in time and cost more than its original conceptual cost. Furthermore, because of the poor quality of inquiry sessions and concern of tender commission, the abnormally low bidding company usually went to court.

When tender applications by 4734 Law compared with the EU tenders, demand of bank guarantee to document financial status and similar work document are same. In addition to these documents, in international tenders, entities demand documents that show the contractor's seriousness. These include curriculum vitae (CV) of site manager, quality control manager and other engineers containing their work experience; center administrative organization chart, site organization chart, list of subcontractors and introduction file (İnci and Ergönül, 2005). But in Turkey, CVs of key technical personnel is demanded technical personnel's CV is not necessary. Documents demanded by entities of EU show their seriousness and care to the tenders.

3.3 Criticisms to 4734 Law by EU Commission

4734 Public Procurement Law was formed by considering the EU standards. This Law is parallel to the 2004/18 directive except for some differences. The EU committee demands to change the related articles that did not meet the EU standards. These were listed as below:

- EU stated that on the 63rd article of Public Procurement Law, there is a discrimination factor in favor of Turkish firms and this situation contradicts with the principle of equal treatment and non-discrimination. According to the 63rd article, if tenders are below the threshold amount, contracting authorities can establish some provisions to tender documents with regard to only domestic tenderers participate in tenders and if tenders are above the threshold amount, contracting authorities can put up to %15 price advantage to contracts in favor of Turkish firms.

This article has a link with article 40 about approval of tender. Due to 40th article, the tender is concluded by economically most advantageous tender basis with application of 63rd article.

- EU specified that threshold amounts are higher than their threshold amounts, and these amounts limited the competitiveness and opportunities of foreign tenders (Şimşek, 2006). Threshold amount of construction works in Turkey is 19.411.781 YTL and in EU 6.242.000 € (6.242.000 € x 1,85 YTL/€ = 11.547.700 YTL) on construction works. In Turkey every year, in EU every two years the threshold amounts are revised according to the inflation. It was implied that threshold amount of Turkey was %68 more than EU. When evaluating with the article mentioned above, it could be understood that foreign tenderers would not attend to Turkish tenders that were %68 more than their threshold amounts whereas Turkish tenderers could attend EU tenders. The detailed table that showed comparison of threshold amounts in Turkey and EU was shown on Table 3.
- The period between notice of tender and receipt of tender is shorter than EU directive. EU demanded the required harmonization according to EU legislation and also usage and implementation of Common Procurement Vocabulary (CPV) with full membership of Turkey to EU (Şimşek, 2006). The period for open procedures in EU is minimum 52 days and in Turkey it depends on threshold amounts. For open tenders above threshold amount, it is minimum 40 days and for construction tenders, whose conceptual estimate is between 962.761 YTL and threshold amount, is minimum 21 days. It will be investigated on the abnormally low tender evaluation questionnaire whether the period is the one of the reasons of abnormally low tenders or not (Table 4).

Table 3: Comparison of Threshold Amounts in Turkey and EU

	Turkey	EU	*Difference
Procurement of goods and services general or annexed budget entity	529.411	299.700	%77
Procurement of goods and services other entity within scope of PPL	882.352	460.650	%92
Construction works (Public Works contracts)	19.411.781	11.547.700	%68

All values are in YTL,

* : It is the proportion that determines how high Turkey's threshold amount is of EU's.

Table 4: Time Limits for Receipt of Tenders

	Tender type and cost (YTL)	Turkey	EU	Diff.
a)Tenders above or equal to threshold	Open procedure	40	52	%23
	Restricted procedure	14	40	%65
	Negotiated procedure	25	37	%32
b) Tenders below threshold	Service, goods <57.761 Construction works<115.524	7	-	
	57.761≤Service, goods≤115.524 115.524≤Construction ≤962.723	14	-	
	115.524<Service, goods<threshold 962.723<Construction < threshold	21	-	

- It is stated on the 2004/18 directive that these time limits for EU (Table 4) are applicable to the tenders equal or above the threshold amounts.
- In EU, time limits were prepared by considering tender types.

- Due to 2004/18 directive, if contracting authority published a prior information notice, the period would be shortened to 36 days in open and restricted procedures.
- Difference column in Table 4 shows how much the duration of receipt is less than the EU.
- The periods in 2004/17 directive are same as 2004/18 directive.
- The time limits below-threshold contracts were not mentioned by the directives.
- Contracting authorities specifies their own tender criterion in EU when tender is below threshold amounts. Campbell (2007) stated the threshold amounts for United Kingdom for construction works which are:
  - Below £15,000 - single quotation,
  - Between £15,000 and £100,000 - written quotations invited,
  - Between £100,000 and £3.8 million - formal UK tenders invited,
  - Above £3.8 million - formal EU tender process.

CHAPTER 4

INVESTIGATING ALTs in EU and TURKEY

4.1 Definition of Abnormally Low Tenders

In the 4734 Public Procurement Law, the definition and evaluation of abnormally low tenders were mentioned on 38th article. This article is as follows:

"The tender commission shall evaluate the tenders in accordance with Article 37 and shall determine those that are abnormally low compared to the other tenders or the estimated cost determined by the contracting entity. Before rejecting these tenders, the commission shall request from the tenderers, the details relating to components of the tender that are determined to be significant, in writing and within a specified period.

The tender commission shall evaluate the abnormally low tenders taking into consideration the written explanations documented on the following aspects:

a) Economic nature of the manufacturing process, the service provided and the method of works,
b) Selected technical solutions and advantageous conditions to be utilized by the tenderer in supply of the goods and services or fulfillment of the works,
c) The originality of the goods, services and works proposed.

As a result of this evaluation, the tenders of the tenderers whose written explanations are found insufficient or who fail to make a written explanation shall be rejected."

It was confusing that evaluation process of abnormally low tenders was explained with few words and touched upon lightly although this subject had been faced as a problem for a long time. In addition, it was seen that inquisition of ALT was not done and tenders were still awarded to ALTs without considering 38th article of Public Procurement Law. Therefore, in 2004, Public Procurement Authority published a general notification and mentioned about evaluation of abnormally low tenders (PPA, 2004). It is stated on the notification that contracting authorities concluded the tender without three paragraphs in 4734 Law or only demanded the documents specified on 34th article of Implementation of Works Procurement Regulation, which were the quantity estimate and its prices, but not inquired for abnormally low tender. For that reasons PPA developed a formula that calculated the lower limit for inquisition of abnormally low tender. This formula and evaluation method will be discussed on the following chapter. This formulation slightly reduced the problem of abnormally low tenders but not solved the problem totally.

4.2 Definition of Abnormally Low Tender in EU

EU published a directive, namely directive 2004/18 whose aim is to coordinate the award of public works, supply and service contracts. 4734 Public Procurement Law of Turkey was written in the light of this EU directive. The definition of abnormally low tenders in that directive is:

"If, for a given contract, tenders appear to be abnormally low in relation to the goods, works or services, the contracting authority shall, before it may reject those tenders, request in writing details of the constituent elements of the tender which it considers relevant". The first three elements of tender are same with the 4734 Law. In addition to them there are two more elements mentioned in 2004/18 directive. These are:

a) Compliance with the provisions relating to employment protection and working conditions in force at the place where the work, service or supply is to be performed,
b) The possibility of the tenderer obtaining State aid.

"The contracting authority shall verify those constituent elements by consulting the tenderer, taking account of the evidence supplied. Where a contracting authority establishes that a tender is abnormally low because the tenderer has obtained State aid, the tender can be rejected on that ground alone only after consultation with the tenderer where the latter is unable to prove, within a sufficient time limit fixed by the contracting authority that the aid in question was granted legally. Where the contracting authority rejects a tender in these circumstances, it shall inform the Commission of that fact." On the official site of European Community, it was written that state aid is the government support but prohibited because of its advantage over its competitors. It is only supported if it meets some criteria which were specified on site (EC, 2007)

A literature review on the ALTs reveals that other countries and researchers have developed their own ALT criteria. Cauwelaert (1999) stated that deviation which identified a tender as being abnormally low varied between %10 - %15 from average of all tenders but its efficiency was questionable. Also he mentioned about different definitions of ALTs in some EU countries.

According to the Luxemburg Law, which was established in 1999, prices are considered as being abnormally low in the circumstances in which, after allowing for all expenditures, the price offered leaves no margin for a normal level of profit.

In Belgium, France, Italy, Portugal, Spain and Greece (1999) ALTs were defined as the prices offered less by a certain percentage than the average of the tenders submitted or discounts granted.

According to FIEC (1999), normal level of profit could not be defined so the role of European competition legislation on pricing most adequately was respected.

Variety of definitions mentioned above reveals that taking into consideration different national Laws, regulations, different social perceptions, and different cultures is not enough to make a clear and common definition of ALTs. It was thought that common point of these definitions was "Contractors of ALTs will lose money".

4.3 ALT problem in EU

In Europe, construction sector gained importance after 1990s. To improve the competitiveness of European construction sector several entities came together, specified strategic objectives, made action plans. At the end of those efforts, it was agreed that as a part of the action plan, DG III convened a working group to make recommendations on the priority of permitting fair competition by making use of mechanisms to detect and rule out ALTs. DG III had met on 5 occasions, at the end on 19th May of 1999; it published a report namely "Prevention, Detection and Elimination of Abnormally Low Tenders in the European Construction Industry". In that report, several subjects were pointed out but for aim of this study reasons to submit ALTs; recommendations for prevention, detection, elimination of ALTs were mentioned.

4.3.1 Reasons to Submit ALTs in Europe

DG III defined ALT by considering Community, national legislation and procurement Laws. "A tender is assumed to be abnormally low if in the light of client's preliminary estimate and of all the tenders submitted, it seems to be abnormally low by not providing a margin for a normal level of profit, and in relation to which the tenderer can not explain his price on the basis of economy of

the construction method, or the technical solution chosen, or the exceptionally favorable conditions available to the tenderer, or originality of the work proposed"

Reasons of ALTs in Europe on that report (1999) were imprecise and ambiguous projects and tender documentation, inadequate time to prepare tenders, errors in evaluating tender documents, abuse of post-tender negotiations and the negotiated procedure, participation of public entities, awarding of contracts to lowest price, intention of contractors to submit ALTs which were mentioned below.

Tenderer could misunderstand specifications and the obligations involved at the project or could take risks in order to produce the lowest price if the tender documents were imprecise and ambiguous. That increased a risk that financial compensation was sought by reduction of quality, additional costs, and imposition of subcontractors during execution of works.

Deadlines for preparation of tenders were short so risk analyses could not be performed. As a result, estimates and assumptions became too optimistic. Also tenders were prepared by using estimates of historical data. That caused errors in estimation and usually prices were under estimated.

Some of the contracting authorities negotiated the constituent elements with the aim of reducing prices or imposing contractual terms which were especially favorable to the client after tenders had been submitted in both open and restricted procurement procedures even post-tender negotiations were prohibited. Contractors reduced prices by negotiating with subcontractors and suppliers without the protection of regulation.

Public entities did not operate on the basis of private risk capital so they could submit tenders far below the costs of private enterprise.

Constrained financial situation of public authorities resulted in award of contracts to the lowest bidder but the problem was that they did not think of additional costs like deficient quality of work and supervision of work.

Contractors generally intentionally submitted ALTs because they wanted to gain or preserve market share, survive in the expectation of better time, not to fire employees, obtain cash advance from their client bank.

4.3.2 Recommendations for Prevention of ALTs in Europe

In DG III report recommendations for prevention of ALTs were mentioned as below:

- Qualitative legal, economic and technical selection criteria should properly applied by contracting entities. These were explained in articles 24-28 of Public works directive which contains exclusion conditions from participation in a contract, proof of contractor's enrolment in the professional or trade register, proof of contractor's financial and economic standing, evidence of contractor's technical capability.
- Contracting entities should use procurement systems that require support for quality and performance criteria by encouraging the production of the optimum solution integrating construction, maintenance and whole life costs.
- Technical contractors should be appointed on appropriate terms at the earliest opportunity to work with design team.
- Partners should be selected on the basis of attitude to team working, ability to innovate, offering effective solutions.
- Design should be precise and unambiguous.
- Time limits should be chosen by considering complexity of work.
- Surety bond that cover bid, performance and payment bond should be used.

- Post-tender negotiations should be prohibited in open and restricted procedures.
- Changes for contract should be added if unforeseen technical conditions or constraints to specifications were occurred.
- In order to ensure fair competition any favorable treatment of public entities must be ruled out.
- Long term and steady investments by public entities balance supply and demand relationship in construction sector. ALTs are principally due to imbalance between them.
- Awareness of public entities for negative effects of ALTs should be raised.

4.3.3 Recommendations for Detection of ALTs

Predetermined detection mechanism system should be established which identified ALT differing by a certain percentage (recommended 10%) from a combination of the client's estimate and from the average of tenders but corrections must be made if tender was much higher than average. Another detection mechanism was based on statistical method. In that system, the threshold below which a tender had to be considered as abnormally low could be determined based on dispersion parameters of the fair price and on an analysis of the global amounts of the previous tenders.

4.3.4 Recommendations for Elimination of ALTs

Explanations of tender prices should be precise, objective, based on specific circumstances or advantages and include sub contract tenders that form a part of total tender. Quality and whole life costs should be balanced by using EMAT. EMAT Scoring system should be used, so submitting of ALTs would decrease.

The client had to reject tenders if explanation of the constituent elements of a tender did not satisfactory.

4.4 Evaluation of Public Procurement System in Turkey

The criticisms and benefits of the Public Procurement System were discussed both on First International Public Procurement Symposium and SIGMA (SIGMA is the joint venture of Organization for Economic Co-operation and Development and EU). On the symposium Küçük (2004), who was the deputy secretary of Ministry of Public Works, stated that Public Procurement Law had increased the bureaucracy, lengthened the tender process, had not been understood by people because of its complexity and no effort had been done to understand it. Also he mentioned about two reasons for lengthening of the tender process which were conservatism and period of transfer of authorities' authorization.

Küçük (2004) explained that, before the 4734 Law, the 2886 Law had given responsibilities to some enterprises and ministries about application of tender Law. The three ministries which were responsible for the Law were Ministry of Public Works, Ministry of Finance, and Audit Court. Ministry of Public Works prepared regulations, unit prices and public enterprises must have obeyed them. Ministry of Finance provided financial supervision to the tenders. Audit Court approved the tenders. In 24th December 2003, Public Finance Management and Control Law removed the approvals of Ministry of Finance and Audit Court. Transfer period of minister's authorizations lasted for a year and this was one of reasons of lengthening the tender process but Public Procurement Authority was considered being responsible for that situation.

Another important criticism to the Public Procurement was excessive formalism specified by both SIGMA (2005) and symposium. The Pubic Procurement Authority made a lot of secondary legislations rely on 4734 Law. One of the secondary legislation did not allow completing the documents but allow

completing correctable formal errors for attached documents. More than half percent of bids were rejected because of formalism (SIGMA, 2005).

Gökçe (2004), who is General Manager Assistant BUMKO of Ministry of Finance, talked drawback about the tenders which was made by lowest tender principle. On the first session of tender evaluation, bids of tenderers had been announced so, the tenderer would not have completed the incomplete documents within the time given for completion because he had known that his bid had not been the lowest. For that reason, tender process lengthened unnecessarily.

When tender applications were investigated, it was observed that tender Laws were not properly applied as they were aimed. The basic factor behind that was human factor because human have probabilities of making mistakes, emotional and ulterior motives to Law. (İnci and Ergönül, 2005)

Both in 2886 and 4734 Law, tenders generally were awarded by lowest tender method. Awarding the lowest bidder could be beneficial in theory, but in practice, it did not benefit the bidder and owner of the job. The reason for that was not only contractor's lack of knowledge, but also psychology of tender, that winner must be contractor. Contractors offered such a tender (ALT) that, it was impossible to complete the work by appropriate security, quality and technical standards. Also it was seen that the consequences of these tenders caused irrecoverable defaults, economic loss and even endangered human's life (İnci and Ergönül, 2005).

Inci and Ergönül (2005) thought that the most appropriate tender method was average method. But they mentioned two types of average methods. One of them was determining of ALT limit by considering average of tenderers. They thought this type was a fair tender but explanation demand of tender commission below the ALT limit and accepting by their own opinion had obscured transparency. Their offer was an application of a system that determination was done by documents or calculations that do not depend on people's own views. The second

type of average method was grading system. The evaluation should depend on documents and experience and bids below ALT limit must have been eliminated (Inci and Ergönül, 2005). Their method is similar to the EMAT method which is applied in EU (will be explained later on this chapter).

CVs of technical personnel should be demanded and organization chart of contractor showing position of technical personnel should be attachment of technical personnel notification document like international tender applications (Inci and Ergönül, 2005).

Although, there are many drawbacks of Public Procurement, there are some benefits. Public Procurement Authority was constructed to apply the Public Procurement Law. The duties of this institute are the main benefits of the Public Procurement System. Some of the duties and also the benefits of Procurement System are listed below:

- Evaluation of complaints about the tender process, which is useful to know whether the regulations work well or not (SIGMA, 2005).
- Education about Public Procurement subjects (SIGMA, 2005), which help to understand the Law and its applications.
- Keeping the list of abandoned tenderers to participate in public tenders (SIGMA, 2005).
- Not tendering of tenders without budget, which prevents abuses while constructing (Inci and Ergönül, 2005).
- Unavailability of conceptual cost on tender announcement which calculation of conceptual cost by contractors can increase seriousness of tenders (Inci and Ergönül, 2005).
- Demand of experience with reference to contracts of a similar nature instead of amount of any work (Inci and Ergönül, 2005).

4.5 Procedure of Complaint and Review in Turkey

The procedure of complaint and supervision was specified on regulation about administrative applications against tenders (PPA, 2006d). According to the regulation, at first, complaint application is done to the contracting authority. The period for this application is *15* days after realization of reasons for complain. Realization day is considered to be the day that tender document was bought if the complaint was done to the tender or pre-qualification document. Holidays are included in the period. Then, the contracting authority evaluates the complaint and gives a decision within *30* days. The decisions according to the 15th article of regulation are:

- Specifying of corrective procedure if the complaint can be solved by corrective action in order not to interrupt the tender procedure.
- Cancellation of tender procedure when a situation was specified that it prohibits the tender procedure and it is contradictory to the Law and regulation which can not be corrected by corrective procedure.
- Appliance of complaint was not appropriate.

If one of these decisions did not satisfy the applicant or when Contracting Authority could not give decision within 30 days, the applicant can apply to the Public Procurement Authority. The time period for application is *15* days after the decision of Contracting Authority or after 30 days decision period of Contracting Authority for complaints. The applications can be in two-ways which are complaint as objection, investigations of claims. Applications of complaint can be done about the decisions of Contracting Authorities. Investigation of claims is about the contractions in the tenders according to Law and regulations. Public Procurement Authority publishes decisions of complaints as objection. The period for decision is maximum *45* days. When the italic durations were added together, the complaint period was found to be **105** days. This duration is too much for the awarding of the tender. This duration should be shortened for the benefit of the public entities.

4.6 Procedure of Complaint and Review in EU

The purpose of the directives in EU is to construct transparent and easy control procedures, and provide fair competency among the member states. The directives were separated into two groups: Public sector directives and Utilities directives. These directives were composed for the tenders above the pre-determined threshold amounts to construct an international legislation between member states. If there is not any article related with a subject, EC Agreement will take effect. This agreement has legal decisions about the tenders below threshold amounts.

EC Public Procurement Legislation is applied by EU Commissions, but at local level by member states. For the review and complaint procedure of tenders, EC published two directives. One of them was 89/665/EEC review directive of public works and public supply dated 21/12/1989 and the other one was 92/13/EEC review directive of utilities. The 89/665/EEC directive will be mentioned in accordance with purpose of this thesis.

Judicial intervention of EC is not much (Alyanak, 2005). According to article (3) paragraph (2) of 89/665/EEC directive: "The Commission shall notify the Member State and the contracting authority concerned of the reasons which have led it to conclude that a clear and manifest infringement has been committed and request its correction". Three solutions should be given by the national courts of member states or independent administrative authorities. These solutions were mentioned on following page (Alyanak, 2005):

1- Actions that provide suspension of award procedure.
2- Making a judgment that provides privilege to cancel an administrative decision taken during the awarding process or taking corrective actions on the subjects that need to be corrected.
3- Compensation of loss.

