A STUDY ON THE PRICE ESCALATION SYSTEM IN PUBLIC CONSTRUCTION CONTRACTS IN TURKEY

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Approval of the thesis:

A STUDY ON THE PRICE ESCALATION SYSTEM IN PUBLIC CONSTRUCTION CONTRACTS IN TURKEY

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ABSTRACT

A STUDY ON THE PRICE ESCALATION SYSTEM IN PUBLIC CONSTRUCTION CONTRACTS IN TURKEY

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The construction industry has a major role in the development of Turkish economy. The construction sector contributes 6-8 % of the gross domestic product of Turkey. At the same time, public investments comprise an important portion in the Turkish construction sector. Medium to large construction projects generally take over a year for completion and cost of materials and labor that are used as resources in construction projects often increase during implementation of construction projects. On the other hand, construction projects are executed according to the pre-confirmed contract value and contract agreement in principle. Thus, due to the cost increases in construction inputs, most contractors have to bear considerable extra burden which causes major problems and disputes during administration of the contract. To cope with these types of problems, most countries regulated the escalation clause in the law or conditions regarding construction contracts. Escalation Clause regulates adjustments to the contract amount, due to the changes in prices.

The purposes of this study are (i) to study the current price escalation decree in Turkey, (ii) to understand the escalation clauses presently used in construction

contracts adopted by various Government agencies in Turkey, (iii) to investigate the arguing points related to the price escalation decree and problems related to price adjustment applications, (iv) to provide suggestions to improve the current price adjustment system; through questionnaires directed towards representatives from contracting parties. The results show that; the most important problem related to the price adjustment applications is varying price adjustment implementations of different government agencies. The most important problems related to the price escalation decree are; unpredictable increases in exchange rates that bring contracts to an incomplete state, and the indices used for the price adjustment payment that do not exactly reflect the market conditions. The most important suggestions to improve the price escalation system are; the practices of the contracting authorities should be united in terms of putting the price adjustment clause into the contract, in order to simplify the calculation of price adjustment calculations and to avoid differences in implementation, a web-based Price Adjustment Calculation Module which is open to the use of administration and contractors should be established on the website of the Public Procurement authority, and construction indices that are specific to construction project type and take into account the construction sector inputs should be created and used in price adjustment (Building Cost Index, Road Cost Index, etc.).

Keywords: Escalation, price adjustment, price change, construction price index

ÖZ

TÜRKİYEDE KAMU İNŞAAT PROJELERİNDE FİYAT FARKI UYGULAMASI ÜZERİNE BİR ÇALIŞMA

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İnşaat sektörü Türkiye ekonomisinin gelişiminde önemli bir role sahiptir. İnşaat sektörünün Türkiye'nin gayri safi yurtiçi hasıla içerisindeki payı yaklaşık % 6-8 seviyesindedir. Bununla birlikte inşaat sektöründe kamu yatırımları önemli bir yer tutmaktadır. Orta ve büyük ölçekli inşaat projelerinin tamamlanması genellikle bir yıldan fazla sürmekte ve bu projelerde kullanılan işçilik ve diğer yapı malzemelerinin fiyatları inşaat aşamasında sıklıkla artmaktadır. Öte yandan, inşaat projeleri prensipte önceden belirlenmiş bir sözleşme ve sözleşme bedeline göre yürütülmektedir. Bu durumda, inşaat girdilerindeki maliyet artışları nedeniyle müteahhitlerin çoğunun büyük zarar taşımaları gerekmekte ve bu durum sözleşmenin yönetiminde önemli sorunlara neden olmaktadır. Bu tip problemler ile başa çıkmak için, çoğu ülkede kanunlarla veya inşaat sözleşmeleri ile Eskalasyon maddesi düzenlenmektedir. Eskalasyon maddesine fiyat değişimleri nedeniyle inşaat sözleşmelerinin tutarında değişiklik yapmak için başvurulmaktadır.