Member states are responsible for providing privileges of individuals within the awarding process on the subject of infringement of EC Public Procurement rules. EU Commission is the authority to watch the applications of member states that are not appropriate to the EC Law. On the 226th article of EC agreement infringement procedure is mentioned. Infringement procedure consists of before judicial and judicial procedure. Judicial procedure is applied only if the first procedure fails. Complaint can be done by anyone who entered the tender or independent individuals to EC. There is no style obligation in application. This procedure was specified by the directive 89/665/EC with article (3). If commission determines that EC rules infringed clearly, they will indicate the reasons of that situation and what should be done to eliminate the infringement and declares to the member state. Member state should communicate to the commission according to article (3) paragraph (3) that:

1- Confirmation that the infringement has been corrected.
2- A reasoned submission as to why no correction has been made.
3- A notice to the effect the contract award procedure has been suspended either by the contracting authority on its own initiative or on the basis of temporary decision taken by national court or entities according to review mechanism of member state.

The period for application to the Commission was not mentioned in the directives. However, applications to the Commission and decision of the Commission should be made before the contract has been signed. If 52 days for open procedures is added with the 15 days of awarding period when requested from contracting authority, the duration is 67 days for conclusion. The awarding period for EU without the judicial process is much lower than Turkey.

4.7 Winning of Abnormally Low Tender

In Turkey, generally tenderers of abnormally low tenders are awarded with the bid. It was seen that the contract was awarded to not always the lowest bidder, but sometimes any bidder under abnormally low tender limit. Ünüvar (2004), in his speech on the 1st international public procurement symposium, mentioned that why bureaucrat-politicians, who had spent government budget inappropriately, had awarded the contract to the cheapest bid. According to him, reasons of awarding to lowest bid were:

- Insufficiency of risk analyses.
- Lack of confidence of contracting authorities to their own conceptual cost.
- Anxiety of protecting the benefit of government treasury.

In addition to them, he mentioned about negative effects of abnormally low tenders on bidders, workers, subcontractors, suppliers, contracting authorities, national economy, and competency among different sectors.

Reason for contract authority's lack of confidence was that he did not calculate his conceptual cost considering market prices. It was seen that while calculating conceptual cost, unit prices method which was used before the procurement Law and the conceptual costs of similar contracts was adopted to the new tender's conceptual cost. How the conceptual cost has to be calculated will be explained on the following chapter.

The last reason of awarding was the supervision fear of contracting authorities. Contracting authorities have worries about questions by Audit Court on why the project is not given to the lowest bidder.

In EU, some of the reasons for accepting ALT were insufficient risk analysis, lack of resources or skills, inadequate selection criteria, justification of contract awards, limited scope of EU directives (Harrower, 1999).

When EU and Turkey compared, it was seen that only the insufficient risk analysis was similar. The other ones were different according to the different point of views. However, it is thought that lack of resources or skills and justification of contract awards were also the reasons to accept ALTs encountered in Turkey. Owner of the work generally criticizes after the completion of work whether it was good or bad but not at the beginning. Also client does not want to spend money very much so he does not care about additional costs or even the work does not meet higher standards.

4.8 Problems in International Tenders

As mentioned before, EU directives are applied to the tenders equal and above a specified threshold amount. In EU, generally tenders are awarded with open procedures. According to the 2004/18 directive, the suitability of tenderers are specified in transparent and non-discriminatory behavior. Erdal Eren, on I.Symposium in 2004, mentioned about problems met in international tenders. He said that pre-sufficiency conditions had been well prepared in EU tenders. In that situation, the risk percentage of the qualified firms was nearly equivalent to each other. A highway tender was made in Bulgaria in 2002 and 23 firms were qualified for bidding. 9 out of 23 firms were Turkish firms. The bids of these firms were neither abnormally low, nor very high. However, same firms could not enter to the tenders in Turkey, because tenders did not announced with pre-qualification conditions and also attendance to tenders started to be letter of guarantee cost. Contracting authorities divide the project into works below pre-qualification conditions. For that reason, firms with different conditions, turnover, sizes, calculation techniques, point of views, construction methods bid

for the tender. This condition is one of the reasons of abnormally tenders (Eren, 2004).

In Turkey, some of the firms entered international tenders but these firms could not qualify for bid. The reason behind that is the decrease of the turnover due to the decrease in the budget in public investments. In the highway tender made in Romania, a consortium consist of big firms could not qualify. On the letter of non acceptance it was specified that consortium had got 150-200 million$ work. It completed approximately 1 million $ work per year. It could be implied that consortium is busy at least 100 years. So that offer of consortium was rejected because of work load for 100 years. However, the reason of rejection was not due to the consortium's work capability. The government could only pay 1 million $ per year. It could not be explained that if government paid more money, the work would be completed (Eren, 2004).

The other problem is about letter of guarantees. Letter of guarantee and loan is equal in calculation of funds. For that reason, banks prefer giving loan and take interest instead of giving letter of guarantees. The banks in Turkey are either make joint-ventures with the foreign banks or bought by the foreign investors. None of these banks give letter of guarantee while entering to international tenders. If any solution can not be found, firms will not enter to the international tenders because of letter guarantee and turnover conditions (Eren, 2004).

4.9 Decisions of Public Procurement Authority

Decisions taken by the Public Procurement Authority about abnormally low tenders show how these tenders were evaluated and condition of acceptability. Three of the decisions were listed below taken from official web page of PPA.

4.9.1 Decision no 2005/UY.Z-1587 (PPA, 2005b):

Tender subject to application was "Niğde Sevgi Evleri Yapım İşi". Firm's complaint application was rejected by the contracting authority (decision period was 7 days). After 10 days, firm applied to the PPA as complaint objection. PPA decided that the application of complaint as objection was not appropriate on 21.07.2005 (37 days after application). Applicant firm affirmed that abnormally low tender inquisition was made despite none of the bids were under %40 and above %120 of conceptual cost, none of the important components were determined about bid, but firm presented all of the invoices and Commission acted against Public Procurement Law. The summary of the PPA's decision was: The condition that a bid to be an abnormally low tender was not below the %40 of the conceptual cost, it was below the ALT limit specified by notification. Complainant did not have quantity take-off and price analyses at his cost calculations, the works on cost estimated were calculated generally but not individually, contract cost, PPA cost and All – risk insurance cost were not calculated. Because of those reasons, the complaint's application was rejected due to the insufficient explanations of estimated cost. The winner firm was under inquisition of abnormally low tender. This firm gave all of the cost analyses, general costs, invoices, and bid proposals from market, Technical Approach Report about how the work could be made. In addition explanation of economy of work, advantageous conditions were found to be sufficient.

4.9.2 Decision no 2006/UY.Z-1041 (PPA, 2006a):

Tender subject to application was "Konya Adliye Hizmet Binası Yapım İşi". Firm's complaint application was rejected by the contracting authority 27 days after application. Then, at the end of 15 days, firm applied to PPA. PPA decided that the application of complaint as objection was not appropriate on 01.05.2006 (45 days after application). The explanation note of the contracting

authority included the applicant firm and the other 4 firms were under ALT limit and the documents and explanations presented to the contracting authority were not sufficient. One of the important reason of rejection was the large differences between quantity take-offs of tenderer and contracting authority. Also one of the firms took his bid bond back which meant that the contract could not be done with that price. The applicant firm applied to Adana Chamber of Civil Engineers for recalculation of quantity take-off. The result of Chamber also showed that the applicant's quantity take-off was very low that decreased bid price significantly. In the investigation procedure of PPA, it was seen that some of works did not have prices. The other reasons of rejection were the low cost of a fire detection system and that prices of details of closed-circuit television system were not given. To conclude, the rejection of bid proposed by tenderer was not against the legislation rules.

4.9.3 Decision no 2006/UY.Z-1163 (PPA, 2006b):

Tender subject to application was "Manisa Vergi Dairesi Başkanlığı Hizmet Binası Yapım İşi". Firm's complaint application was rejected by the contracting authority 3 days after application. Then, at the end of 7 days, firm applied to PPA. PPA decided that the application of complaint as objection was not appropriate on 08.05.2006 (25 days after application). The firm had the lowest bid but tender was not awarded because explanations of the firm were not appropriate. PPA's decision was "Economic nature of method of works was not explained; technical solution proposed, how and where to provide advantageous conditions was not specified, no explanation was made about originality of work." Evaluation of tender was found out to be against the legislation according to another firm's complaint application. So, tender procedure after the bid was taken was cancelled, and it was decided to take corrective action for tender process after obtaining of bids. Abnormally low tenders were reevaluated

again the result did not change and it was decided to reject all of abnormally tenders and tender was awarded to the first firm above the ALT limit.

If 15 days is assumed for application to the contracting authority after realization of reasons for complain, total complaint periods are:

- Niğde Sevgi Evleri Yapım İşi : 69 days
- Konya Adliye Hizmet Binası Yapım İşi : 102 days
- Manisa Vrg. Dairesi Bşk. Hizmet Bin. Yapım İşi : 50 days

Large differences of complaint period among 3 tenders showed that these periods were changing due to the size of the job. EU demanded to shorten this period in order to comply with their norms. According to these 3 tenders and the other complaint periods on PPA's official web page, it can be implied that this period can not be shortened for a long time.

The behavior of some contracting authorities had changed. At first contracting authority hesitated not to give to abnormally low tender but now it analyses ALTs well. It did not accept advantageous conditions like cheap workforce, having materials, vehicle park alone. It accepts new technologies, new techniques, and creative ideas as advantageous conditions.

4.10 Case Laws in EU

First case (C-304/96) was an example of showing ALTs can not be rejected without demand of explanation in EU even if national Law permits. This case is between Hera SpA (Tenderer) and Unita Sanitaria Locale (Local Health Authority, USL), Impresa Romagnoli SpA (Other tenderer). Sides were subject to

the Law of Italian administrative Law. The judgment of case was mentioned below:

On 19 December 1995 the USL published an invitation to tender for a contract for works relating to the internal reorganization and technological adaptation of its property, the “Vecchio Istituto del Presidio Socio Sanitario” in Genoa. According to the invitation to tender, the contract was to be awarded to the tenderer offering the maximum discount against the base price of LIT (Italian Lira) 16 643 000 000. Hera submitted the best tender, offering a discount of 17,3%. However, that bid was excluded from the tendering procedure on the ground that it was abnormally low, with the result that the contract was awarded to Impresa Romagnoli SpA. The contracting authority's decision was based on Article 21(1a) of Law No 109, as amended by Decree Law No 101 and Law No 216. This provides that until 1 January 1997, tenders in which the percentage discount exceeds by more than one-fifth the average of the discounts in all the tenders admitted shall be excluded from public works contracts for amounts above or below the Community threshold. In proceedings before the national court contesting the contracting authority's decision, Hera claimed that the USL had infringed Article 30(4) of Directive 93/37, which provides that: “If, for a given contract, tenders appear to be abnormally low in relation to the works, the contracting authority shall, before it may reject those tenders, request, in writing, details of the constituent elements of the tender which it considers relevant and shall verify those constituent elements taking account of the explanations received. However, until the end of 1992, if current national Law so permits, the contracting authority may exceptionally, without any discrimination on grounds of nationality, reject tenders which are abnormally low in relation to the works, without being obliged to comply with the procedure provided for in the first subparagraph if the number of such tenders for a particular contract is so high that implementation of this procedure would lead to a considerable delay and jeopardize the public attaching to the execution of the contract in question. The national court pointed out that the USL had correctly applied the Italian legislation providing for the exclusion of

abnormally low tenders. It held, however, that there was a discrepancy between that legislation and Article 30(4) of Directive 93/37. The national court decided to stay proceedings to European Court of justice.

Answer of the Court (European Court of Justice):

Article 30(4) of Directive 93/37 lays down strict conditions circumscribing the contracting authority's power to waive the verification procedure for tenders which appear to be abnormally low. It may dispense with that procedure exceptionally and provided that it does not discriminate on grounds of nationality if the number of such tenders for a particular contract is so high that implementation of the procedure would lead to a considerable delay and jeopardize the public interest attaching to the execution of the contract in question. Moreover, that option is available only until 31 December 1992 but this case was dated 19 December 1995 (Case – 304/96, 1995). As a result, contracting authority could not reject ALTs without following verification process.

The second case between the Sintesi Spa and Public Works Supervisory Authority was an example to explain authority's right to choose between the abnormally low tender and economically most advantageous tender. The case concluded on 7th October in 2004. According to the Italian International Legislation's 21st article 1st and 2nd paragraphs:

1) The award of contracts by open or restricted tender shall be based on the criterion of lowest price
2) The award of contracts by call for competitive tenders and also the allocations of concessions by restricted calls for tender shall be made on the basis of the criterion of the most economically advantageous tender, taking into account factors which vary according to the work to be carried out

The City of Brescia (Contracting Authority) in Italy awarded Sintesi a concession contract for the construction and management of an underground car park. Under the contract concluded between the City of Brescia and Sintesi in December 1999, Sintesi was required to submit the completion of the works to a restricted call for tenders, at European level, in accordance with the Community rules on public works. By a notice published in the Official Journal of the European Communities on 22 April 1999, Sintesi made a restricted call for tenders based on the criterion of the most economically advantageous tender. Following the pre-selection stage, Sintesi sent the selected undertakings a letter of invitation to tender and the file of tender documents. Ingg. Provera e Carrassi SpA (Provera), one of the companies invited to submit a tender, sought and was granted an extension of the period for submitting its tender. However, it subsequently informed Sintesi that it would not take part in the tendering procedure, on the ground that it was unlawful. As a result, Sintesi awarded the contract, accepting the most economically advantageous tender. Following a fresh complaint by Provera, the contracting authority, informed Sintesi that it regarded the tendering procedure in question as contrary to Law No 109/1994, and on 7 December 2000 it adopted Decision No 53/2000, which is worded as follows:

1) In the system governed by Framework Law No 109/1994 on public works, a contract can be awarded only on the basis of the criterion of the lowest price; the criterion of the most economically advantageous tender can be employed only in the hypotheses of competition for and the concession of the construction and management of public works
2) The above rules are applicable to all works contracts, whatever the amount involved, including where that amount is above the Community threshold, and the system in question cannot be regarded as contrary to Article 30(1) of Directive 93/37/EEC

Sintesi challenged that decision before the national court, claiming, in particular, that there had been a breach of Article 30(1) of the Directive. It claimed that it

followed from that provision that the two criteria for the award of public works contracts, namely the "lowest price" criterion and the "most economically advantageous" criterion, were placed on an equal footing. Law No 109/1994 trespassed article 30(1) of the directive. The national court made the point that the car park in question would be situated in the historical center of the City of Brescia. Consequently, the works to be carried out would be very complex and would require an assessment of technical elements, which should be provided by the tenderers, so that the contract could be awarded to the undertaking most capable of carrying out the work. Court decided to stay proceedings and refer the following question to the European Court of Justice for a preliminary ruling, does article 30(1) of the Directive allows individual contracting authorities to choose either the lowest price or the most economically advantageous tender as the criterion for the award of a contract?

According to Sintesi, Article 30(1) of the Directive, in so far as it left to the contracting authority the free choice between lowest price and most advantageous tender as the criterion for awarding public works contracts, implements the principle of free competition. At that point, reducing that authority's discretion to a mere analysis of the prices submitted by the tenderers, as required by Article 21(1) of Law No 109/1994, constituted an obstacle to the selection of the best possible tender and was therefore contrary to Article 81 EC.

According to Provera and the Italian Government, it followed from the very wording of article 30(1) that the directive did not ensure that the contracting authority was free to choose one criterion rather than another, nor did it require that one or other criterion be used in certain specific circumstances. Article 30(1) merely set out the two criteria applicable to the award of contracts and did not specify the cases in which they are to be used. Austrian and Italian governments agreed with the Provera.

The Commission submitted that the Directive did not express any preference for one or other of the two criteria set out in article 30(1) of the directive The Commission observed that, in that case, article 21(1) of Law No 109/1994 required that the lowest-price criterion be used in order to ensure the greatest transparency of procedures relating to public works contracts, which was consistent with the objective pursued by the Directive, namely to ensure the development of effective competition. Such a provision was therefore not contrary to Article 30(1) of the Directive.

Answer of the Court (European Court of Justice, 2004):

The objective of the EU directives was to ensure genuine competition in field of public works contracts. In order to meet the objective of developing effective competition, the directive sought to organize the award of contracts in such a way that the contracting authority is able to compare the different tenders and to accept the most advantageous criterion on the basis of objective criteria. A national provision, such as that at issue in the main proceedings, which restricts the contracting authorities' freedom of choice, in the context of open or restricted tendering procedures, by requiring that the lowest price be used as the sole criterion for the award of the contract, did not prevent those authorities from comparing the different tenders and from accepting the best one on the basis of an objective criterion fixed in advance and specifically included among those set out in article 30(1) of the Directive. However, the abstract and general fixing by the national legislature of a single criterion for the award of public works contracts deprived the contracting authorities of the possibility of taking into consideration the nature and specific characteristics of such contracts, taken in isolation, by choosing for each of them the criterion most likely to ensure free competition and thus to ensure that the best tender would be accepted. In the main proceedings, the national court has specifically highlighted the technical complexity of the work to be carried out and, accordingly, the contracting authority could profitably have taken that complexity into account when choosing objective criteria for the award

of the contract, such as those set out, by way of example, in article 30(1)(b) of the Directive. It followed from the foregoing considerations that the answer to the questions referred to the Court must be that Article 30(1) of the Directive was to be interpreted as meaning that it precluded national rules which, for the purpose of the award of public works contracts following open or restricted tendering procedures, imposed a general and abstract requirement that the contracting authorities used only the criterion of the lowest price. As a result, awarding of tender by principle of economically most tender would be the most appropriate to the Law.

The result of that tender showed that the judicial system works well in EU countries even if the contracting authorities' different thoughts. The tender was concluded as it should be. If the complex projects awarded by the lowest bidders, there would be possibilities of not completing of project and cost more than its original cost, which occurrence of these are in high probability. The benefit of EMAT was observed in that case.

4.11 Economically Most Advantageous Tender (EMAT)

It is essential that the tender should be evaluated based on quality and economy by contracting authority when awarded with the EMAT principle. In EU, EMAT are specified by considering price and non-price factors. Furthermore, a report was prepared in order to evaluate EMAT by EMAT Task Group in 2003. In that report, non price factors were mentioned for construction works. Also, there were weights of price and non-price factors which summed %100. It was specified proportion of non-price/total price changes due to type of project.

First factor of non-price factors was quality. Definition of quality was difficult and products were assessed to 5 groups (Table 5)

Table 5: Quality Assessment and Scoring

Assessment	Prompt for Assessment
4	Very high standard with no reservations at all about acceptability
3	High standard
2	Good standard – Acceptable with minor reservations
1	Acceptable – Significant reservations
0	Not acceptable

Another non-price factor was maintenance and replacement costs. This included maintenance period, maintenance interval, spare part, labor cost. The weights of the price and non-price factors were not constant due to the product's quality, originality, operation life. The main criterion of these factors was given by a formula which is (EMAT report, 2003):

$$QW\% + LW\% + PW\% = 100\% \quad (1)$$

where;

QW: Weight of quality factors, LW: Weight of life cycle factors, PW: Weight of price factors

With application of non-price factors, ALTs were not considered as primary way of awarding tenders. The reason for that was prohibition of tenderers to propose ALTs. These factors should be chosen in accordance with the tender, should be objective, supervised and measurable. Those should be applied not only to contractors but also subcontractors if available (Kural *et.al*, 2005)

In evaluation of EMAT two models are generally used. The models are Price Discounting Model and Prior Overall Model (EMAT Report, 2003).

4.11.1 Price Discounting Model

Price Discount Model is based on discounting on tender price to compare how each tender scores on quality (EMAT Report, 2003). At that model, at first discount limit for non-price factors is specified. Then quality scores are given in percentages. The quality scores are multiplied by discount limit and discount percentage is obtained. Finally tender price is multiplied by the discount percentage and discounted price is found (Kural *et.al*, 2005). An example was given about this model (Table 6). At this example discount limit was specified as %30 by contracting authority. The ranking of the contractors is made due to the discounted price.

4.11.2 Prior Overall Weighting Model

Prior Overall Weighting Model is based on weighted scores of quality and price. At first quality score is found and discount limit is given like the previous model. However, in that model some adjustments are made which were mentioned in EMAT task group. First one is adjustment of quality scores. The highest quality score is rated as %100 and the other quality scores are adjusted by expressing them as a percentage of the highest quality score (52,5/58,5 = %89,74). These scores are multiplied by discount limit (%30 on this example) and weighted quality score is found. Second one is adjustment of tender prices. The lowest tender score is rated as %100 and the other tender prices are adjusted by expressing them as inverse percentage of the lowest tender price (193.567/210.739 = %91,85). Then these are multiplied by price ratio (%70 on this example) and weighted price score is found. Finally, weighted quality score

and price score are added together to find the total weighted score. The ranking of the contractors is made due to the total weighted score. (Table 7)

The results of these following models were same but the second one seemed to be more efficient in specifying EMAT. Relative scoring method improves the competition between the contractors. The balance between the quality and price can be achieved on this method, so probably the winner firm will be the one that catches the maximum quality on average price.

Table 6: Price Discounting Model

	Contractor 1	Contractor 2	Contractor 3
1.Quality score	42,75%	52,50%	58,50%
2.Percentage discount	12,83%	15,75%	17,55%
3.Tender price	€ 193.567	€ 210.739	€ 203.453
4.Tender price discount	€ 24.825	€ 33.191	€ 35.706
5.Discounted price	€ 168.742	€ 177.548	€ 167.747
6.Quality ranking	3	2	1
7.Price ranking	1	3	2
8.Ranking on discounted price	**2**	**3**	**1**

Table 7: Prior Overall Weighting Model

	Contractor 1	Contractor 2	Contr. 3
1.Quality score	42,75%	52,50%	58,50%
2.Adjusted quality score	73,08%	89,74%	100%
3.Weighted quality score	21,92%	26,92%	30,00%
4.Tender price	€ 193.567	€ 210.739	€ 203.453
5.Adjusted price score	100,00%	91,85%	95,14%
6.Weighted price score	70,00%	64,30%	66,60%
7.Total weighted score	91,92%	91,22%	96,60%
8.Quality ranking	3	2	1
9.Price ranking	1	3	2
10.Ranking on total weighted score	**2**	**3**	**1**

In Turkey, on 43rd article of regulation on implementation of work, it was written that the contracting entities may never employ grading procedure at any level of evaluation of qualification. According to Gencer (2005), for efficient and effective usage of poor public resources and presentation of social benefit gained from investments lowest bid that creates competitive tendering, realize good quality within planned budget and time should be the economically most advantageous tender. He offered a method for determining EMAT but his offer required scoring system. This method is called Analytical Hierarchy Process, which is used by a program called Expert Choice. At that method, economic, financial and technical qualification criteria and their sub criteria are scored by considering relative importance. Expert Choice evaluates the scores by using weights. The highest score is the EMAT that realizes the technical, financial,

economic criteria at lowest price. For selecting of EMAT by that method, 43rd article of regulation on implementation of works should be changed as contracting entities may employ grading procedure at evaluation of qualification and 67th article, which the most advantageous tender in economic terms shall be assumed as the lowest price offer, should be changed as the most advantageous tender in economic terms shall be assumed as the lowest price offer that best satisfies economic, financial and technical qualification criteria. (Gencer, 2005)

4.12 Public Private Partnerships

Public-private partnership (PPP) is a system in which a government service or private business venture is funded and operated through a partnership of government and one or more private sector companies. The thought of this system first arose from macro economic dislocation of 1970s and 1980s due to the concern at increasing level of public debt. During these years the idea was that the private sector had taken responsibility for most aspects of service provision which yielded improved allocation of risk. The central problem was that private investors demanded and received a rate of return that was higher than the government's bond rate, even though most or all of the income risk associated with the project was borne by the public sector. Government of Tony Blair elected in 1997, persisted with the Private Finance Initiative sought to shift the emphasis to the achievement of "value for money" mainly through an appropriate allocation of risk (Spackman, 2002). Now this principle is used most of the PPPs.

4.12.1 Benefits of PPPs

Because of the spent cash to various costs, in Turkey investments of some sectors stays insufficient. When insufficient resources and investment combine with the low service quality, it is needed to make investments to various areas by private

sector. These include motorways, bridges, airports, energy, and education. Rapidly it can be said that types of PPP vary from the point at which the public sector responsibility is maximum level to the point at which private sector responsibility is maximum level (Özdemir, 2006). It should not be thought that PPP is only a finance tool. The aim should be not only providing additional financial resources, but also reveal additional benefits. These benefits are clearness to renewal, distribution of risk, privatization, dependence of investments to government, decrease of cost of investment activities, and raising of quality of public services (Özdemir, 2006). Public is traditional but private sector is reformist, open to research. Because the public and private sector realize a good project and make effort on it, the risk is shared between these sectors.

With the privatization, the sectors were opened to private sector which did not even think of operating them. The important privatization was in tourism sector. Especially in Antalya, thousands of beds were built (Özdemir, 2006).

The most important problem of the construction sector is budget for the first year but not for the next year. This problem can be solved PPPs because contracts is made for 30-49 years and the realization of project can be applied. So dependence of project to Government decreases. The other benefit is the decrease of investment costs. Private sector decreases costs because it knows it will be manager later. Rising of quality of public services can be achieved by using the public resources with the purpose of supervision and control (Özdemir, 2006)

4.12.2 Doubts about PPPs

PPP has some reservations. These are long-term contracts, the anxiety of public sector about the disinterest from its essential duties, and political consistency and stability (Özdemir, 2006). Long-term contracts can not cancelled easily so in the

signing process of contracts a great effort must be spent from the point of view of Law.

The public makes its purchases from one hand, provides procuring from one hand. However, it divides into parts in the private sector. So private sector has an anxiety of not having a scale economy advantage. But worrying about that was useless because PPP is a partnership so both the public and private sector work together and share the risk together.

The continuity of the contract must be provided by the present government which was prepared by the previous one. A trust ambiance must be provided. The public benefits must be protected and long-term cost analysis must be done. But all of this must be done at the beginning of the partnership because as mentioned before, PPP contracts are very difficult to be changed and almost impossible. At last a good coordination of PPPs and good team work must be provided for a long period of time.

4.12.3 Importance of a Good Capital Investment Program

According to Martin Darcy (2006), the contents of public investments should be thought carefully because good projects were good projects regardless of the form of financing and bad projects were bad projects even if financed by whether public or private sector. He also talked about properties of good and bad projects in order to define the importance of capital investment program and to find an answer to the problems faced due to unfinished projects. To summarize, the good projects can create economic benefits, growth, social improvement, confidence in country, value for money solutions minimize the amount of tax required to pay for it all. On the other hand bad projects can create continuous liabilities for many years. Significant amount of money can be lost. They can undermine investor

confidence, make good projects unaffordable. Both the good and bad projects have large magnitude. In order to start projects like that magnitudes, PPPs must understand the purpose of project clearly. For example, purpose of building a hospital should be making sick people better, not have a nice building (Darcy, 2006). If that was understood, options for achieving the objective can be reviewed and cost/benefit analysis on each of the options can be done. Capital costs of a project must be correctly estimated. If it is underestimated, project can be finished half as much as its original cost, which happens frequently in many countries (Darcy, 2006). PPPs also should learn experience of previous projects, and other countries.

4.12.4 Reasons of Governments to Form PPPs

Governments generally bring in the private sector in spite of the controversial thoughts. In addition to the reasons mentioned in introductory paragraph of PPP there are some other reasons of governments for partnerships with private sector. These reasons were mentioned below (Darcy, 2006):

- Need for investments are great because of historic underinvestment
- Bring in new type of skills, new technologies more than expected
- Expectance of greater access to services like reliable power, drinkable water
- Existence of special needs which require significant amount of investment in a short period time
- Bringing in greater discipline to activities like waste water and waste management sectors
- Existence of different motivations between public works contracts and PPPs

- PPPs /Concessions have an in-built motivation towards on time and on budget completion whereas public works contracts have an in-built motivation towards cost over-run and delay
- With the public refunded public works contracts there are staged payments to the contractor. Workers of this contract bid below actual cost because they knew they could make additional profit by claims. However, contractor in PPPs only receive revenue when facility is in use. So completing the project on time and on budget depends on his interest.

It is needed to be learnt from mistakes of the bad projects and about how to do good projects from people who do well (Darcy, 2006).

4.12.5 Attracting investors

People only invest when some conditions are satisfied. Investors have money and also have many choices about where to invest, which projects to invest. So, some conditions have to be created both on national level and project level in order to attract their attention. Conditions at national level were listed below (Darcy, 2006):

- Strong political will and leadership is required for successful PPP.
- Clear and permissive legal framework is needed. If lack of clarity, investors will seek another country.
- Having a skilled coordinating entity at the center of government, which acts as a skill base and a resource for all of the ministers and a place to go to with policy issues when they arise
- Priorities should be set for projects of PPPs and these projects should be based on sound economic values.

- Awareness program need to be created in order to make people understand the need to bring in the private sector and educate them to provide skills required to do projects.

Conditions at project level were listed below (Darcy, 2006):

- Good projects should be created.
- Project has to be clearly defined and affordable by both private and public sector.
- Good quality and experienced advisors are needed.
- The PPP project can be created by three main phases: a) Preparation and Development phase to create conditions; b) Procurement phase or Bidding, Negotiation phase; c) Implementation and Operating phase

4.12.6 Evaluation of PPP in Turkey

In Turkey, PPP had a background and application of this model was performed on Build-Operate-Transfer type projects. This type of projects started in 1984 with electrical sector and continued with highway, airport, customs station, seaport projects. In 2006, health sector started to use PPPs to make hospitals.

If balanced risk distribution is provided, public investments and service costs can be reduced significantly especially by decreasing the operational risks. However in Turkey, risk distribution between the partners is not properly made (Çanakçı, 2006). As mentioned before PPP need legal framework to operate. Unfortunately in Turkey, it is insufficient so primary objective of PPP becomes to handle it, so the other aspects like technical, financial feasibility and also risk analysis stay as secondary objective (Çanakçı, 2006).

As mentioned before, when conditions are satisfied for PPPs to operate, they are useful for country for significant reduce of costs. On the other hand, it could be dangerous if sufficient risk analyses were not made, national conditions were not sufficient; PPPs could lead to abnormally low tenders. When PPPs meet it, the project cost more than its original tender cost. Loser at that point will be not only the private sector, but also the country. The worst situation can be the loans from other countries to complete to project or balance the budget. In Europe, because of the wrong selection type of PPPs or bad projects, PPPs lead to abnormally low tenders in some countries.

As a result, it can be said that PPP will be useful for Turkey, when appropriate legal framework, national strategy and experienced administrative staff are constructed. PPP is a benefit for treasury to reducing the cost of projects. In PPP agreements, contractor will operate the project for a period of time. During operation period he must make income to pay his debts and also have profit. So that contractor has to make cost analysis and risk analysis well in order to make profit. When his price is abnormally low tender, it is difficult for him to make profit also he has a risk of bankruptcy. So, contractor will calculate his prices reasonable in order not to go bankruptcy. Consequently, PPPs may be a good solution for abnormally low tenders if good projects are selected.

4.13 Opinion of EU on ALT

On the 2nd symposium of public procurement, one of the subjects was social effects of public procurement. Erdal Sağlam (2006), who is the newspaper columnist of Hürriyet, mentioned about relation between social effects and abnormally low tenders. He stated that there was a social policy on the basis of public purchases and policy of the EU. Public procurement was used as a tool while realizing the aim of social policy. The aim of social policy was improvement of life standard, employment, social development, and working

conditions under its economical strength. In this context, when EU faced with abnormally low tenders, they were looking for whether there was social policy deficiency behind that or not. They were investigating the contractors whether they were ruling out the factors like employing the unemployed ones for a long term, giving educations to them, health, security, hygiene conditions, youth, women, pregnant women, and lower wages. In Turkey, from public procurement, it was understood that favor, corruption and inefficiency were the results of social policy (Sağlam, 2006).

If point of views of Turkey and EU to social policies are investigated, it can be understood that why the proportion of ALTs in EU is less than Turkey. While EU was looking over the social effects under ALT problem, awarding of tender to someone with corruption in Turkey is a serious problem. If the corruption was thought to be made on basis of giving the tender to abnormally low tenders or showing abnormally low tender as a normal tender by decreasing conceptual cost, the solution efforts of ALT would become almost impossible. Prevention of corruption could be accomplished by charging top position people who are honest, knowledgeable, close supervisor. At that situation efforts can be made to solve the ALT problem by handling of corruption.

CHAPTER 5

ABNORMALLY LOW TENDERS

In this chapter, evaluation of abnormally low tenders by past literature is mentioned first. These views contain information about what is being done about ALTs in practice, what should be done about the problem. These recommendations are useful to gain insight on the problem. The ALT evaluation questionnaire and its results, and recommendations for ALTs are the main subjects of this study. The evaluation and recommendations was made by combining both the ALT evaluation questionnaire and recommendations of people about ALTs.

5.1 Evaluation of ALTs by some researchers

38th article of Public Procurement Law is about determination of ALTs and claim of written explanation about ALTs. However in practice, it was determined that, without determination of ALT, tender was awarded to the lowest bidder or without claim of written explanations about constituent elements or even if it was claimed, tender was not evaluated by considering 3 sub articles, which are economic nature of the manufacturing process; selected technical solutions and advantageous conditions to be utilized by the tenderer in supply of the goods and services or fulfillment of the works; the originality of the goods, services and works proposed. It was seen that some contracting authorities made ALT inquisition by only considering 34th article of Implementation of Works Procurement Regulation (Şimşek, 2006). Aydıner (2005) thought that ALTs show the condition of incompleteness of project. He said "Althought you know that situation, you evaluate those tenders, take explanations and if these are appropriate you award them". Abnormally low tenderers must persuade

contracting authority for explanations on the subject of how to complete the project without losing money.

Besides, one of the purposes of 38th article in Public Procurement Law is to prohibit the tenderers that bid abnormally low in order to win the public contracts, who lose money, and form destructive competitiveness (Bilir *et.al*, 2005). 34th article (PPA, 2006c) is "Furthermore, the contracting entities shall require from the tenders to attach the amounts concerning the items and/or work groups comprising the tender price and the related unit prices and the analyses suitable for the construction requirements defined by the contracting entity concerning these prices and the estimation schedule indicating the tender price in respect of the turn key lump sum works, and the analyses suitable for the construction requirements defined by the contracting entity concerning the prices proposed for evaluation of the abnormally low tenders and implementation of the contract".

Contracting authorities hesitated about not awarding the tender to the lowest bid. The reasons for that are previous habits and worry about not awarding the lowest (İntes, 2005). According to İNTES, conceptual estimate should only be used for budget, because there was no practical result for inquisition of ALTs depending on conceptual cost. Specifying of EMAT should be based on contractors' bids. Also, contracting authorities could not properly specify conceptual cost in real market conditions (Oğuz, 2004a). It is known that if the lowest price creates serious problems and hence quality of investment will decrease. Acceptance of ALTs is the acceptance of unfair competitions, poor quality investments and earthquake disasters (İntes, 2005).

Some public authorities accept bid prices of each work found by contractor in a tender, invoice that show costs of some important bid prices, which affects tender price a lot, as advantageous conditions. Although, these do not fully meet the requirements of advantageous conditions besides these are claimed for application of contract and knowledge of public authorities. So, ALT investigation of public

procurement authorities only by using these documents will be against the Public Procurement Law. It should be an obligation that inquisition of ALTs requiring 34th article should also consider 38th article (Şimşek, 2006).

Tender Commissions intensively demand explanations according to (b) sub article of 38th article on Public Procurement Law in ALT inquisition process. The reason for that is knowledge of Commission that bidders should know the most economical solution and appliance of it in a tender. Also, bidders are restricted by projects and technical specifications so originality of work can not be applied. Generally most of the tenderers know the economical nature of processes so this should not evaluated as a benefit for a tenderer to another. If the tender requires a new technique that have never met before, it should be investigated whether it will be appropriate to the technical specification or not. (b) paragraph of 38th article of Law consists of two subjects to be explained. These are technical solutions and advantageous conditions (Şimşek, 2006).

a) Technical solutions:

- Technical explanations about how the works could be made,
- Technical explanations according to the pre-determined technical specifications specified by contracting authority,
- How the solutions are economic and explanation of them by analysis,
- Prove of technical solution if it was applied before by documents with calculations and analysis,
- How much the solution affects total price and how the proposed price was achieved.

b) Advantageous conditions

- Being manufacturer of goods or material that will be used in project,
- If machinery-equipment could not be easily obtained from market, the owner of this type of machinery-equipment would have advantageous

condition. The company must prove by documents. On the other hand, if machinery-equipment could easily be obtained from market, the owner of this would not have advantageous condition.

- Organization structure and experience of personnel of work should not be considered as an advantageous condition because; quality criteria were specified in administrative specification so all of the firms propose sufficient quality personnel.
- If the location of available site of bidder is near to the construction area, not construction of second site can be advantageous condition but must be proved that how much benefit is provided by that site on cost by documents.
- Location of receiving materials would be almost same for all bidders so it should not be considered as advantageous condition.

5.2 Calculation of ALT Limit

In Turkey, ALT limit, which firms below that limit are inquired by article 38 of Public Procurement Law, was arranged by Public Procurement General Notification (PPA, 2005a). Tender Commission is responsible for this inquisition. At first it evaluates valid tenders on a public work according to the required Law, regulations and documents. Then, it calculates arithmetic mean of the tenders by excluding tenders which are over %120 of conceptual cost and below %40 of conceptual cost. **C** value is obtained by dividing the mean to the conceptual cost. By using Table 8, **K** value is found by using C value. Finally K value is multiplied by the conceptual cost in order to find ALT limit. The formula of ALT limit was shown below.

$$AL = K \times CC \tag{2}$$

$$C = \frac{T_{mean}}{CC} \tag{3}$$

Where;

AL: Abnormally Low Tender Limit; CC: Conceptual Cost

T_{mean}: Mean of tenders by excluding tenders over %120 below %40 of CC

Table 8: Coefficients to find ALT Limit

C	K	C	K	C	K	C	K
1,20 – 1,00	**0,800**	0,85	**0,746**	0,70	**0,671**	0,55	**0,575**
0,99	**0,797**	0,84	**0,741**	0,69	**0,666**	0,64	**0,568**
0,98	**0,794**	0,83	**0,737**	0,68	**0,660**	0,53	**0,560**
0,97	**0,791**	0,82	**0,732**	0,67	**0,654**	0,52	**0,553**
0,96	**0,787**	0,81	**0,728**	0,66	**0,648**	0,51	**0,545**
0,95	**0,784**	0,80	**0,723**	0,65	**0,642**	0,50	**0,538**
0,94	**0,781**	0,79	**0,718**	0,64	**0,635**	0,49	**0,530**
0,93	**0,777**	0,78	**0,714**	0,63	**0,629**	0,48	**0,522**
0,92	**0,773**	0,77	**0,709**	0,62	**0,623**	0,47	**0,514**
0,91	**0,770**	0,76	**0,704**	0,61	**0,616**	0,46	**0,506**
0,90	**0,766**	0,75	**0,698**	0,60	**0,610**	0,45	**0,497**
0,89	**0,762**	0,74	**0,693**	0,59	**0,603**	0,44	**0,489**
0,88	**0,758**	0,73	**0,688**	0,58	**0,596**	0,43	**0,481**
0,87	**0,754**	0,72	**0,682**	0,57	**0,589**	0,42	**0,472**
0,86	**0,750**	0,71	**0,677**	0,56	**0,582**	0,41	**0,463**

The important point is the good estimation of the conceptual cost. When the difference between the conceptual estimate and arithmetic mean of tenders decreases, the relationship (C-K) becomes linear but when increases, the relationship becomes in second or third degree equation. This equation has benefit on tenderers side. ALT limit decreases by second or third degree equation if it is much lower than conceptual estimate. So, the tender should be redone if that happens because it means that contracting authority could not able to find conceptual cost properly.

5.3 E-procurement – Conceptual cost

Electronic procurement can be defined as the realization of the high valued purchases, procurement activities and sale of supplies that necessitates document based long processes by electronic methods via internet.

Main principles of E-procurement, which were considered to be starting point, are: increasing transparency and efficiency, value for money, facilitating the access to the tender notices and increasing competition, accountability.

With the notification of procurement notices by electronic means, reaching of notices to larger zones is provided. That increases the number of participants and naturally competition. Increase of competition means buying of needs with more rational prices. That also leads an increase in quality so public administrations have a gain of *purchasing the more qualified good with a lower price*. (Sagun, 2006). According to EU data, increase in competition caused a decline of %36 in Italy, %18 in Denmark, %31 in UK, %25 in Portugal in procurement prices.