Bu çalışmanın amaçları (i) Türkiye'de mevcut fiyat farkı kararnamesini incelemek, (ii) Türkiye'de kamu inşaat projelerinin sözleşmelerinde kullanılan eskalasyon

maddesini incelemek, (iii) eskalasyon kararnamesi ile ilgili tartışmalı konuları ve bu kararnamenin uygulanmasında karşılaşılan problemleri incelemek, (iv) sözleşme taraflarının dahil edildiği anket düzenleyerek, onlarında görüşleri doğrultusunda mevcut kararnameyi ve uygulamalarını iyileştirmek için öneriler sunmaktır. Yapılan anketin sonuçlarına göre; fiyat farkı uygulamaları ile ilgili en önemli sorun farklı devlet kurumlarının farklı fiyat farkı uygulamalarının olmasıdır. Fiyat farkı kararnamesi ile ilgili en önemli sorunlar ise öngörülemez döviz kuru artışlarının sözleşmeleri tamamlanamaz duruma getirmesi ile fiyat farkı ödemesinde kullanılan endekslerin, piyasada gerçekleşen fiyat değişimleri tam olarak yansıtmıyor olmasıdır. Fiyat farkı sistemini iyileştirmek için kabul gören önerilenden en önemlileri ise; fiyat farkı maddesinin, sözleşmeye konulması açısından, ihale makamlarının uygulamalarında birlik olması, fiyat farkı hesaplaması işlemlerinin kolaylaştırılması ve uygulamada farklılıkların önüne geçilebilmesi amacıyla, Kamu İhale Kurumunun sitesinde, idare ve yüklenicilerin kullanımına açık web tabanlı bir Fiyat Farkı Hesaplama Modülü oluşturulması ve inşaat sektörüne özgü girdilerin yer aldığı inşaat proje tipine özel endekslerin (Bina Maliyet Endeksi, Yol Maliyet Endeksi vb.) oluşturulması ve kullanılmasıdır.

Anahtar kelimeler: Eskalasyon, fiyat ayarlaması, fiyat değişim, inşaat fiyat endeksi

Dedicated to my wife

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LIST OF ABBREVIATIONS

BCCI	Building Construction Cost Index
BCIS	Building Cost Information Service
BoQ	Bill of Quantities
CI	Cost Index
CLI	Cost of Living Index
CLII	Construction Labor Input Index
COICOP	Target Based Individual Consumption Classification
CPI	Consumer Price Index
DOT	Departments of Transportation
DPPI	Domestic Producer Price Index
EUROSTAT	Statistical Office of the European Community
FIDIC	International Federation of Consulting Engineers
ICC	Istanbul Chamber of Commerce
MPWS	Ministry of Public Works and Settlement
NACE	Statistical Classification of Economic Activities in the European Community
N.E.C	Not elsewhere classified
OECD	Organization for Economic Co-operation and Development
$PBPI_1$	Produced Building Price Index 1
$PBPI_4$	Produced Building Price Index 4
PPA	Public Procurement Authority
PPI	Producer Price Index

TURKSTAT	Turkish Statistical Institute
TL	Turkish Lira
UK	United Kingdom
US	United States
WPI	Wholesale Price Index

CHAPTER 1

INTRODUCTION

The construction industry has a major role in the development of the Turkish economy. This sector contributes 6-8 % of the gross domestic product of Turkey. At the same time, public investments comprise an important portion in the Turkish construction sector.

In general, construction projects are usually quite lengthy ranging from several months to several years and construction projects are performed according to a pre-confirmed contract amount and contract agreement in principle. On the other hand, there is a strong probability that the cost of labor and materials will rise and fall periodically, to a greater or lesser extent, during the life of the project (Choi et al., 2006). Contractors working in volatile materials market find that estimating, bidding and financing the construction projects are challenges. Many face significant losses or erosion of anticipated profits because many of them are locked into fixed-price construction contracts where contractors bear the risk of material price and supplier cost increases. Without the price escalation clause that allows for an adjustment to the contract price, if there is an unexpected rise in the market prices of key construction materials, a contractor will have no respite from such increases. It is necessary to have an escalation clause in the contract to guard against a sudden spurt in the cost of materials. To reduce this degree of risk, it is necessary for the contractor to include large contingencies in initial estimates of the contract when he tenders the contract. If the contingencies are overestimated, the probability of the contract being awarded to another contractor is increased. On the other hand, if the contractor does not allow for inflation and interest rate correctly, his initial tender would be too low and he would suffer significant losses (Kalidindi et al., 2011).