Conceptual cost is determined by contracting authorities and real cost is determined by results of bids. E-procurement can be considered as an instrument for determining of conceptual cost (Özgen, 2004). Therefore, no data should be lost about previous procurements. Any procurement process that was made by any public entity at any date must be updated for contracting authority that will make the similar procurement. As a result, the difference between conceptual cost and real cost should be minimized to "0", which is one of the aim of E-procurement.

The person who determines conceptual cost should be right and experienced at his job. He should know from where and which documents be taken. Unit prices, market prices or escalated prices of previous works can be used while determining conceptual cost. The important point to find the right methodology and only the right person can apply the right one (Koçoğlu, 2004).

5.4 Abnormally Low Tender Evaluation

ALT evaluation was performed by using Abnormally Low Tender Evaluation Questionnaire. It consists of eighteen questions, two of which are information about respondent and company. This questionnaire was prepared within a long period with contributions of experienced people, who have knowledge about abnormally low tenders. Also, especially PPA contributes much while preparation of ALT questionnaire. All thoughts about ALTs are put together in order to obtain the best results from the questionnaire.

The questionnaire was distributed in two ways. First way is distribution by hand, thus, the hardcopies were distributed to specific people and two enterprises, which were İNTES and Association of Contractors. The process of obtaining the results were followed for a while, then it was seen that number of respondents remained low for an analysis. So, as a second way the questionnaire was prepared by using internet. Web page was prepared for the questionnaire. The web page was linked by METU, which is www.ce.metu.edu.tr/~ihale , and then that site was linked to Public Procurement Authority. Use of web increased the number of respondents. Finally, questionnaires filled out as hardcopies were added to web site for obtaining overall analysis.

On the following page sample questionnaire is given. The last questions on web site, which were what the name of company and what the name of respondent, were not shown.

ABNORMALLY LOW TENDER EVALUATION QUESTIONNAIRE

This research is performed by Assoc.Prof.Dr. Murat Gündüz and H.Volkan Karacan who is a graduate student in METU in construction management section of civil engineering. Purposes of this questionnaire are specifying the place of ALT problem in Turkey, finding reasons of ALTs and solving that problem. Answers, which will be given by you, will be evaluated in a confidential way and will not be shared with any person, firm, enterprise (3rd person). Construction sector and public enterprises will benefit from analysis that will be performed by considering your answers. For that reason, your participation to this questionnaire is very important for us. That questionnaire must be filled by experienced people who are familiar with that problem for obtaining the most proper information. This questionnaire will take 20 minutes at most. We are very grateful for your time and your interest to our questionnaire.

If you want to ask any questions, you can access to us by numbers which was written below.

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H.Volkan KARACAN
Graduate Student
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1) How many people are working at central office in your company?

☐ 1-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ >25

2) Which type of works do you deal with?

☐ Infrastructure

☐ Power plants

☐ Mechanical, plumbing

☐ Telecommunication

☐ Railways, airports, seaports

☐ Pipeline, fuel plants

☐ Superstructure

☐ Electric works

3) Does your company work abroad?

☐ Yes ☐ No

4) How do you determine prices of each work item on bid package?

☐ Market research

☐ Unit prices of official institutions

☐ Determining the most appropiate price by getting bids from other firms

☐ Using cost analyses of similar works

5) Which factor affects your final bid price at most?

☐ Risk of the work

☐ Regular payment of public authority

☐ Quantity of your works in progress

6) If a bid was determined as the lowest tender, what are the reasons of it?

☐ Miscalculation of bid price

☐ Inaccuracy of conceptual cost

☐ Staying in the business

☐ Advantageous conditions

☐ Work experince document

☐ Ambiguity in tender document

☐ Shortage of tender preparation period

7) How often do you face abnormally low tender inquisition? (Write average of how many tenders you bid in a year to the text box)

☐ 0-25% ☐ ☐ 26-50% ☐ ☐ 51-75% ☐ ☐ 76-100% ☐

8) Do you use computer software to determine your bid price?

☐ Yes ☐ No

9) Which can be documented regarding originality of work and advantageous conditions in ALT inquisition?

- ☐ Contractor prepares design documents
- ☐ Contractor has special technology
- ☐ Contractor manufactures its own materials
- ☐ Contractor has special equipment
- ☐ Contractor is the main manufacturer for special work items
- ☐ Contractor employs inexpensive labor
- ☐ Contractor owns a vehicle park
- ☐ Contractor has another site nearby

10) Please scale materials/works according to advantageous conditions. (1-most important, 14-least important)

☐ Labor costs	☐ New technology
☐ Cement prices	☐ Diesel prices
☐ Steel prices	☐ Overhead costs
☐ Liquid fuel prices	☐ Inflation
☐ Timber prices	☐ Workload of contractor
☐ Equipment prices and availability	☐ Payment statements in the contract
☐ Transportation costs	☐ Other ( )

11) Do you think that not adapting to Public Procurement Law causes abnormally low tenders? What kind of problems do you face with? (Please write in the blanks)

☐ Yes ☐ No

_____

_____

12) Do you think proper and sufficient quality control is applied especially in construction period?

☐ Yes, I think so

☐ Generally applied

☐ Applied in few tenders

☐ No, I do not think so

13) Is restricted procedure with prequalification appropriate for solving abnormally low tenders?

☐ Yes ☐ No

14) Please indicate average percentage values for bid types you participate in a year?

☐ Open procedure ☐

☐ Restricted procedure ☐

☐ Negotiated procedure ☐

15) Is surety bond system appropriate for solving abnormally low tenders?

☐ Yes, It is

☐ No, It is not

☐ It can not be applied in Turkey

16) How can abnormally low tender problem be solved?

5.5 Data Characteristics

The total number of companies that responded to the questionnaire was 430. The companies were grouped according to their sizes as small (1-5 employees), medium (6-25 employees) or large companies (>25 employees). The total number of small, medium and large companies was 247, 138 and 39 respectively. The relationship between the company size and the distribution of type of works can be seen in Table 10. As can be inferred from this Table, the majority of the works carried out by all size of contractors are infrastructure and superstructure. It should be noted that one company might be working on more than one type of work.

19%, 48% and 33% of the small, medium and large size companies were working abroad respectively. This result was not surprising because working abroad requires more experience, technical and financial capacity. Therefore, generally medium and large companies can meet the requirements of working abroad.

It was also seen that half of the companies specified the tender price through market research. Other means of price estimation was through unit prices and cost analysis of similar works.

An analysis of the data collected by means of the questionnaire revealed that companies of all sizes considered the risk of the work most while determining the final tender price.

In addition, the high response rate in this study is significant in that companies often lose jobs to ALTs and that industry professionals also want this problem to be solved in an efficient manner.

5.6 Analysis of the Abnormally Low Tender Questionnaire

The companies were grouped according to their employees as small companies (1-5), medium companies (6-25) and large companies (>25). Number of work types of large companies was variable. About half of them were dealing with one type of work. The others were dealing with 3 or more than 3 type of work (Table 9). Half of small and medium companies also were dealing with one type of work but the other largest proportion was dealing with two type of work.

Table 9: Distribution of Amount of Work Types According to Size of Companies

	Size of Companies			**Size of Companies**		
Amount of Work Types	Small Companies	Medium Companies	Large Companies	Small Companies	Medium Companies	Large Companies
1	131	72	20	%53	%52	%51
2	74	36	5	%30	%26	%13
3	23	10	5	%9	%7	%13
>3	12	12	8	%5	%9	%20
No answer	7	8	1	%3	%6	%3
Total	**247**	**138**	**39**	**%100**	**%100**	**%100**

Table 10: Distribution of Type of Works According to Size of Companies

	Size of companies		
Work Types	Small Companies	Medium Companies	Large Companies
Infrastructure (1)	123	70	23
Power plants (2)	6	5	3
Mechanical plumbing (3)	21	18	8
Telecommunication (4)	3	11	4
Railways, Airports, Seaports (5)	8	14	9
Pipe line, Fuel plants (6)	15	10	6
Superstructure (7)	183	84	20
Electric works (8)	42	21	8
Total	**401**	**233**	**81**

It was found out from Table 10 that most of the large companies were dealing with infrastructure, whereas most of the small companies were dealing with superstructure. As a better way of seeing these results from Table 10, Figure 1 was prepared.

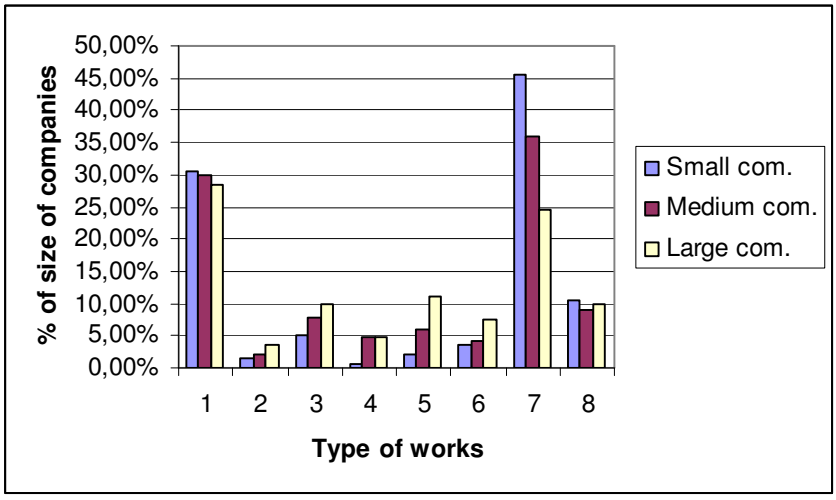

Figure 1: Distribution of Work Types According to Size of Companies

Half of the companies working abroad were medium companies. The other large proportion was large companies, only the fifth of the companies were small companies (Table 11). This result was not surprising because working abroad requires more experience, technical and financial capacity so generally the medium, large companies have these capacities. That situation depended on departmental relationships. Small companies' departmental relationship is not strong because one person must do several works and that person would be manager of different departments. However, in medium and large companies, every department manager has different people under them which provide better process of work. Besides work load was distributed to many people.

Table 11: Working Abroad Rate According to Size of Companies

	Companies working abroad	
	Amount	Percentage
Small Companies	8	%19
Medium Companies	20	%48
Large Companies	14	%33

It was found that the order for methods of specifying each work item from most to least is same for small and medium companies as overall questionnaire's order but large companies' order is different (Table 12). Market research and unit prices are main methods for determining prices of each work item.

Table 12: Methods of Determining Prices of Each Work Item

	Small Companies	Medium Companies	Large Companies
Market Research	%46	%45	%44
Unit Prices	%25	%22	%20
Determining Most Appropriate Price	%12	%15	%15
Cost Analysis of Similar Works	%17	%18	%21

Large companies considered the risk of the work at most while determining final bid price. Results (Table 13) showed that also medium and small companies considered risk at most. So, it can be referred that there was not any connection between size of the companies and factors determining final bid price.

According to large companies, reasons of the abnormally tenders were obtaining work experience document; miscalculation of bid price of a company; inaccuracy of conceptual cost; and staying in the business (Table 14). Staying in the business was most important reason for small, medium companies; whereas obtaining work experience document was most important reason for large companies. Shortage of tender preparation period was at least supported by all companies.

Table 13: Factors Affecting Tender Price According to Size of Companies

	Small Companies	Medium Companies	Large Companies
Risk	%61	%66	%54
Regular Payment	%26	%19	%28
Works in Progress	%13	%15	%18

Table 14: Reasons of ALTs According to Company Sizes

	Number of Respondents		
	Small Companies	Medium Companies	Large Companies
Miscalculation of Bid Price (1)	104	69	20
Inaccuracy of Conceptual Cost (2)	79	52	20
Staying in the Business (3)	149	70	21
Advantageous Conditions (4)	44	39	16
Work Experience Document (5)	75	52	25
Ambiguity in Tender Document (6)	66	39	15
Shortage of Tender Preparation Period (7)	15	17	4

These results were turned into graphical form (Figure 2) for better understanding.

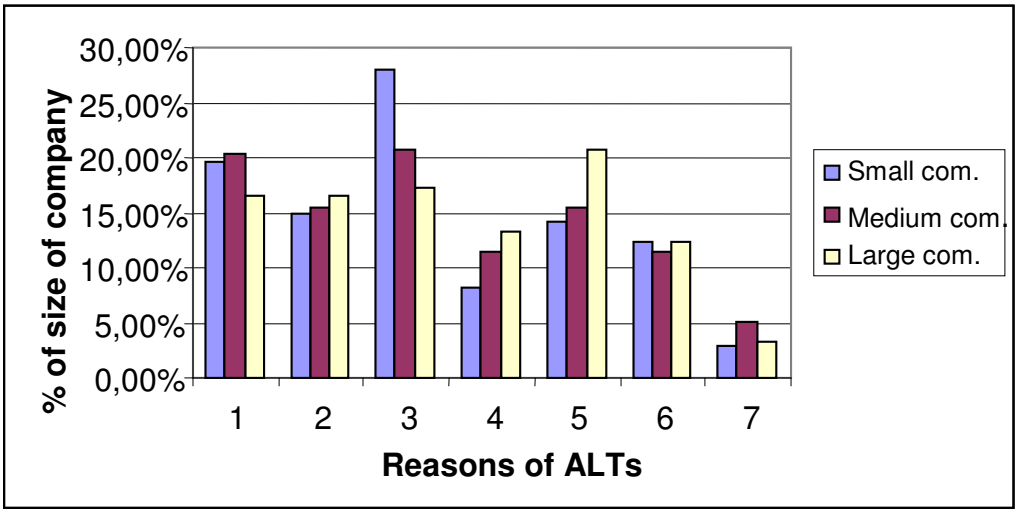

Figure 2: Distribution of Reasons of ALTs According to Company Sizes

It was specified that large companies generally experience 76-100% ALT inquisition more than small and medium companies (Figure 3). Their reasons for

ALTs were staying in business, obtaining work experience document inaccuracy of conceptual cost of contracting authority, ambiguity in tender document. Therefore, it can be inferred that large enterprises want to obtain work experience document in different work types by bidding the lowest. Even if the work could not be completed with the lowest price, large companies can transfer cash from their other works. Besides 0-25% inquisition rate for all kind of companies is %50 or more than %50.

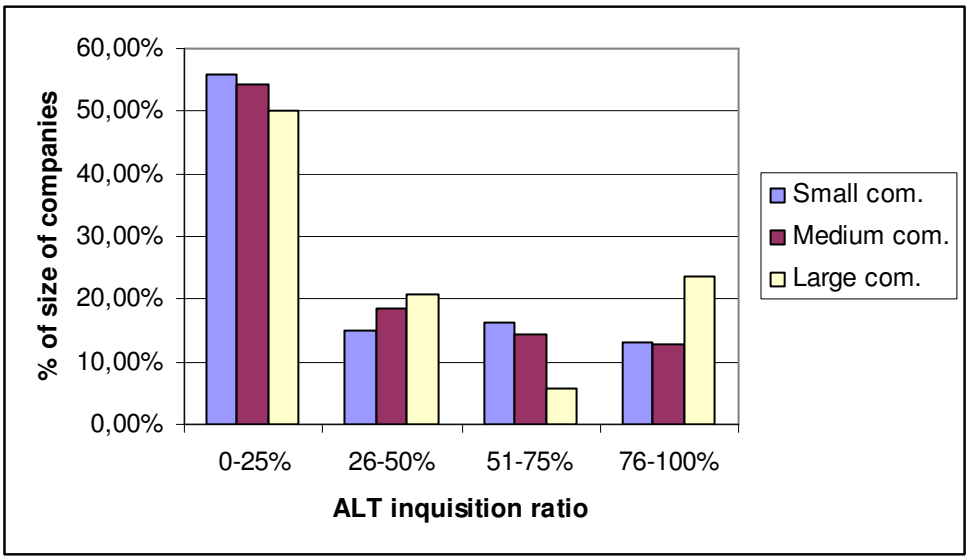

Figure 3: ALT Inquisition According to Size of Companies

Another question was asked in the questionnaire was whether the company is using computer software for tender price calculation. The data can be seen in Table 15. All size of companies is using computer software at around 60% level while calculating tender price. Although the software use ratio is close to each other for different size of companies, large companies that use software for tender price calculation rarely experience ALT inquisition. This may be due to the level of software usage and the experience of technical staff using computer software packages. Also, it was determined that, computer programs are an advantage

while calculating proper bid prices for large companies. On the other hand, small companies getting 76-100% rate of ALT inquisition generally uses computer programs (Table 15). It can be referred from these different results that small companies did not think about some important costs that affects bid price.

Table 15: Computer Software Usage According to Size of Companies

	Small Companies	Medium Companies	Large Companies
Use Computer Software (1)	144	94	25
Do not use Computer Software (2)	101	43	14
Computer Software Usage Ratio (1)/(1+2)	%59	%69	%64
76-100% ALT Inquisition Ratio of Companies Using Computer Software (3)	20	10	1
Companies Taking 76-100% ALT Inquisition (4)	30	16	8
Percentage of (3)/(1)	%14	%11	%4
Percentage of (3)/(4)	%67	%63	%13

By examining 9th question of questionnaire, manufacturing own materials by contractor and being main manufacturer for some special work items were the explanations of large companies which could be documented (Table 16). However, small and medium companies determined manufacturing own materials by contractor and having own vehicle park as documented.

Table 16: Advantageous Conditions and Originality by Size of Companies

	Small Companies	Medium Companies	Large Companies
Contractor prepares design documents	%7	%6	%7
Contractor has special technology	%8	%9	%12
Contractor manufactures its own materials	**%18**	**%16**	**%18**
Contractor has special equipment	%12	%12	%13
Contractor is the main manufacturer for special work items	%15	%13	**%16**
Contractor employs inexpensive labor	%10	%10	%8
Contractor owns a vehicle park	**%17**	**%18**	%13
Contractor has another site nearby	%13	%16	%13

Respondents that support restricted procedure with prequalification requirements did not think financial sponsor company could solve ALT problem (Table 17). Also respondents that not support restricted procedure with prequalification requirements for solving ALTs were in same opinion about sponsor companies with supporters of restricted procedure.

Table 17: Restricted Procedure and Financial Sponsor

	Restricted Procedure with Prequalification			
Financial Sponsor for solving ALT	Appropriate (Respondents)	Not Appropriate (Respondents)	Appropriate %	Not Appropriate %
Appropriate	37	30	%16	%17
Not Appropriate	72	82	%32	%47
Not Applicable in Turkey	116	62	%52	%36
Total	225	174		

Table 18: ALT Inquisition with Prequalification System

	ALT Inquisition Ratio			
Restricted Procedure with Prequalification	0-25%	26-50%	51-75%	76-100%
Appropriate	111	35	34	28
Not appropriate	96	28	19	24

The reasons of ALTs were miscalculation of bid price, and staying in business according to supporters of prequalification system, which were also reasons specified by large companies. Whether technical capacities of companies are appropriate can be specified by prequalification system and only the qualified companies are invited to the tender. As a result, the belief of elimination of companies which calculated tender cost wrong and low or which have to stay in business in order to survive, caused companies to support prequalification system. Besides, there are more people who take ALT inquisition below %50 and support restricted procedure than counters of restricted procedure (Table 18). That situation showed, these companies calculates their tender cost close to conceptual cost thus they want to compete with companies which capacities are equal to them.

It was determined that most of companies which specified not adaptation to PPL caused ALTs thought adequate quality control during the construction period is not applied. Nearly half of the companies that disagree with 11^{th} question also thought the same way (Table 19). So, it was thought that there was no linkage between PPL and quality control. For being sure chi-square test also applied and the result supported the thought. On the other hand, not answering of 11^{th} question more than 100 people showed PPL was not exactly known by people.

Table 19: PPL and Quality Control

	Not Adapting to PPL Causes ALT				
Adequate Quality Control	Yes	No	No answer	Yes (%)	No (%)
Yes	14	8	6	%7	%7
Generally	49	36	19	%24	%33
Sometimes	78	33	34	%39	%30
No	60	33	30	%30	%30
No answer	1	2			

As it can be understood by overall questionnaire, during the construction process, proper and adequate quality control was not applied. That causes contractors to finish the work as soon as possible with highest profit. Company will prefer poor quality and cheap materials. In order not to spend much money, it tends to use unqualified workers, which not only dangers work security, but also stability.