To cope with the price fluctuation problem, most countries regulated the escalation clause in the law or conditions regarding construction contract. The basic rationale for escalation clause is to compensate the contractor for an increase in material prices which are beyond the control of both parties.

The clause referenced to change the contract amount in a construction contract, due to the change in price, is called an Escalation Clause. 'Escalation' is a term used in most countries, including Turkey, to indicate the extent of these changes from the commencement of a project through any point during its life. As equivalent terms, 'fluctuations', 'rise and fall' and 'contract price adjustment' are used interchangeably (Choi et al., 2006).

In Turkey, inflationary pressure increased as the 1970s, instead of executing construction works under fixed price contracts, Ministry of Council published Escalation Decree which determined the principles of implementation of escalation clauses to compensate the contractors for an increase in construction costs. After that, in accordance with changing conditions and needs in Turkey, Ministry of Council has published various Escalation Decrees from the past to present. In fact, there is no absolute and only escalation regulation, clause, formula or provision that can solve the problems related to the construction input price changes in all conditions from the perspectives of both a contractor and an client. On the other hand with the time and experience, suggestions have been provided to improve the escalation system for the construction contract.

The latest escalation decree for public construction projects has been published in 2013 which states the principles of price adjustment system and implementation provisions of escalation clause. On the other hand, there are some arguing points related to the provisions and applications of currently used escalation decree. Therefore the objectives of the present study are (i) to study the current escalation decree in Turkey, (ii) to understand the escalation clauses presently used in construction contracts adopted by various government agencies in Turkey, (iii) to investigate the arguing points related to the current price escalation decree and problems related with price adjustment applications, (iv) provide suggestions to

improve the current price adjustment system in public construction contract in Turkey.

To achieve the purposes of this study, an opinion questionnaire survey is formed and questionnaire is directed towards representatives from contracting parties of public projects. In fact, this questionnaire helps to discover the controversial points related to the price adjustment system in public construction projects with different perspectives of contracting parties and also helps to find out suggestions to improve the price adjustment system based on the experience of the contracting parties.

The general outline of the thesis is listed below.

Chapter 2: *Concept of Escalation*- This chapter consists of information about inflation and escalation, also information about the concept of escalation. Finally in this chapter a brief review of the studies conducted on the cost and benefit of escalation is given.

Chapter 3: *Escalation Clause Parameters in Construction Contracts*- In this chapter, information about the history of price escalation clause is given. Then general information about price escalation clause applications in the world is given. Finally, adjustment clause parameters and selection of these parameters are presented briefly.

Chapter 4: *Literature Review on Price Adjustment and Escalation Clauses*- In this chapter, previous research studies about thesis subject are summarized and presented.

Chapter 5: *General Information about Price Indices in Turkey*- In this chapter, general information about price indices such as Consumer Price Index, Domestic Producer Price Index, Wholesale Price Index, Building Construction Cost Index for Turkey and the relevant calculation methods are presented.

Chapter 6: *Price Escalation Applications in Turkey: Construction Contracts from the past to the present*- In this chapter, previous and current escalation decrees and provisions of them are mentioned.

Chapter 7: *Escalation Clause in Construction Contracts in Turkey*- Currently used escalation decree and its provisions are mentioned in this chapter. Then arguing points related to the principles and applications of escalation decree are mentioned.

Chapter 8: *Research Methodology and the Questionnaire*- In this chapter the research methodology, the steps followed in forming the questionnaire, structure and parts of the questionnaire are explained in detail.

Chapter 9: *Research Findings*- This chapter presents the research findings and discussion of the results of the questionnaire.

Chapter 10: *Summary and Conclusions*- In this chapter, according to the results of the survey, suggestions to improve the price adjustment system in public construction projects in Turkey is presented and also final comments and recommendations are made on suggestions.