Proportions of facing with ALT inquisition were approximately same, who agree or disagree with not adapting to PPL causes ALTs (Table 20). From there, it can be concluded that PPL has not an important effect on proportions facing with ALTs. Despite of the fact that, yes answers of 11^{th} question was more than no answers, it could be seen that the answers were proportionally nearly same. In fact, this situation supported PPL has an effect on ALTs but not much.

Table 20: PPL and ALT Inquisition

	Not Adapting PPL Causes ALT	
ALT Inquisition Ratio	Yes	No
0-25%	%56	%57
26-50%	%16	%14
51-75%	%12	%16
76-100%	%16	%13

Table 21: Reasons of ALTs Considering Size of Companies due to ALT Inquisition Rate

	Reasons of ALTs due to ALT Inquisition Rate of 0-25%		
	Size of Companies		
	Small	Medium	Large
1.	Staying in business	Miscalculation of bid price	Work experience document
2.	Miscalculation of bid price	Staying in business	Miscalculation of bid price
3.	Work experience document	Work experience document	Inaccuracy of conceptual cost
	Reasons of ALTs due to ALT Inquisition Rate of 26-50%		
	Small	Medium	Large
1.	Staying in business	Staying in business	Miscalculation of bid price
2.	Miscalculation of bid price	Miscalculation of bid price	Work experience document
3.	Inaccuracy of conceptual cost		Staying in business
	Reasons of ALTs due to ALT Inquisition Rate of 51-75%		
	Small	Medium	Large
1.	Staying in business	Staying in business	Staying in business
2.	Miscalculation of bid price	Inaccuracy of concep. cost	Work experience document
3.	Inaccuracy of conceptual cost	Miscalculation of bid price	Advantageous conditions
	Reasons of ALTs due to ALT Inquisition Rate of 76-100%		
	Small	Medium	Large
1.	Staying in business	Miscalculation of bid price	Staying in business
2.	Miscalculation of bid price	Staying in business	Inaccuracy of conceptual cost
3.	Inaccuracy of conceptual cost	Advantageous conditions	Work experience document

The first three reasons of ALTs are listed according to ALT inquisition rates and size of companies on Table 21. It was found that staying in business and miscalculation of bid price are main reasons of ALTs for small companies regardless of ALT inquisition rate. The reason for middle companies which took 0-25% and 76-100% ALT inquisition is miscalculation of bid price. According to questionnaire (Table 14), this is the second reason for middle companies. Obtaining work experience document is found the main reason for large companies by overall questionnaire but in Table 21, first rank of it was observed on 0-25% of ALT inquisition rate. Difference comes from the majority of companies which took 0-25% rate (%50 of inquisition rates). Also, reasons in Table 21 are the first four reasons of ALT in overall questionnaire except advantageous conditions.

In the questionnaire, there were some peak answers related to the other answers. It was investigated that whether any relationship existed other than mentioned above and many weak relationships were found. Some of the important relationships were explained on statistical part of this study. Peak answers led the questionnaire greatly and prevented the occurrence of relationships between some questions. Results of overall questionnaire were listed below:

- Small companies were %58 of total companies.
- Many of the companies were dealing with superstructure and infrastructure.
- Great amount of companies were not working abroad. Filling of this questionnaire with companies working in Turkey increased the reliability of questionnaire, which was appropriate with the aim of this study.
- Prices of each work of bid were determined by market research at most. As a result of this, proportions of getting ALT inquisition stayed in 0-25% level.
- Risk of work was determined as the most significant factor that affects final bid price.

- Staying in business was found to be the first reason of ALT.
- Manufacturing of own materials by contractor and having own vehicle park were the most advantageous conditions to be documented.
- Also, labor costs and payment statements in contract were advantageous conditions but their number of respondents was much less than conditions mentioned above.
- Proper and adequate quality control was not applied in construction period
- It was determined by respondents that surety bond system was not appropriate for Turkey.
- Solution recommendations for ALTs vary a lot but generally it was desired to have an updated average system, which was applied by 2886 Law, according to today's conditions.

Overall questionnaire statistics were shown on following pages. Data of each question were shown by tabular form (Table 22-35) and percentage of respondents was shown in graphical form (Figure 4-15).

Table 22: Employee Quantity at Central Office

1. How many people are working at central office in your company?		
	% of Respondents	**Number of Respondents**
1-5	%58,25	247
6-10	%21,70	92
11-15	%5,66	24
16-20	%2,59	11
21-25	%2,59	11
>25	%9,20	39
Total Number of Respondents		**424**
No answers		**6**

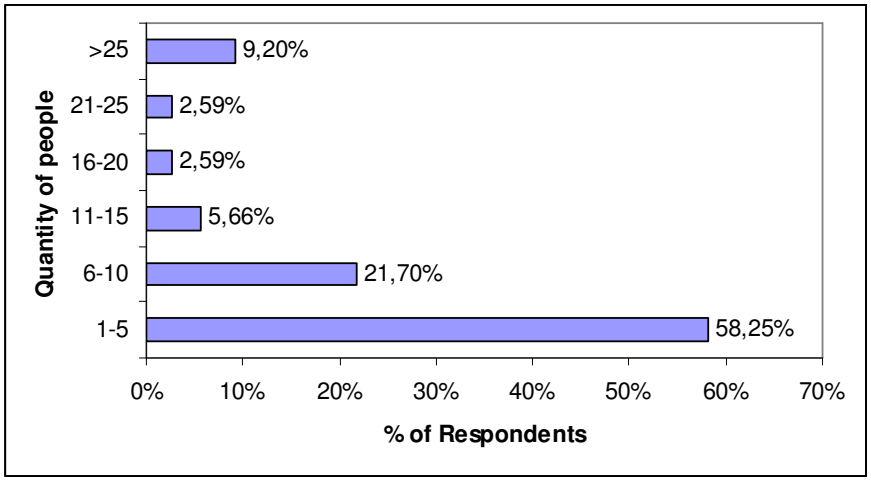

Figure 4: Quantity of People at Central Office

Companies having 1-5 people were relatively peak for others. Difference between peak point and other closest rate was %36,55, which corresponded to 155 companies. Medium companies were %32,54 of total companies according to number of employees.

Table 23: Work Types

2. Which type of works do you deal with?		
	% of Respondents	**Number of Respondents**
Infrastructure	%30,21	219
Power Plants	%1,93	14
Mechanical Plumbing	%6,76	49
Telecommunication	%2,48	18
Railways, Airports, Seaports	%4,41	32
Pipe line, Fuel plants	%4,28	31
Superstructure	%40,00	290
Electric Works	%9,93	72
Total Number of Respondents		**412**
No answers		**18**

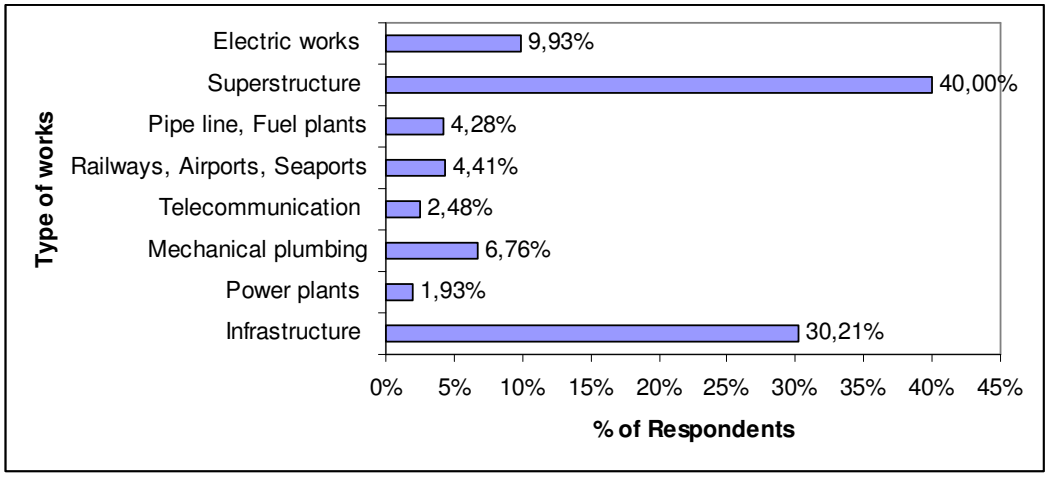

Figure 5: Type of Works

Superstructure and infrastructure were slightly peak type of works relative to the other type of works. These were %20 - %30 more than other type of works.

Table 24: Working Abroad Ratio

3. Does your company work abroad?		
	% of Respondents	**Number of Respondents**
Yes	%9,98	42
No	%90,02	379
Total Number of Respondents		**421**
No answers		**9**

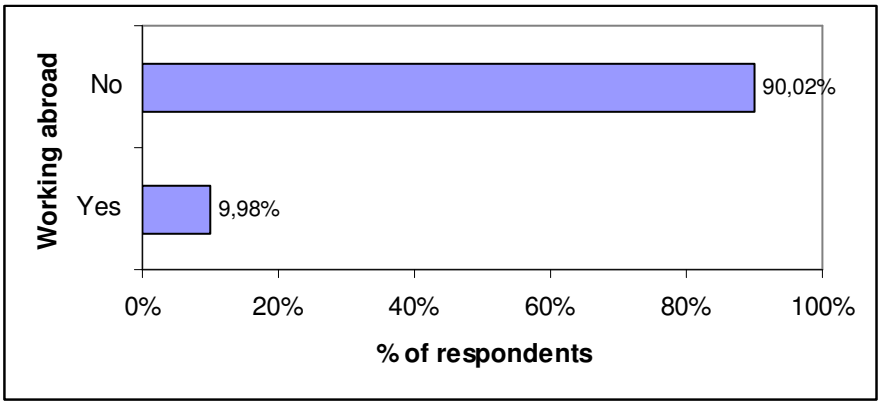

Figure 6: Working Abroad Rate

Companies which were not working abroad were high peak value

Table 25: Work Item Price Determination on Bid Package

4. How do you determine prices of each work item on bid package?		
	% of Respondents	**Number of Respondents**
Market research	%45,51	360
Unit prices	%23,39	185
Determining Most Appropriate Price	%13,27	105
Cost Analysis of Similar Works	%17,83	141
Total Number of Respondents		**427**
No answers		**3**

Only market research was slightly peak for 4th question.

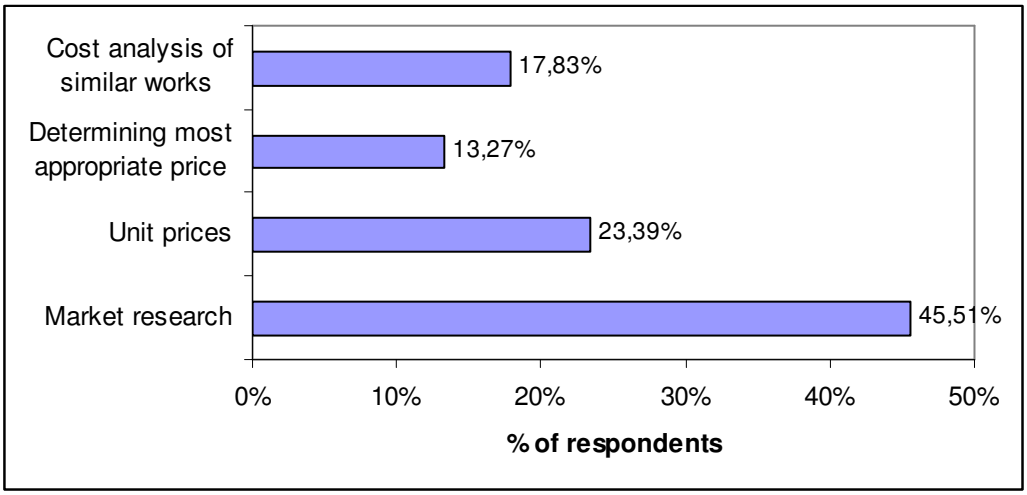

Figure 7: Determining Prices of Each Work Item in a Tender

Table 26: Factors of Final Bid Price

5. Which factor affects your final bid price at most?		
	% of Respondents	**Number of Respondents**
Risk	%61,94	262
Regular Payment	%24,11	102
Works in Progress	%13,95	59
Total Number of Respondents		**423**
No answers		**7**

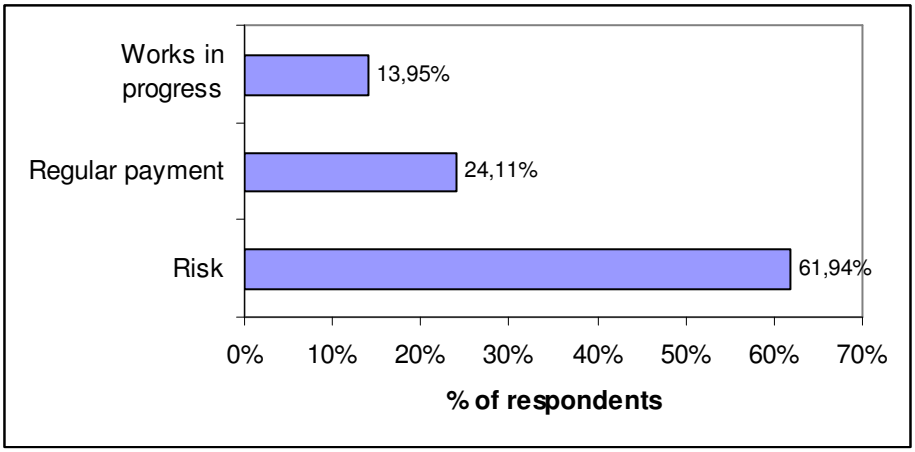

Figure 8: Factors Affecting Bid Price

Table 27: ALT Reasons

6. If a bid was determined as the lowest tender, what are the reasons of it?		
	% of Respondents	**Number of Respondents**
Miscalculation of Bid Price	%19,30	194
Inaccuracy of Conceptual Cost	%15,42	155
Staying in Business	%24,08	242
Advantageous Conditions	%10,05	101
Work Experience Document	%15,32	154
Ambiguity in Tender Document	%12,24	123
Shortage of Tender Preparation Period	%3,58	36
Total Number of Respondents		**423**
No answers		**7**

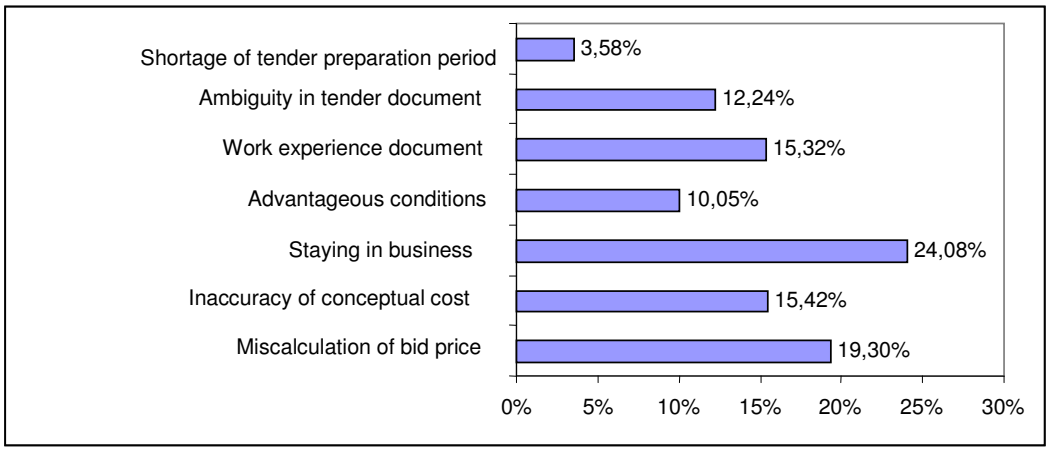

Figure 9: Reasons of ALTs

In figure 8, risk of work was the peak value that affects final bid price most.

Table 28: ALT Inquisition Percentage

7. How often do you face with abnormally low tender inquisition?		
	% of Respondents	**Number of Respondents**
0-25%	%54,85	215
26-50%	%16,58	65
51-75%	%14,54	57
76-100%	%14,03	55

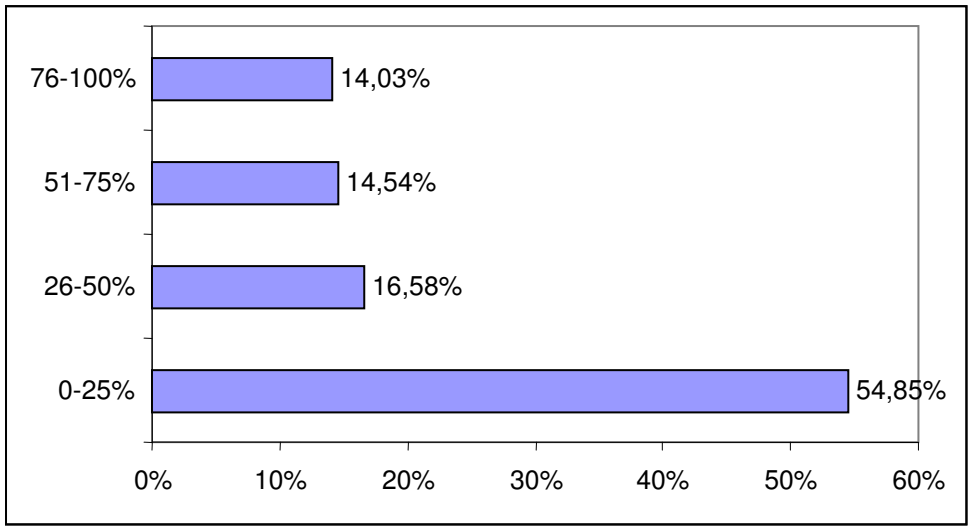

Figure 10: ALT Inquisition Rate

ALT inquisition rate of 0-25% was a peak value related to them. The difference between two high values was %38,27, which corresponded to 150 respondents.

Table 29: Computer Software Usage Rate

8. Do you use computer software to determine your bid price?		
	% of Respondents	**Number of Respondents**
Yes	%62,68	267
No	%37,32	159
Total Number of Respondents		**426**
No answers		**4**

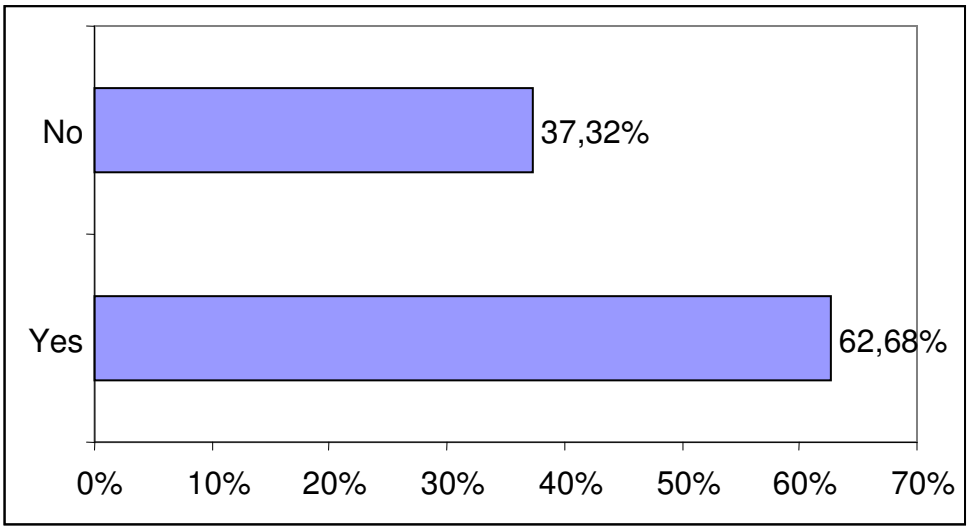

Figure 11: Computer Software Usage

Computer software usage is effective while determining bid price (Figure 11). It provides fast and proper results when quantity take-offs were calculated correctly and put into computer without mistakes. However, generally computer software in market use unit prices of Ministry of Public Works and Settlement. These prices do not reflect the real market conditions. If prices are adjusted for market conditions and right quantity take-off is calculated, computer programs will be very useful way of calculating appropriate prices and will be one of the solutions of ALTs.