CHAPTER 2

CONCEPT OF ESCALATION

2.1 Introduction

One of the most common problems encountered in the execution stage of public procurement contracts is the inability of carrying out the subject of work under the contract price of the tender in works taking more than one year or in the long-term works. In inflationary economies, even if the execution time period of work is short, generally failure situation may arise to complete work on the contract price. In Turkey, as inflationary pressure increased in the 1970s, instead of executing the construction works under fixed price contracts, some kind of arrangements and regulations were made for the difference in price to be given to the contractor, by this way the risk of price changes could be shared between project employers and contractors.

It can be said that there is a general consensus to put a price escalation clause into the contracts of construction projects that are executed in the peak periods of the cost increase. However, there is a common idea that price adjustment should not be performed especially in periods that inflation can be kept at a certain range. The reason behind this common idea is the thought that the price adjustment payment occurs only against the project employers (Oktar, 2014).

2.2 Inflation and Escalation

Many people use the terms inflation and escalation interchangeably, but economists and investment analysts use these words separately. Inflation is a term varying from person to person; which shows the increase in an index. This index usually is a list of

the weighted average price of commercial products such as clothing, food, household goods, and service. In other words, inflation is a general rise in the price level. Over time it reduces the purchasing power of the currency. An individual perceives the inflation as a price increase in food, car and other goods and services.

Inflation, measured by money's purchasing power and the general decline in the value of money varies according to the country's currency and the group of goods and services purchased. For example, the inflation rate depending on Turkish Lira is different from US Dollar and also the inflation rate depending on fuel is different from that of food (Kahraman, 2002).

Obviously in spite of a general inflation rate, in many times the general price trends may vary from one product or service to another. For example, petroleum products increased over 500% in the USA in the 1970s, on the other hand, the prices of certain electronic goods decreased in these times. The situation that price changes differently in distinctive products is called Escalation. In other words, escalation is a function of inflation, supply and demand imbalance, changes in the environment and engineering, developments in technology, changes in market conditions etc. For example, Consumer Price Index in Turkey was about 9% in the 2005-2008 time period, on the other hand, steel price changed (escalated) by over 50% because of a supply-demand imbalance. It should be noted that inflation is concerned with a community of transportable goods and services, on the other hand, escalation deals with the specific areas of these communities (Kahraman, 2002).

Factors affecting the escalation are;

- ✓ Inflation
- ✓ Supply and demand
- ✓ Technological changes
- ✓ Changes in the market
- ✓ Environmental impacts

- ✓ Political effects
- ✓ Other effects

Over long periods of time, if there is a balance between supply and demand of the market, escalation trend will be more-or-less similar to the inflation that occurs when there is no continuous technological development or efficiency changes in a given market.

Similar to the inflation, escalation is calculated by investigating the changes in price index evaluated for a given product and probable future values of escalation can be calculated using econometrics. However, because escalation can occur in a micro-market (unlike inflation), actually it is difficult the measure escalation by surveys or general indices (Kahraman, 2002).

2.3 Concept of Escalation

Public institutions and organizations execute the construction projects by bidding and they prepare the contracts of construction projects in accordance with applicable laws in force. With the conclusion of the bidding, a contract is signed between clients and contractors based on a specified contract price. Therefore, the mentioned work in the contract should be constituted complied with the contract price by the contractor.

Clients and contractors can face a variety of risks in the execution phase of the contract. Price increase in construction materials comes at the beginning of these risks. In particular, fluctuations in the world financial and commodity markets can lead to major changes in the input costs. The economic crisis can be an example for this condition that it began in the last months of 2008 in the United States and influenced many countries around the world. For Turkey since 2008, large increases in input costs especially in the construction materials were observed and then it caused difficulties to perform many construction contracts that concluded under the Public Procurement Contracts Law. This condition caused huge losses of contracting companies, prevented the positive contribution of these companies to the country's economy and also caused the delay of execution of construction projects. In this

context, in order to ensure completion of the projects that tendered before 2008, the price increase risk between the contract price and implementation date price distributed between the parties of the contract in accordance with whether or not the price escalation clause is put into a contract (Oktar, 2014).

During the implementation of the Public Procurement Contracts, depending on the fluctuations in input cost, making an increase or a deduction in progress billings in accordance with certain rules is called an escalation/price adjustment calculation (İnan, 2009).

The principles of price escalation decree no. 2013/5217 which has been published in 2013; states that price adjustment will be constituted as addition or subtraction in payments according to these principles for construction projects. Price adjustment will be performed for the work progress percentage that executed according to the approved work schedule.

There are a variety of effects of rising prices to the construction of works, purchasing, and supply of goods or services. First of all, the subject of purchasement can be postponed, the scope of the contract can be narrowed or due to the lack of budget or fund, the project can be canceled altogether. As a further negative impact, in the case of the high volatility of the price, contractors fail to get the long-term price proposal from the subcontractors or suppliers. This condition causes disruptions in the procurement process of projects. In addition, companies concerned about the increase in input costs are reluctant to participate in tenders and this condition narrows the competition and can cause to a higher bid offer price (Gallagher and Riggs, 2006).

The most important factor in the emergence of the price difference is imperfect information about probable future values of prices and lack of the availability of reliable, precise information about prices. In the case of having full knowledge about future prices of construction inputs, the companies obviously will create bid price according to these prices (Skolnik and Faucett, 2011).

Thus, for the formation of perfect competition, the actors of the market are required to exactly achieve historical cost data, current cost, and information about the future cost of inputs. Fluctuations in input costs are complicating the execution of the construction works with prices that are assigned to the signed contract, so the presence of the company concerned in this case, prevents the formation of perfect competition (Mansfield, 1975). By applying the price adjustment to the contract prices and giving a guarantee to the companies on prices in the future, the requirement of firms to reach cost information in future is largely being eliminated and more competitive bidding may be carried out by price adjustment application.

In the construction contracts where there is not unforeseen price adjustments; all costs risk related to the price changes of construction materials is being undertaken by the contractors. The cost risk constitutes unfavorable conditions encountered in the production process, production stoppages, and strikes, facing unexpected changes in input prices or other unforeseen circumstances. Companies are faced with the risk of financial loss if they cannot control costs successfully. By the implementation of price adjustment, the price change risks related with works is transferred from contractors to employers. By this way, in response to the advantages provided to the contractor, expectations of employers regarding taking more appropriate tender offers are increasing (Arnoid et al., 2013).

In the case of preparation of the contracts without envisaging price adjustment payment due to the fluctuations in the material cost of construction work, in another word in the case of concluding contracts with fixed prices, two different cases may appear (Holman et al., 2008).

In the first case, while the works are performing according to the contract, there may be an increase in the price of construction inputs. In this situation, there may be a delay in completion of work or contractor may fall into dispute with subcontractors that signed a contract and contractor may have to cover the losses of the sub-contractors. In this case, the works can be either completed by a small amount of losses or these price changes may drag the contractor to bankruptcy.

In the second case, any increase in input prices may not occur and contract can be completed with the contract price as planned. In this condition, the risk premium that is added to the contractor's offers for the probable price fluctuations in the implementation of works will be counted as additional profits of contractors if contract prices do not change (Holman et al., 2008).

Some alternatives for managing price increases are shown in Figure 2.1. As it is shown in that figure, client/employer will not share or take a significant risk if price adjustment implementation is not placed in the contract. In this case, almost all risk is undertaken by the contractor. On the other hand, if there is a provision in the contract for price adjustment, thus most of the risk will be undertaken by client/employer (Holman et al., 2008).