Table 30: Types of Advantageous Conditions and Originality of Work during ALT Inquisition

9. Which can be documented regarding originality of work and advantageous conditions in ALT inquisition?		
	% of Respondents	**Number of Respondents**
Contractor prepares design documents	%6,42	87
Contractor has special technology	%8,85	120
Contractor manufactures its own materials	%17,33	235
Contractor has special equipment	%12,02	163
Contractor is the main manufacturer for special work items	%14,45	196
Contractor employs inexpensive labor	%9,66	131
Contractor owns a vehicle park	%17,11	232
Contractor has another site nearby	%13,13	178
Other	%1,03	14
Total Number of Respondents		**405**
No answers		**25**

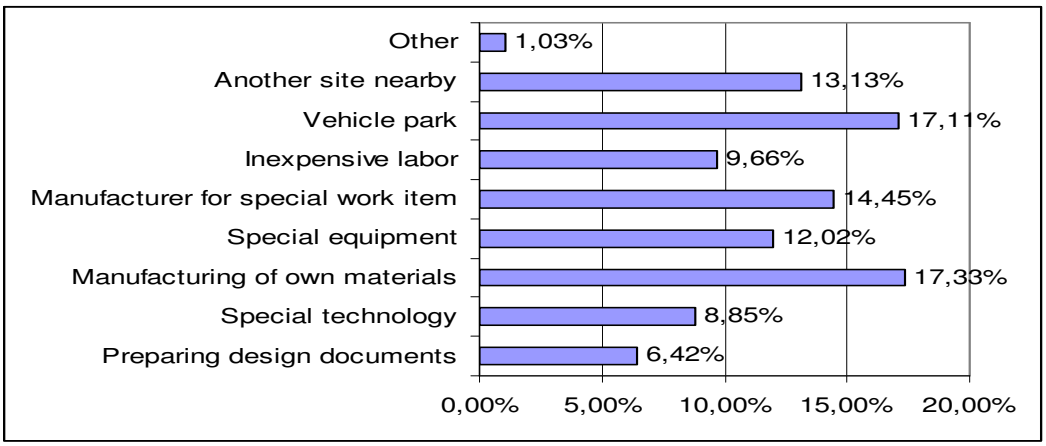

Figure 12: Advantageous Conditions, Originality of Work

Having construction site where the project will be held was written to the other answers. Respondent may not see the last answer box, so he wrote it to other

section. As it can be seen from the Figure 12 there was no peak point for that answer.

Table 31: Scaling of Advantageous Conditions

10. Please scale materials/works according to advantageous conditions		
	% of Respondents	**Number of Respondents**
Labor Costs	13,63%	129
Payment statements in the contract	11,10%	105
Steel prices	9,30%	88
Equipment prices and availability	8,98%	85
Inflation	8,35%	79
New Technology	8,25%	78
Liquid fuel prices	7,19%	68
Diesel prices	6,98%	66
Cement prices	6,66%	63
Workload of contractor	5,92%	56
Transportation costs	5,50%	52
Overhead costs	3,49%	33
Timber prices	3,17%	30
Other	1,48%	14

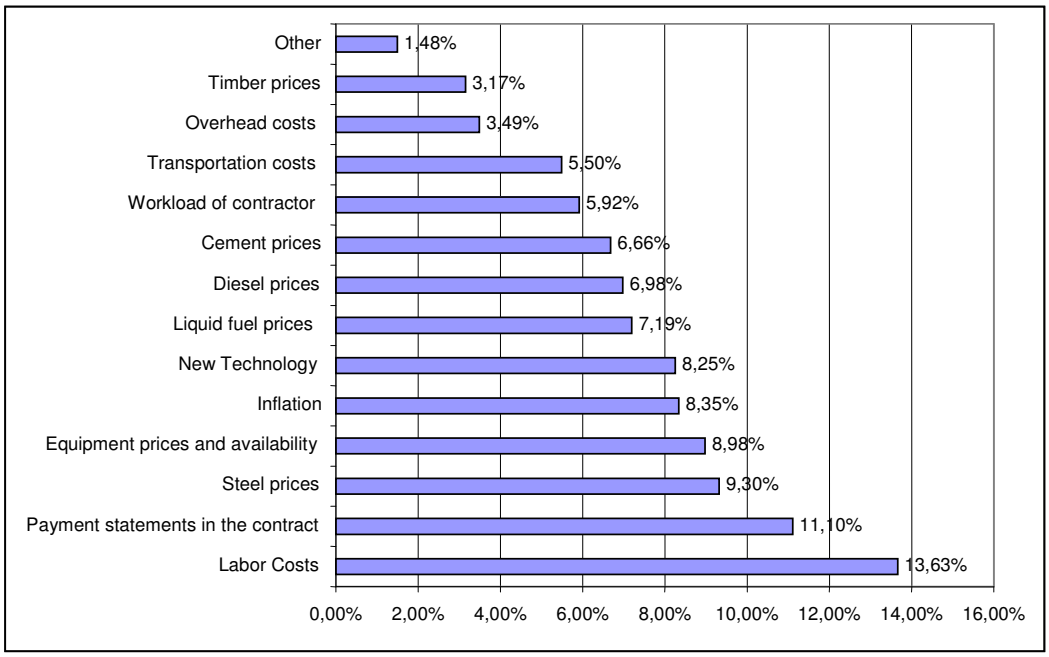

Figure 13: Rank of Advantageous Conditions

- Materials, works were put into the Table 31, when they were 1st advantageous condition for respondents.
- Other answers were work completion of a company, its history and capability, similar work experience, accomplishing work fast by support of contracting authority

Table 32: Relation of not Adapting to PPL and ALTs

11. Do you think that not adapting to Public Procurement Law causes abnormally low tenders? What kind of problems do you face with?		
	% of Respondents	**Number of Respondents**
Yes	%64	202
No	%36	112

It is believed that not adapting to PPL causes ALTs (Table 32) but ratios are not very far from each other. So it can be said that PPL's effect to ALTs is not much. Besides, a lot of problems were specified by respondents. The most important ones (mentioned more in questionnaire) are listed below:

- Conceptual cost is not determined properly because contracting authority did not investigate market prices instead it uses unit prices.
- Technical specifications and projects have deficiencies.
- ALT explanations are not examined properly because of fear of contracting authority for not awarding the tender to lowest bidder.
- Generally lowest price is the economically most appropriate price.
- Lack of information of tenderers and their attendance to tender. They give ALTs because of adeptness to 2886 Law.
- Risks are not considered properly so invisible costs appear while in progress of work.
- Unfair competition exists.

Table 33: Construction Quality Control Rate

12. Do you think that proper and sufficient quality control is applied especially in construction period?		
	% of Respondents	**Number of Respondents**
Yes	%7,00	28
Generally	%26,00	104
Sometimes	%36,25	145
No	%30,75	123
Total Number of Respondents		**400**
No answers		**30**

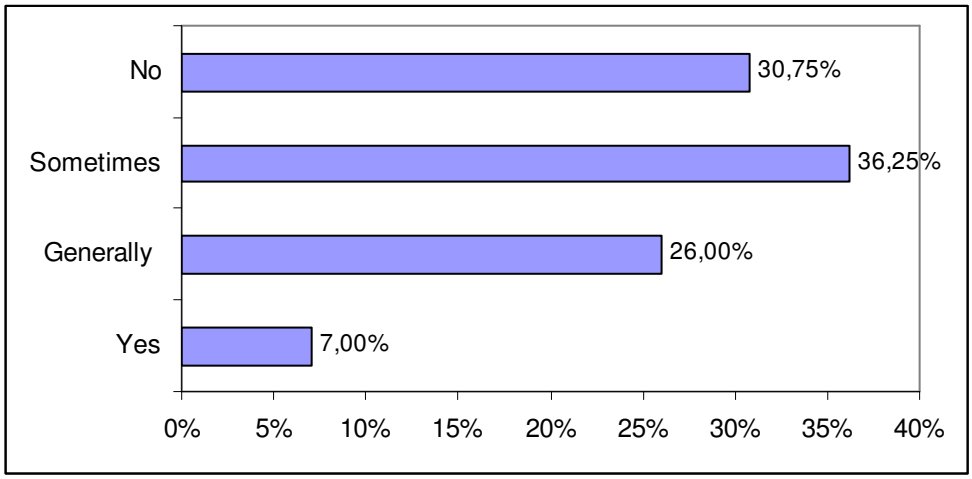

Figure 14: Quality Control Rate in Turkey

Table 34: Appropriateness of Restricted Procedure with Prequalification

13. Is restricted procedure with prequalification appropriate for solving abnormally low tenders?		
	% of Respondents	**Number of Respondents**
Yes, It is	%55,97	225
No, It is not	%44,03	177
Total Number of Respondents		**402**
No answers		**28**

Table 35: Appropriateness of Surety Bond System

15. Is surety bond system appropriate for solving abnormally low tenders?		
	% of Respondents	**Number of Respondents**
Appropriate	%16,67	67
Not Appropriate	%39,05	157
Not Applicable in Turkey	%44,28	178
Total Number of Respondents		**402**
No answers		**28**

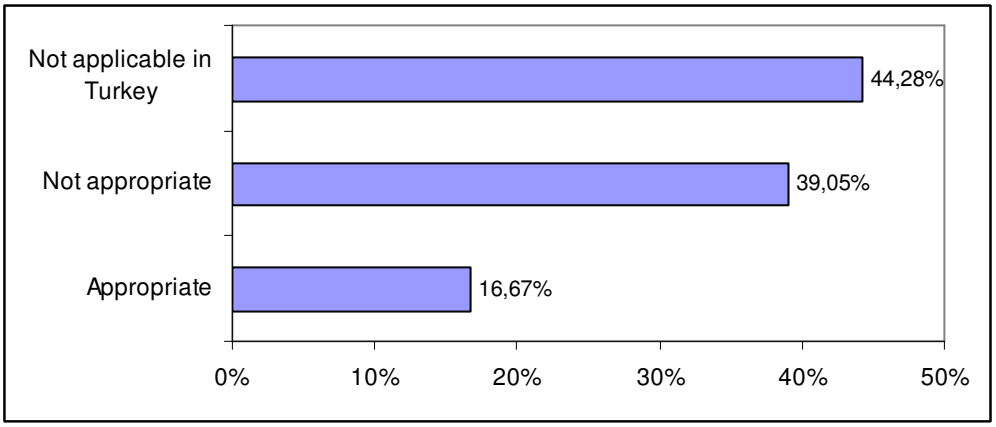

Figure 15: Surety Bond System Application

Solution proposals of ALTs were answered by 369 respondents. 61 out of 430 respondents skipped that question. 357 out of 430 respondents filled company information and 371 people filled his name and surname.

5.7 Abnormally Low Tenders Minimizing Recommendations

Comprehensive examination of ALT questionnaire and evaluation of past literature revealed some recommendations. The following recommendations are proposed in order to minimize ALT problem in Turkey.

- According to questionnaire, proper quality control (Table 33) is not applied so that, proper quality control should be applied in construction and after construction process. Quality control is made only by contracting authorities. They inform contractor before visiting the construction site. This gives time to the contractor to hide faults. Besides, it was observed that, good relationships between contractor and contracting authority cause some ignorance in process of work. To prevent this, consultant companies should supervise public works without any warning. Supervisors in consultant companies should be experienced in project which they are sent to control. They should also make records about quality of work, rate of

progress, check quantities that are specified in tender documents like materials, machines, equipment and man-hours. Performance of both contractors and sub-contractors should be recorded. These records should be delivered to PPA so that PPA can give some points to the contractors for accomplishment of every work item in a project, and can give penalties for failure of every work item. The points should be seen on PPA's web site by companies by subscription system (not by all public). Contracting authorities should use these points while calling for tenders. In addition, if any difference is determined between quantities or quality specified in specifications and on site, high penalty rates should be applied.

- Determining prices of each work item by market research (Table 25) explains higher rate of 0-25% ALT inquisition (Table 28). Changeable inflation rates, competition between manufacturing companies and quantity of goods cause prices of construction work items to change in a year. Unit prices are prepared at the beginning of the year so on the following months, validity of the prices decreases. At the same way, because of originality of each project, updating the prices considering similar works sometimes results in error. Updating old project to new project can be done in several ways. One of them is updating by a coefficient which shows price changes of products. This coefficient shows the general price changes of every kind of products so it has a probability of mistake. Market research between the announcement of tender and entrance to tender provides determining of work items in a project most adequately. So that, probability of prices to be lowest decreases.
- Questionnaire results revealed that risk of work (Figure 8) affects final bid price at most. Risk changes due to place where project will be held. Risk factors are divided into two which are general and specific factors. General factors consists of more predictable risks such as country risk (politic, economic), geographical risk (regional climate conditions, attitude, latitude). On the other hand, specific risks consist of more unpredictable risks that belong to construction site such as earth structure, local climate

conditions, and social risks. If risk analysis of a project is not made properly, bid price of that project will be low. Error rate of risk analysis is mainly due to the specific risks. For minimizing the error rate in analysis, territory of construction site should be investigated in detail and if possible feasibility reports should be demanded from corresponding enterprises.

- According to questionnaire staying in business (Table 27) is the main reason of ALT. It is necessary to buy tender documents in order to bid for a tender. One of the tender documents is administrative specification. In that specification, it is emphasized that lowest bid is the economically most advantageous tender. Also if it is determined that more than one tenderers propose same bid and they are EMAT, work experience document will be evaluated as non-price factor while determining EMAT. If bids are not same and contracting authority did not stay any non-price factor, contractors have to bid the lowest price in order to win the tender. The lowest bid for contractors not to lose money is a price corresponds to cost of entire project. Contractors have a probability of winning and also can stay in business with that cost price.
- Respondents of questionnaire generally use computer software packages (Table 29). In one of them, all of the details are available for determining bid price. The important thing is to correctly calculating quantities of work items in a tender. Prices are determined considering unit prices. Software allows changing the prices. Software also calculates cost of the project and bid price properly if quantities of work items and related proportions are registered correctly. Questionnaire also revealed that computer software users generally do not experience 76-100% ALT inquisition (Table 15). This situation also shows that users of computer software are technically sufficient. Consequently, usage of computer software packages by technically and professionally sufficient people can be a way to solve ALTs.
- It was observed that manufacturing of materials and owning a vehicle park can be documented at most regarding originality of work and

advantageous conditions (Figure 12). Manufacturing of materials which constitutes large quantities in quantity take-off can be advantageous condition. Manufacturers sell their products with a profit. When bidder buys from manufacturer company, it gives another profit to the manufacturer's price. So that, if manufacturer companies bid for a tender, their bid price always remains lower than non-manufacturer companies. In construction works generally vehicles are used. Buying or renting of construction vehicles affects final bid price a lot. So owner of vehicle park has an advantageous condition when compared to other companies. Continuity of advantageous condition according to vehicle park depends on usage of vehicles continuously. It can be provided by winning tenders. If vehicles are not used continuously, maintenance costs increase, labors take money even if they are not working. As a result, companies should have vehicle park, if they have much more works. If companies prefer manufacturing company, they should choose steel production according to Figure 13. In addition, labor costs is the most important advantageous condition, so contractors should prefer labors whose performance/cost rate is at most and should make long-term agreement with them.

- According to questionnaire results, surety bond system is not appropriate for Turkey (Figure 15) because this system can cause contractor to leave the work earlier. Contractor could think sponsor would finish the work for him, so it can leave the job when it makes some profit. Surety company will soon not want to be a surety company because of that type of contractors who leaves the work. As a result, surety bond system should not be applied in today's conditions of Turkey.
- On 1st January 2007, tender announcements started to be published by electronic means, which is called E-procurement bulletin. It works with a free subscription system, where you can find tender announcements, complaints and decisions of PPA. In addition to those, some statistics of completed projects should be recorded. These should be classified according to type of work and then place of it. Contractors would examine

the market unit prices; labor, material costs and other related works. This would be a key for contractors so their price could reflect real market prices. Contracting authorities should see real completion price of the project. If contractor's profit is assumed to be known (%25), real completion price would be a key for conceptual cost.

- Conceptual cost of contracting authority and real cost of project should be checked by a supervisor, which is determined by Supreme Technology Committee. If conceptual cost is different from real cost (±%10), person, who made conceptual cost, should be punished by penalty rates and low performance point.
- ALT limit calculation is appropriate for determining ALTs. However, on administrative specification of a tender, it was specified as economically most advantageous tender is lowest price except contracting authority did not stay any non-price factor. This article should be changed as tender is awarded to economically most advantageous tender but not to the lowest price instead the average one. While calculating average the following procedure should be followed. Average of tenders should be found like determining ALT limit. Then mean of average of tenders and conceptual cost could be taken. Then a bid which is close to this price (at positive or negative side) should be awarded as winning tender. However, this recommendation is not stated in EU directives.
- Projects of a work should be full and without mistake. It was seen that because of projects defaults, some companies give low price due to the misunderstandings. After the awarding process, project details should not be changed. Adequate supervision should be made before announcement of tender.

CHAPTER 6

STATISTICAL ANALYSES of ALT QUESTIONNAIRE

Relationships between variables can be found by considering some statistical tests. ALT questionnaire consists of mainly qualitative (nominal) variables and some quantitative variables. So, statistical tests for categorical data are chosen to understand associations between variables and degree, strength of them. Finally, multinomial logistic regression model is conducted to determine the important variables to explain the behavior of ALT Inquisition ratio.

6.1 Chi-Square Test

Chi-Square (χ^2) test is also known as Pearson's Chi-Square test. Pearson's Chi-Square test (Chernoff and Lehmann, 1954) is used to assess two types of comparison: tests of goodness of fit and tests of independence. A test of goodness of fit establishes whether or not an observed frequency distribution differs from a theoretical distribution. A test of independence assesses whether paired observations on two variables, expressed in a contingency table (Table 36), are independent of each other. In this study, chi-square test of independence is used because it is more important to investigate associations between variables rather than goodness of fit. Independence test is applied as mentioned below:

1) Null hypothesis (H_0) is proposed. According to H_0, there is no association between variables.
2) Contingency Table (Table 36) is prepared to investigate two variables. It is a two-way Table that observed (OV) and expected values (EV) are written to the corresponding rows and columns.

Table 36: Contingency Table

	I. Variable			
II. Variable	1 (Observed Value)	1 (Expected Value)	2 (Observed Val.)	2 (Expected Val.)
1	N_{11}	N_{11}	N_{12}	N_{12}
2	N_{21}	N_{21}	N_{22}	N_{22}

3) Significance level (α) is determined.
4) Degree of Freedom (DF) is determined. It is equal to (r-1)x(c-1) where r is the number of rows, c is the number of columns.

$$DF = (r-1)\ x\ (c-1) \tag{4}$$

5) H_0 rejection area is determined. By using α value and DF, critical value ($\chi^2 c$) is determined. If $\chi^2 > \chi^2 c$, H_0 hypothesis will be rejected.
6) The test statistic, χ^2 value is found by using contingency table. The formula is:

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(OV_{ij} - EV_{ij})^2}{EV_{ij}} \tag{5}$$

Expected value of each cell on contingency table is calculated by multiplying corresponding sum of row and sum of column divided by grand total.

$$\text{Expected value (EV)} = \frac{Sum\ of\ row\ (r) x Sum\ of\ column(c)}{Grand\ Total} \tag{6}$$

Chi- square test of independence was applied to observe whether there are any association between size of companies and amount of work types (Table 37). Application of this test is different due to the type of cross table. If cross table is 2x2 format one of the three type of chi-square test is chosen. Type of chi-square test is chosen according to the value of expected values. Pearson chi-square is preferred when all of the expected values are greater than 25. If one of the expected value is $5 \leq EV < 25$, Yates chi-square test and if one of the expected value is $EV < 5$, Fisher Chi-square test is applied. If cross table is different than 2x2 format then Pearson chi-square test is applied however number of EV whose

value lower than 5 must not exceed %20 of total number of cells (n(EVij<5)<%20xrxc). Observed and expected frequencies were shown on Table 37.

Yates chi –square (χ_Y^2) test is also known corrected chi-square. In SPSS software it is called continuity correction. Formula of this test is given below.

$$\chi_Y^2 = \sum_{ş=1}^{r}\sum_{j=1}^{c} \frac{\left(\left|OV_{ij} - EV_{ij}\right| - 0{,}5\right)^2}{EV_{ij}} \qquad (7)$$

Table 37: Contingency Table of Company Sizes and Amount of Work Types

	Size of Companies						
Amount of Work Types	Small Companies Observed	Small Companies Expected	Medium Companies Observed	Medium Companies Expected	Large Companies Observed	Large Companies Expected	Total
1	131	131	72	71	20	21	223
2	74	68	36	37	5	11	115
3	23	22	10	12	5	4	38
>3	12	19	12	10	8	3	32
Total	240		130		38		408

As a better way of understanding, calculation of the expected value of N_{11} was explained. It was found by first multiplying sum of row (1), which is 223 (131+72+20), by sum of column (1), which is 240 (131+74+23+12). The result is 53.520. Second this result was divided by grand total 408, which is sum of all observed values. Finally the result (131,18) is rounded to closest integer 131.

Table 38: Chi-Square Test of Company Sizes and Amount of Work Types

Chi-Square Values	Small Companies	Medium Companies	Large Companies
1	0,0000	0,0141	0,0476
2	0,5294	0,0270	3,2727
3	0,0455	0,3333	0,2500
>3	2,5789	0,4000	8,3333

Square table is 4x3 table and %16,67 (2/12) of EV is lower than 5 so that Pearson chi-square test can be applied. Chi-square test value is the sum of chi-square values of each cell. Cell (N_{12}) was found by formula 5 which the corresponding values are $(72-71)^2/71 = 0,0141$. Chi-Square test statistics was shown below including Ho hypothesis. Also calculation of Chi-square value was shown below to better way of understanding.

$\chi^2 = (131-131)^2/131 + (72-71)^2/71 + (20-21)^2/21 + (74-68)^2/68 + (36-37)^2/37 + (5-11)^2/11 + (23-22)^2/22 + (10-12)^2/12 + (5-4)^2/4 + (12-19)^2/19 + (12-10)^2/10 + (8-3)^2/3 = 15,8319$

H_0: There is no relationship between size of companies and amount of work types
Degree of Freedom = (4-1) x (3-1) = 6
Significance level = 0,05 (chosen)
Critical value = 12,592 (found from Table 39)

So that $\chi^2 > \chi^2c$, Ho hypothesis is rejected on 0,05 significance level. It means that there is a relationship between these two variables. Chi-square test only indicates whether association between variables exits but not the degree of it. Degree of relationship can be found by contingency coefficient (CC). This coefficient is used to determine degree of association for either quantitative or qualitative variables.

$$CC = \sqrt{\frac{\chi^2}{\chi^2 + N}} \quad (8)$$

$$CC = \sqrt{\frac{15{,}8319^2}{15{,}8319^2 + 408}} = 0{,}62$$

where N is the grand total

CC values differ from 0 to 1. 0 represents no association and 1 represents full association. The CC value for size of companies and amount of work types is at medium level which means association is neither strong nor weak.

Table 39: Critical Values of the χ^2 Distribution

	Area in the upper tail					
df	0,99	0,95	0,90	0,10	0,05	0,01
1	0,000	0,004	0,016	2,706	3,841	6,635
2	0,020	0,103	0,211	4,605	5,991	9,210
3	0,115	0,352	0,584	6,251	7,815	11,345
4	0,297	0,711	1,064	7,779	9,488	13,277
5	0,554	1,145	1,610	9,236	11,070	15,086
6	0,872	1,635	2,204	10,645	12,592	16,812
7	1,239	2,167	2,833	12,017	14,067	18,475
8	1,646	2,733	3,490	13,362	15,507	20,090
9	2,088	3,325	4,168	14,684	16,919	21,666
10	2,558	3,940	4,865	15,987	18,307	23,209
11	3,053	4,575	5,578	17,275	19,675	24,725
12	3,571	5,226	6,304	18,549	21,026	26,217
13	4,107	5,892	7,042	19,812	22,362	27,688
14	4,660	6,571	7,790	21,064	23,685	29,141
15	5,229	7,261	8,547	22,307	24,996	30,578

Table 40: Contingency Table of Size of Companies and Work Types

	Size of companies						
Work Types	Small Comp. Obs.	Small Comp. Exp.	Medium Comp. Obs.	Medium Comp. Exp.	Large Comp. Obs.	Large Comp. Exp.	Total
Infrastructure	123	121	70	70	23	24	216
Power plants	6	8	5	5	3	2	14
Mechanical plumbing	21	26	18	15	8	5	47
Telecommunication	3	10	11	6	4	2	18
Railways, Airports, Seaports	8	17	14	10	9	4	31
Pipe line, Fuel plants	15	17	10	10	6	4	31
Superstructure	183	161	84	94	20	33	287
Electric works	42	40	21	23	8	8	71
Total	401		233		81		715

Ho: There is no association between size of companies and work types

Chi-Square Value = 38,8181 (Formula 5 was applied to Table 40)

Degree of Freedom = (8-1) x (3-1) = 14

Significance level = 0,05 (chosen)

Critical value = 23,685 (found from Table 39)

So that $\chi^2 > \chi^2 c$, Ho hypothesis should be rejected on 0,05 significance level, also ratio of EV, whose quantity is lower than 5, is %16,67 (4/24).

$$CC=\sqrt{\frac{38{,}8181^2}{38{,}8181^2+715}} = 0{,}82 \text{ (Strong Association)}$$

Chi-Square test was applied to methods of specifying of each work item and size of companies (Table 41). According to the results there is no association between these two variables.

Table 41: Contingency Table of Price Determination Methods and Company Sizes

	Size of companies						
Determination Methods of Each Work Item	Small Comp. Obs.	Small Comp. Exp.	Medium Companies Observed	Medium Companies Expected	Large Companies Observed	Large Companies Expected	Total
Market Research	201	198	120	121	36	37	357
Unit Prices	106	101	59	62	16	19	181
Determining Most Appropriate Price	52	57	39	35	12	11	103
Cost Analysis of Similar Works	74	77	47	47	17	14	138
Total	433		265		81		779

Ho: There is no association between size of companies and price determination methods

Chi-Square Value = 2,6935 (Formula 5 was applied to Table 41)

Degree of Freedom = (4-1) x (3-1) = 6

Significance level = 0,05 (chosen)

Critical value = 12,592 (found from Table 39)

So that $\chi^2 < \chi^2 c$, Ho hypothesis cannot be rejected on 0,05 significance level.

Table 42: Contingency Table of Factors Affecting Final Bid Price

	Company Sizes						
Factors Affecting Final Bid Price	Small Comp. Obs.	Small Comp. Exp.	Medium Comp. Obs.	Medium Comp. Exp.	Large Comp. Obs.	Large Comp. Exp.	Total
Risk	148	151	90	84	21	24	259
Regular Payment	63	58	26	33	11	9	100
Works in Progress	32	34	20	19	7	6	59
Total	243		136		39		418

Ho: There is no association between size of companies factors affecting final bid price

Chi-Square Value = 3,5604 (Formula 5 was applied to Table 42)

Degree of Freedom = (3-1) x (3-1) = 4

Significance level = 0,05 (chosen)

Critical value = 9,488 (found from Table 39)

So that $\chi^2 < \chi^2 c$, Ho hypothesis cannot be rejected on 0,05 significance level. It means that no association was found between two variables.

Table 43: Contingency Table of Company Sizes and ALT Reasons

	Company Sizes						
ALT Reasons	Small Comp. Obs.	Small Comp. Exp.	Medium Comp. Obs.	Medium Comp. Exp.	Large Comp. Obs.	Large Comp. Exp.	Total
Miscalculation of Bid Price	104	104	69	66	20	24	193
Inaccuracy of Conceptual Cost	79	81	52	52	20	18	151
Staying in the Business	149	129	70	82	21	29	240
Advantageous Conditions	44	53	39	34	16	12	99
Work Experience Document	75	82	52	52	25	19	152
Ambiguity in Tender Document	66	64	39	41	15	15	120
Shortage of Tender Preparation Period	15	19	17	12	4	4	36
Total	532		338		121		991

Ho: There is no association between size of companies and ALT reasons

Chi-Square Value = 17,3131 (Formula 5 was applied to Table 43)

Degree of Freedom = (7-1) x (3-1) = 12

Significance level = 0,05 (chosen)

Critical value = 21,026 (found from Table 39)

So that $\chi^2 < \chi^2 c$, Ho hypothesis cannot be rejected on 0,05 significance level.

Chi-square value showed that there is no association between reasons of ALTs and company sizes. Also %4,76 of EV is lower than 5.

Table 44: Contingency Table of Company Sizes and ALT Inquisition Ratio

	Size of companies						
ALT Inquisition Ratio	Small Comp. Obs.	Small Comp. Exp.	Medium Companies Observed	Medium Companies Expected	Large Companies Observed	Large Companies Expected	Total
0-25%	128	126	68	69	17	19	213
26-50%	34	38	23	21	7	6	64
51-75%	37	34	18	18	2	5	57
76-100%	30	32	16	17	8	5	54
Total	229		125		34		388

Ho: There is no association between size of companies and ALT inquisition ratio
Chi-Square Value = 5,0835 (Formula 5 was applied to Table 44)
Degree of Freedom = (4-1) x (3-1) = 6
Significance level = 0,05 (chosen)
Critical value = 12,592 (found from Table 39)

So that $\chi^2 < \chi^2 c$, Ho hypothesis cannot be rejected on 0,05 significance level.

Table 45: Contingency Table of Company Sizes and Advantageous Conditions

	Size of companies						
Advantageous Conditions	Small Comp. Obs.	Small Comp. Exp.	Medium Comp. Obs.	Medium Comp. Exp.	Large Comp. Obs.	Large Comp. Exp.	Total
Contractor prepares design documents	49	48	27	28	10	10	86
Contractor has special technology	63	66	37	39	18	13	118
Contractor manufactures its own materials	133	130	72	76	27	26	232
Contractor has special equipment	88	90	53	53	19	18	160
Contractor is the main manufacturer for special work items	109	107	58	63	25	21	192
Contractor employs inexpensive labor	73	71	42	42	12	14	127
Contractor owns a vehicle park	129	128	81	75	19	26	229
Contractor has another site nearby	103	107	69	63	19	21	191
Total	747		439		149		1335

Ho: There is no association between company sizes and advantageous conditions

Chi-Square Value = 7,4588 (Formula 5 was applied to Table 45)

Degree of Freedom = (8-1) x (3-1) = 14

Significance level = 0,05 (chosen)

Critical value = 23,685 (found from Table 39)

So that $\chi^2 < \chi^2 c$, Ho hypothesis cannot be rejected on 0,05 significance level.

Table 46: Contingency Table of Financial Sponsor for Solving ALT and Restricted Procedure with Prequalification

	Restricted Procedure with Prequalification				
Financial Sponsor for solving ALT	Appropriate Observed	Appropriate Expected	Not Appropriate Observed	Not Appropriate Expected	Total
Appropriate	37	38	30	29	67
Not Appropriate	72	87	82	67	154
Not Applicable in Turkey	116	100	62	78	178
Total	225		174		399

Ho: There is no association between financial sponsor for solving ALT and restricted procedure with prequalification

Chi-Square Value = 11,8473 (Formula 5 was applied to Table 46)

Degree of Freedom = (3-1) x (2-1) = 2

Significance level = 0,05 (chosen)

Critical value = 5,991 (found from Table 39)

So that $\chi^2 > \chi^2 c$, Ho hypothesis is rejected on 0,05 significance level.

Table 47: Chi-Square Test of Sponsor and Restricted Procedure on SPSS

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11,431[a]	2	0,003
Likelihood Ratio	11,489	2	0,003
Linear-by-Linear Association	5,099	1	0,024
N of Valid Cases	399		

a. 0 cells (0%) have expected count less than 5. The minimum expected count is 29,22

According to SPSS 15 (Statistical Package for the Social Sciences) software when asymptotic significance is less than 0,05; Ho hypothesis is rejected. Likelihood ratio and linear by linear association values are different statistical tests to detect the existence of association. Both of them give the consistent results with the Pearson Chi-Square test. Contingency coefficient was found to observe the level of association.

$$CC= \sqrt{\frac{11,8473^2}{11,8473^2 + 399}} = 0,51$$

According to the CC value, association between sponsor company and restricted procedure is fair.

Table 48: Contingency Table of Quality Control and Not Adapting to PPL

	Not Adapting to PPL Causes ALT				
Adequate Quality Control	Yes Observed	Yes Expected	No Observed	No Expected	Total
Yes	14	14	8	8	22
Generally	49	55	36	30	85
Sometimes	78	72	33	39	111
No	60	60	33	33	93
Total	201		110		311

Ho: There is no association between adequate quality control and not adapting to PPL causes ALT

Chi-Square Value = 3,2776 (Formula 5 was applied to Table 48)

Degree of Freedom = (4-1) x (2-1) = 3

Significance level = 0,05 (chosen)

Critical value = 7,815 (found from Table 39)

So that $\chi^2 < \chi^2 c$, Ho hypothesis cannot be rejected on 0,05 significance level.

6.2 Kendall Tau Coefficients

Associations between ordinal variables can be found by using statistical methods. Kendall tau coefficients are one of the popular methods. It is to measure the degree of correspondence between two rankings and assessing the significance of this correspondence. Kendall tau has three sub-methods, but Kendall tau-a has no adjustments for ties so Kendall tau-b and tau-c are used. Kendall tau-b tests the strength of association of the cross tabulations when both variables are measured at the ordinal level. It is most suitable for square tables. Kendall tau-c tests the strength of association of the cross tabulations when both variables are measured at the ordinal level. It makes adjustments for ties and is most suitable for rectangular tables. In both of the tests, values range from -1 (negative association) to +1 (positive association). A value of zero indicates the absence of association (Kruskal, 1958). SPSS 15 software was used to determine Kendall values. Many associations were tested and slight associations were found however it is not possible to show all of the relations so some of the important relations were shown. Most of the data is not ordinal but in order to make Kendall test they are coded with ordinal numbers. The formula of tau-b and tau-c were shown below.

$$Tau-b = \frac{P-Q}{\sqrt{(P+Q+Tx)(P+Q+Ty)}} \tag{9}$$

$$Tau-c = \frac{2m(P-Q)}{n^2(m-1)} \tag{10}$$

Where;

P: Number of concordant parts

Q: Number of discordant parts

Tx: Number of pairs tied on X but not on Y

Ty: Number of pairs tied on Y but not on X

m: Number of rows or columns whichever is smallest

n: Total number of cases

Table 49: Employees and Working Abroad Cross Tabulation

	Working Abroad		
Employees	1	2	Total
1	8	233	241
2	20	117	137
3	14	25	39
Total	42	375	417

Employees are grouped into 3 categories which 1-5 employees as 1, 6-24 employees as 2 and >25 employees as 3. Companies are grouped into two which working abroad are 1, and others are 2. Observed values are shown on rectangular cross table (Table 49) and both Kendall tests were applied.

Table 50: Kendall Tau Tests for Employees and Working Abroad Rate

	Value	Asymp. Std.Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Kendall's tau-b	- 0,289	0,046	- 5,081	0,000
Ordinal by Kendall's tau-c	- 0,182	0,036	- 5,081	0,000
N of Valid Cases	417			

a. Not assuming null hypothesis

b. Using the asymptotic standard error assuming null hypothesis

Negative association was found between employee quantity and working abroad rate. As cross table is rectangular, it is most appropriate to use Kendall tau-c coefficient. It is inferred that when employee quantity rises, rate of companies which do not work abroad decreases. Asymptotic standard error shows the error

rate of Kendall value and approximately T is the t distribution with approximate significance.

Table 51: Ambiguity and Cost Analyses of Similar Works Tabulation

	Cost analyses of similar works		
Ambiguity in tender document	0	1	Total
0	216	84	300
1	67	56	123
Total	283	140	423

Table 52: Kendall Tau Tests for Ambiguity in Tender Document and Cost Analyses of Similar Works

	Value	Asymp. Std.Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Kendall's tau-b	0,169	0,050	3,343	0,001
Ordinal by Kendall's tau-c	0,145	0,043	3,343	0,001
N of Valid Cases	423			

a. Not assuming null hypothesis

b. Using the asymptotic standard error assuming null hypothesis

If one cell is less than other cell for row and column comparison, parts are called concordant. If row comparison of one cell is less than other cell but for column comparison one cell is greater than other cell or reverse, parts are called discordant. For Table 51, 216 and 56 are concordant because both row1 (216) and column1 (216) is greater than row2, column2 (56). Values 67 and 84 are discordant because row1 (84) is greater than row2 (67) but, column1 (67) is less than column2 (84). The calculation of Kendall values were shown below for better understanding.

P= 216 * 56 = 12.096, Q= 67*84= 5.628

Tx= 216 * 84 + 67 * 56 = 21.896, Ty= 216 * 67 + 84 * 56= 19.176

m= 2, n= 423

$$Tau-b=\frac{12.096-5.628}{\sqrt{(12.026+5.628+21.896)(12.026+5.628+19.176)}}=0,169$$

$$Tau-c=\frac{2x2(12.096-5.628)}{423^2(2-1)}=0,145$$

Companies which chose the corresponding answer selection is given 1 and respondent which do not select is given 0. Kendall's tau-b coefficient is most appropriate for these data. Although ambiguity in tender document and cost analyses of similar work are positively related, correspondence is weak.

Table 53: Ambiguity and Special Technology Tabulation

	Special technology		
Ambiguity in tender document	0	1	Total
0	217	68	285
1	69	51	120
Total	286	119	405

Table 54: Kendall Tau Tests for Ambiguity in Tender Document and Special Technology

	Value	Asymp. Std.Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Kendall's tau-b	0,187	0,052	3,560	0,000
Ordinal by Kendall's tau-c	0,155	0,044	3,560	0,000
N of Valid Cases	405			

a. Not assuming null hypothesis

b. Using the asymptotic standard error assuming null hypothesis

Kendall's tau-b is appropriate for these variables. Positive association was found between ambiguity in tender document and special technology. The strength of correspondence is low for these variables.

Association between work types and size of companies was found strong by contingency coefficient so Kendall tau tests were applied to these variables and some associations were found between telecommunication, railways, airports, seaports; superstructure. All of the degrees are slight but the largest correspondence was shown on Table 55. It can be inferred from this result that Kendall tau tests had association level decreased related to the contingency coefficient.

Table 55: Kendall Tau Tests for Company Sizes and Superstructure

	Value	Asymp. Std.Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Kendall's tau-b	-0,160	0,048	-3,265	0,001
Ordinal by Kendall's tau-c	-0,153	0,047	-3,265	0,001
N of Valid Cases	410			

a. Not assuming null hypothesis

b. Using the asymptotic standard error assuming null hypothesis

Cross Table is rectangular so tau-c is appropriate for degree of association. Negative association between variables indicates that when company size gets bigger, companies tend to make infrastructure (rank from 8 to 1 increase, which can be seen on Table 10).

Table 56: Kendall Tau Tests for ALT Inquisition and ALT Reason

	Value	Asymp. Std.Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Kendall's tau-b	-0,124	0,046	-2,691	0,007
Ordinal by Kendall's tau-c	-0,139	0,052	-2,691	0,007
N of Valid Cases	391			

a. Not assuming null hypothesis

b. Using the asymptotic standard error assuming null hypothesis

Kendall tau-c is used and negative association (Table 56) was found between ALT Inquisition rate and one of the reasons of ALTs which miscalculation of bid price of company. This reason is coded as 0 and 1 which 1 is a respondent answered corresponding ALT rate. So result indicates that when ALT inquisition rate increases, rate of this reason to be answered decreases.

Table 57: Kendall Tau Tests for ALT Inquisition and Electric Works

	Value	Asymp. Std.Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Kendall's tau-b	-0,147	0,045	-3,186	0,001
Ordinal by Kendall's tau-c	-0,124	0,039	-3,186	0,001
N of Valid Cases	380			

a. Not assuming null hypothesis

b. Using the asymptotic standard error assuming null hypothesis

Kendall tau-c is used and negative association (Table 57) was found between ALT Inquisition rate and electric works. This work type is coded as 0 and 1 which 1 is

a respondent answered corresponding ALT rate. So result indicates that when ALT inquisition rate increases, rate of this work type decreases.

6.3 Logistic Regression Models

Logistic regression is a model used for prediction of the probability of occurrence of an event. It makes use of several predictor variables that may be either numerical or categories (Agresti, 2002a). Formulation of this regression is shown below. This formula (11) is used for binary logistic regression.

$$P(y) = \frac{1}{1+e^{-z}} \text{ where;} \tag{11}$$

P(y) : Probability of occurrence

z : Analytic function in x

$$z = \beta_0 + \beta_1 x_1 + ... + \beta_k x_k \text{ where;} \tag{12}$$

x_i : The i-th predictor, i= 1, 2,…, k

β_0 : Intercept

β_1, β_k : Coefficients

The interpretation of the β_k parameter estimates is as the additive effect on the log odds ratio for a unit change in the k^{th} explanatory variable. The odds ratio (Agresti, 2002b) is a measure of effect size important in logistic regression. Coefficients are estimated through an iterative maximum likelihood method.

$$Odds = \frac{P(y)}{1-P(y)} \tag{13}$$

$$Odds\ ratio = \exp(\beta) = \frac{Odds(event)}{Odds(other\ event)} \tag{14}$$

Logistic regression has three models of which are determined by data of response. If response has two answers, binary logistic regression is used. If data of response

is ranked such as bad-good-very good (at least three) ordinal logistic regression is used. If response set has categorical variables more than two, multinomial logistic regression is used. Logistic regression models were constructed by using SPSS 15. Logistic regression does not have all the assumptions (Garson, 2008) of regression analysis. The assumptions of logistic regression are explained below.