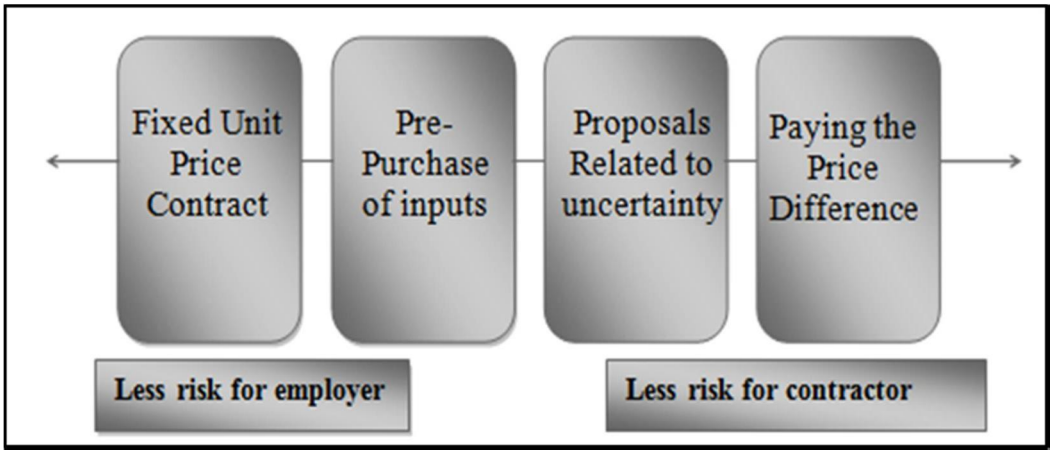

Figure 2.1 *Some alternatives related to managing price changes (Holman et al., 2008)*

One of the suggested methods to reduce the price change risk is the pre-purchase of inputs. In the case of the prior purchase of products with high price volatility such as steel, by this way, the price of the input will be kept constant for a certain time. At the same time, a new cost will emerge such as the cost of storage for pre-purchased inputs in appropriate conditions. Another alternative for price fluctuations is to add a price change risk premium into the bid price. Possible price increases in the future, as well as risk factors such as environmental factors, existing laws and regulations are being included in the bid price (Holman et al., 2008).

As stated under this title, there is a continuous debate among the project employers, engineers, contracting authorities, contractors and subcontractors about whether it is necessary to figure an escalation clause into the contract and what are the risks and benefits of escalation clause for all project parties not only in the implementation phase but also in the bidding phase. In the next topic, the cost and benefit aspect of price adjustment will be scrutinized.

2.4 Cost and Benefit of Escalation

In public procurements, charging the high price risks to the employer by paying price difference to contractors constitutes an opinion of imposing a financial burden and increase in public spending at first appearance. However, the comfortable behavior of bidders against price escalation causes more aggressive bids in tenders. Additionally, when economic realities are taken into account, while it is stated that in general an escalation payment is paid to contractors, however in the case of a decrease in input costs, a deduction is applied to payment certificate of contractors. Therefore, there is no certainty about price adjustment that in the implementation phase of a contract that includes a price adjustment provision, the project owner will pay to contractors due to the escalation and as a result of this condition, additional financial burden will be brought to the public budget (Oktar, 2014).

Another claim about the price adjustment implementation is that there is an existing increase of input costs only at financial crisis periods, inflation rates are taken under control considerably, therefore sustaining price adjustment implementation is unnecessary in this respect. It is thought that ending the price adjustment implementation will up cause problems in some aspects.

For example, labor is one of the main resources of construction projects. Even, it may be the most important input for some kind of projects such as superstructure projects. Consumer price index or in some countries minimum wage index are generally used to measure the price changes in labor cost. In most of the countries, the government determines the minimum wage that an employer has to pay to an employee. The amount of minimum wage is generally updated in every 6 months or a year. Most of the construction projects take time more than one year and the

minimum wage that contractor has to pay to construction workers will change while the project continues. In this condition not to pay an additional payment to the contractor due to change in minimum wages will not be fair and it is clear that the contractor will lose money. On the other hand, it would not be healthy that the contractor should prepare proposal by a kind of method that takes into account and predict the increase in minimum wages. Because contractors will not have knowledge of what will be the increase rate in the minimum wage for long-term projects. Therefore, in this case, the contractor will prepare an incomplete proposal and contractor will not fully reflect the minimum wage in the proposal. So regardless of the economic crisis, it is obvious that contractor will lose money by not applying any price adjustment for an expense that there is a steady increase in its costs (Oktar, 2014).

The argument that in many countries inflation rates were reduced to single digits so there is no reason to pay an escalation payment, cannot be considered as logical. For example, as it is known, steel is the most vital input for most of the construction projects. As it is stated before, escalation is somehow different from inflation and it is a function of various variables such as supply and demand imbalance etc. In last ten years, there has been a considerable increase in the commodity price index in the world due to the fact that there has been a rapid increase in the demand for commodities in developing countries such as China and India (Eruysal, 2014).