1) Dependent variables are coded meaningfully. For multinomial regression, the class of greatest interest should be the last class and its correlates should be "+" for positive correlation. Greatest interest for ALT inquisition rate is 76-100% rate so it is coded as 4.
2) All relevant variables are included in the model. If they are omitted, the common variance they share with included variables can be wrongly attributed or the error term can increase.
3) All irrelevant variables are excluded from the model because the can cause greater standard errors for logit coefficients.
4) Error terms are assumed to be independent.
5) Ideal model assumes low error rate in the explanatory variables and no missing cases. There are few missing cases in the model.
6) Logistic regression does not require linearity between independent factors and dependent variables but, it assumes linear association between independent variables and logit (z). If this assumption is violated, degree of association of the independents to the dependent will be underestimated and also it can cause Type II errors which thinking there is no association when actually there is.
7) There should be no multicollinearity in the model. Multicollinearity will occur if one independent is linear function of other independent and affects the reliability of log coefficients but not their estimates.
8) Large samples are used because logistic regression uses maximum likelihood estimation. If small samples are used, there will be high standard errors.

9) Outliers can affect logistic regression results significantly so outliers should be removed from model. Standardized residuals > 1,96 are outliers at 0,05 significance level.

It is important to determine which affects ALT Inquisition rate so multinomial regression model was constructed. In SPSS 15 multinomial logistic regression is selected from analyze menu then regression. Sample window for multinomial logistic regression model is shown on Figure 16.

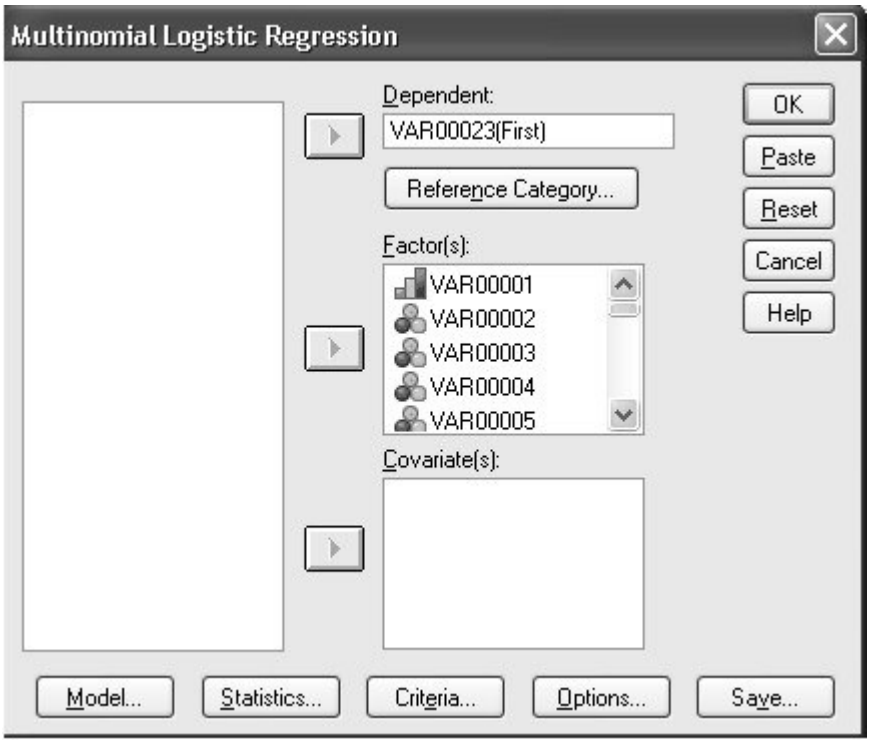

Figure 16: Multinomial Regression Window

Dependent variable is ALT Inquisition Rate and factors are other variables. Since there are no continuous variables in ALT questionnaire, covariates are blank. In the reference category menu first and ascending were chosen, which ascending means increasing values of ALT Inquisition Rate. 0-25% ALT Inquisition rate

was chosen as reference category (first). In statistics menu classification table was selected to observe how well the observed response category fits the predicted response category (Table 58). Other menus can stay default. By pressing ok multinomial test for ALT Inquisition was evaluated and on the first run a warning message consisting some of the factors should be excluded. This result can be an indication of multicollinearity in the model so correlations between independent variables were checked under the menu Analyze/Correlate/Bivariate. Spearman two-tailed correlations were selected because of nominal data and multicollinear variables were eliminated from the model. Elimination was done to the variables due to the least correspondence with dependent variable. Then, standardized residuals were found to eliminate outliers from the model. Residual is the difference between actual response category probability and estimated response category. Standardized residual (SR) can be found by the following formula 15. In SPSS, multinomial analysis do not give standardized residuals so under Transform/Compute variable menu it should be calculated by inserting the formula. Mean and standard deviation of residuals can be found under the menu Analyze/Descriptive statistics/Descriptives. Significance value is 0,05 for the model so that the data of standardized residuals more than 1,96 were eliminated as outliers from the model. However, elimination of all outliers caused problems so some of them could not be eliminated and best model was found on Table 58 without any problems. Outliers are distant observations from the rest of the data.

$$SR = \frac{\mathrm{Re}\,sidual - \bar{x}}{s} \tag{15}$$

Where;

$\bar{x}$: Mean of Residuals

s: Standard deviation of Residuals

Table 58: Classification Table of ALT Inquisition Rate

	Predicted				
Observed	1,00	2,00	3,00	4,00	Percent correct
1,00	193	5	1	4	95,10%
2,00	14	6	3	1	25,00%
3,00	17	1	5	4	18,50%
4,00	16	3	2	0	0,00%
Overall Percentage	87,30%	5,50%	4,00%	3,30%	74,20%

The predicted response category is chosen by selecting the category with the highest model predicted probability. Diagonal cells, which are 193,6,5,0, represent number of correct predictions and others are incorrect predictions. According to the overall percentage of 74,20%, the model is moderate so the predictions should be considered as not reliable. Theoretically %80 and over correctness is desired to have reliable predictions and best model.

Table 59: Pseudo R-Square Value

Cox and Snell	0,398
Nagelkerke	0,484
McFadden	0,295

R-square statistic for linear regression can not be exactly computed for multinomial logistic regression because of categorical dependent variable. Instead pseudo statistics (Table 59) are computed which are Cox and Snell (1989), Nagelkerke (1991), McFadden (1974) in SPSS 15. Cox and Snell's R^2 (R^2_{CS}) is based on log likelihood for the model compared to the log likelihood for a

baseline model but even perfect model has maximum value less than 1. Nagelkerke's R^2 value (R^2_N) adjusts the scale of the statistic to cover the full range and also more than others because it divides Cox and Snell's R-Square value to its maximum. McFadden's R-Square (R^2_M) is based on the log-likelihood kernels for the intercept only model and the full estimated model. Pseudo R-Square statistics indicate that more of the variation is explained by the model, to the maximum value of 1. Since all of the Pseudo statistics for ALT Inquisition is low, the model is poor. Three models were constructed which were P(y=2), P(y=3), P(y=4) relative to P(y=1) by using logarithm natural (ln) function. The models were presented on following Tables 60-62.

$$R^2_{CS} = 1 - \left[\frac{L(\tilde{\pi})}{L(\hat{\pi})} \right]^{\frac{2}{n}} \tag{16}$$

$$R^2_N = \frac{R^2_{CS}}{1 - L(\tilde{\pi})^{\frac{2}{n}}} \tag{17}$$

$$R^2_M = 1 - \left[\frac{l(\hat{\pi})}{l(\tilde{\pi})} \right] \tag{18}$$

Where;

$L(\tilde{\pi})$: Likelihood of model with intercept only

$L(\hat{\pi})$: Likelihood of model with predictors

n : Number of observations

$l(\tilde{\pi})$: Log-likelihood of model with intercept only

$l(\hat{\pi})$: Log-likelihood of model with predictors

Table 60: Parameter Estimates of 26-50% ALT Inquisition Rate

	B	Std. Error	Wald	df	Sig.	Exp(B)	%95 Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-5,434	1,556	12,197	1	0,000			
X1=0	2,784	1,088	6,552	1	0,010	16,179	1,920	136,346
X2=1	-2,210	0,545	16,459	1	0,000	0,110	0,038	0,319
X3=3	1,836	0,837	4,816	1	0,028	6,271	1,217	32,314
X4=1	2,679	0,757	12,518	1	0,000	14,570	3,303	64,267

Where;

X1: Electric works

X2: Software usage

X3: Sometimes quality control is applied

X4: Appropriateness of restricted procedure with prequalification

Interpretation of multinomial regression is slightly different from binary logistic regression. Estimates of independent variables are relative to the reference category like the dependent variable. In SPSS 15, reference category for independent variables is last category for each independent variable. Table 60 is the model for ln(P=2)/ln(P=1). Electric works have odds ratio of 16,179 which means that odds of electric works not to be selected in 26-50% ALT Inquisition rate is 16,179 times more than odds of not to be selected in 0-25% rate. Conversely, electric works are more likely to be selected in 0-25% rate. Software users relative to the non-users has odds ratio of 0,110 which indicates that odds of software users to non-users in 0-25% rate is more than 26-50% rate. Quality control rate is relative to the supporters of no quality control appliance. Appropriateness of restricted procedure relative to inappropriateness is more likely to occur in 26-50% ALT Inquisition rate.

Table 61: Parameter Estimates of 51-75% ALT Inquisition Rate

	B	Std. Error	Wald	df	Sig.	Exp(B)	%95 Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-9,493	1,910	24,693	1	0,000			
X1=0	1,590	0,544	8,557	1	0,003	4,905	1,690	14,237
X2=0	1,437	0,626	5,272	1	0,022	4,208	1,234	14,349
X3=3	1,439	0,714	4,057	1	0,044	4,217	1,040	17,105
X4=1	3,731	1,081	11,921	1	0,001	41,729	5,018	346,977

Where;

X1: Miscalculation of bid price

X2: Obtaining work experience document

X3: Sometimes quality control is applied

X4: Appropriateness of restricted procedure with prequalification

Table 61 is the model for ln(P=3)/ln(P=1). All of the variables have odds ratio greater than 1. The first two of variables (X1, X2) is odds ratio of being not selected to being selected. This indicates that odds of miscalculation of bid price and obtaining work experience document in 0-25% ALT Inquisition are more than 51-75% rate. Rare quality control relative to no control in 51-75% is more than 0-25% rate but not as much as in 26-50% rate. Appropriateness of restricted procedure relative to inappropriateness of it in 51-75% is 41,729 times more than in 0-25% rate which is the most of all rates.

Table 62: Parameter Estimates of 76-100% ALT Inquisition Rate

	B	Std. Error	Wald	df	Sig.	Exp(B)	%95 Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-5,208	1,454	12,826	1	0,000			
X1=2	-2,677	1,308	4,188	1	0,041	0,069	0,005	0,893
X2=0	1,442	0,615	5,503	1	0,019	4,229	1,268	14,108
X3=0	1,981	0,812	5,953	1	0,015	7,252	1,477	35,621
X4=1	-1,763	0,570	9,581	1	0,002	0,171	0,056	0,524
X5=2	-2,603	1,159	5,047	1	0,025	0,074	0,008	0,717
X6=1	2,213	0,669	10,942	1	0,001	9,144	2,464	33,932

Where;

X1: Regular Payment of Contracting Authority

X2: Miscalculation of bid price

X3: Obtaining work experience document

X4: Software usage

X5: Generally adequate quality control is applied

X6: Appropriateness of restricted procedure with prequalification

Table 62 is the model for ln(P=4)/ln(P=1). Regular payment of contracting authority with respect to works in progress in 76-100% Inquisition rate have lower odds than in 0-25% rate. Odds of selection of miscalculation of bid price in 76-100% less than in 0-25% rate but have more odds than in 51-75% rate. Odds of obtaining work experience document in 0-25% rate is more than 76-100% and also 51-75% rate have more odds than 76-100% rate relative to 0-25% rate. Software usage is less likely to be selected in 76-100% rate but 76-100% rate has more odds than 26-50% rate respect to 0-25% rate while selecting software. Random questionnaire was selected for better understanding of logistic regression model. The data of the sample questionnaire was shown on following page.

Sample questionnaire

1-5 employees are working on the company. Company is dealing with infrastructure, mechanical, plumbing works, pipe line and fuel plant works. It is not working abroad. It determines prices of each work item by market research and most appropriate one by getting bid prices from other companies. Works in progress affects final bid price. Reasons of ALTs are inaccuracy of conceptual cost, staying in business, advantageous conditions and obtaining work experience document. It uses computer software. Advantageous conditions of the company are preparation of the project, inexpensive labor, having site nearby. Company does not think adequate quality control is applied. Restricted procedure is not appropriate and sponsor company solution can not be applied in Turkey.

Electric works was not selected by respondent. Not selection of electric works with respect to selection of it was represented by "0". From Table 60, it can be said that odds of not selection of electric works in 26-50% ALT Inquisition rate is 16,179 times more than in 0-25% ALT Inquisition rate.

From Table 62, odds ratio of regular payment with respect to works in progress is 0,069 which is also relative to 0-25% rate. Inversely odds of works in progress in 76-100% rate is 14,493 times more than in 0-25% Inquisition rate.

Miscalculation of bid price has odds ratio of 4,905 (Table 61) which indicates that miscalculation of bid price is not a reason of ALT in 51-75% rate compared to 0-25% rate. Also it is not a reason of ALT in 76-100% rate with respect to 0-25% rate (Table 62).

Obtaining work experience document is one of the ALT reasons of respondent. From Table 61, odds ratio of obtaining work experience document to be selected compared to not selection is 0,236 and from Table 62, it is 0,138. So it can be

inferred that 0-25% rate is more likely to have obtaining work experience document as ALT reason.

Odds of software usage to be selected in 0-25% is more than in other odds probabilities with respect to no usage of it (Table 60, Table 62).

Selection of no adequate quality control with respect to generally quality control in 76-100% rate is 13,514 more than in 0-25% ALT inquisition rate.

According to Tables 60, 61, 62 all of rates have high odds of appropriateness of restricted procedure relative to 0-25% rate. So it can be inferred that it is more likely that inappropriateness of restricted procedure can be selected in 0-25% ALT ratio.

CHAPTER 7

CONCLUSION

There are lots of problems that arise from the Public Procurement Legislation but perhaps, abnormally low tenders are the most serious and important of all. Both Public Procurement Authority and related enterprises concerning this problem continue their research on the matter of solving.

Companies participated to questionnaire generally make superstructure and infrastructure works. According to the Chi-square and contingency coefficient, strong association was found between company sizes and work types. Positive relation was observed with telecommunication; railway, airport, seaport works and negative relation was observed with superstructure due to Kendall tests. Besides, superstructure works are made by mainly small companies and infrastructure works are made by large companies due to the proportions.

According to ALT questionnaire, prices of work items in a tender are determined by market research at most. Also a positive weak association was found between ambiguity in tender document and cost analysis of similar works. Prices found by market research are close to the real costs because market research is done on a date that is close to tender date. Even though, researches show that contracting authorities prepares conceptual cost by unit prices or similar works, conceptual cost has to be found also by market research. If contracting authority also prepares conceptual cost by market research, difference between conceptual cost and bid price of contractor decreases. Decrease in this difference provides ALT to decrease. Moreover, decrease in difference between conceptual cost and tender price is the one of the aims of E-procurement. Large ratio of 0-25% ALT

inquisition rate emphasizes that, prices of work items have to be found by market research.

Risk of work is the most important factor that affects final bid price of tender due to ALT questionnaire. General and specific risk factors have to be determined by analyzing them at place of work in order to find risk of the work properly. Poor risk analysis can result in ALT or higher price compared to conceptual cost. For that reason, risk factors should be prepared in detail and for complicated work experienced companies in risk analysis should be used. Consequently, good risk analysis prevents contractor at least from losing money in a tender.

Abnormally low tenders are encountered as a consequence of the factors, such as, staying in business, miscalculation of bid price, inaccuracy of conceptual cost and requirement of work experience document, which were determined by questionnaire**.** The rank of these reasons is different according to size of companies. For small and medium companies, the first three reasons are same but for medium companies work experience document got the same rank with inaccuracy of conceptual cost. For large companies rank of reasons are work experience document, staying in business, inaccuracy of conceptual cost and miscalculation of bid price, which the rank of the last two is same. In fact, those kinds of factors are fairly different from the ones in EU for; the reasons that seem insignificant in Turkey may become important in the EU. Similarly, those factors are also different in the USA, however the factor of giving low tender for the sake of the survival a firm following a risky strategy and staying in business, reminds the same kind of incidents in Turkey. So as a matter of fact, distinctive reasons that cause abnormally low tenders in different countries are based on different social structure. Moreover a positive weak association was found between ambiguity in tender document and special technology as advantageous condition.

Questionnaire results and statistical tests reveal that computer software users generally do not face with ALT inquisition. There is a lot of computer software

that determine conceptual cost nowadays. One of them was investigated and it was seen that all the cost components of conceptual cost and bid price are defined in that software. Usage of this software requires technical and computer knowledge. Usage of this kind of software with proper quantity take-off provides determining of bid price properly. Therefore, it can be said that computer software will decrease ALT ratio if it is used with experienced staff.

Contracting authorities generally demand proper explanations about advantageous conditions. However, originality of work is restricted in many tenders because of projects and specifications. In fact, advantageous conditions and originality of work are evaluated together. Advantageous conditions, which can be documented in ALT inquisition, are determined as manufacturing of materials, owning vehicle park, being manufacturing company for special work items, and having another construction site nearby in which the work will be performed. Furthermore, labor costs and payment statements in the contract are determined to be advantageous conditions at first place in scaling from questionnaire. It can be referred that lower labor prices and regular payment of contracting authority will decrease the bid price.

It was found out from questionnaire that proper and sufficient quality control is not applied in construction period. It was determined from statistical tests that adequate and proper quality control reduces ALT Inquisition rate. Contracting authorities generally controls process of work before progress payments. Contractors can conceal faults because controllers visit construction site with giving the information about when to come. Relationships between contractor and contracting authority sometimes cause some faults to be ignored. For a proper quality control, control has to be made by people who do not know contractor and also without announcement to come. With that kind of quality control, projects can be finished by more quality.

Logistic regression model and Kendall tau tests revealed some associations related to the ALT Inquisition rate. Negative association was found with miscalculation of bid price and electric works. Logistic regression model supported that when electric works is selected, ALT Inquisition rate decreases. Miscalculation of bid price decreases ALT Inquisition ratio due to Kendall tau, also it decreases ALT Inquisition rate in logistic regression model.

EU and USA occupied with solving abnormally low tender problem for years. EU supports mainly Economically Most Advantageous Tender, and USA supports mainly surety bond system. EMAT system was applied in Turkey but due to some corruptions, it was cancelled and instead, lowest bid system has been established since it was also observed that surety bond system is not practically applicable. For solving of ALTs in Turkey, a new average system should be applied but some modifications must be made in order to adapt it to today's conditions. Application of the new average system should start with determining conceptual cost, which is specified by contracting authority, and calculating mean of bidders that are accepted to enter the tender. While calculating mean of bidders, average determination method in finding ALT limit have to be used. Then, average of conceptual cost and mean of bidders should be calculated. Finally tender should be awarded not to the lowest bidder but a bid which is closer to the new average from positive or negative side should be awarded as winning tender. This situation makes companies to work more carefully to catch up that price. Moreover, the number of companies that cannot win tenders because of ALTs will decline; contractors, who are performing poor quality work with low prices, steal from materials or leave other firms or suppliers in chance of bankruptcy without paying to market will be prohibited. So that, a good service to public and government with more quality and reasonable prices will be obtained. Indeed a proper and tight supervision to both contractor and contracting authority have to be applied in order that new average system will perfectly work.

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