Corresponding to the increase in world steel production, the share of global iron ore consumption is increased nearly twofold in 10 years and China became the consumer of half of the total global iron ore alone. Again, China, which the production of iron does not meet the consumption of it, became the biggest iron importer with the share of 62% in iron import of world in 2012. In this respect, the demand of China is the most important factor that affects iron ore prices (Eruysal, 2014). As it is shown in Figure 2.2, iron/steel prices, that one of the most important inputs especially in construction projects, are considered as fluctuating due to global supply-demand balances independent from the domestic market, therefore obviously controlling inflation rates is not determinant for the change of input prices. Addition to iron/steel inputs, petroleum products can be also examples in this respect.

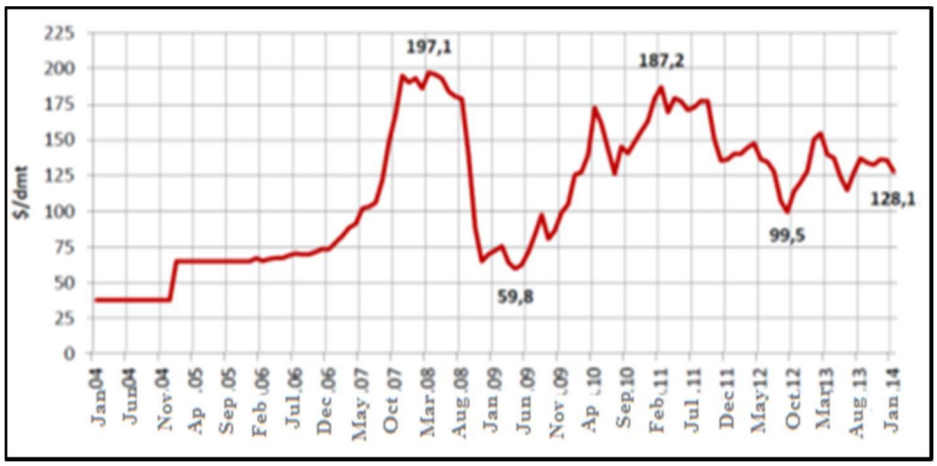

Figure 2.2 *Iron ore prices in between 2004-2014 (Eruysal, 2014)*

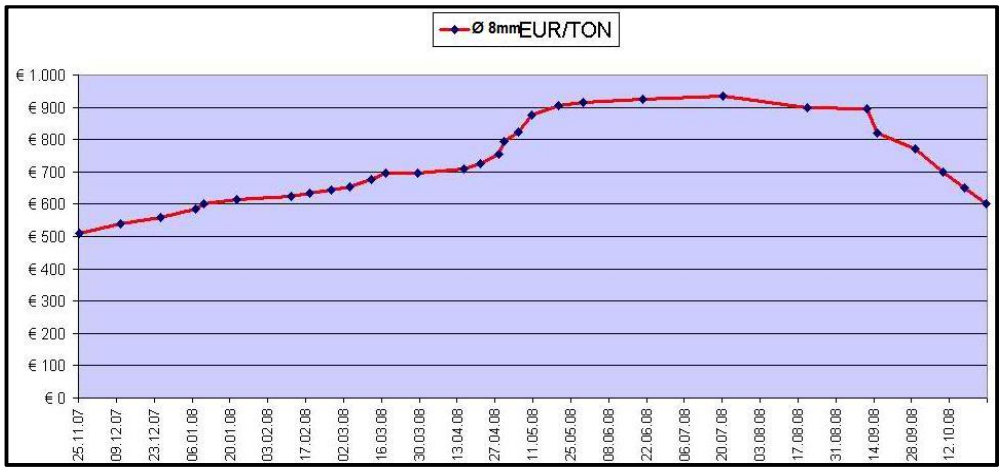

Figure 2.3 *Ø 8 mm steel bar prices in between 2007-2008 in Turkey (www.hisse.net)*

There is not a comprehensive study about cost and benefits of price adjustment applications in the literature. However, Dikbaş (1991) performed a study on this topic. Dikbaş conducted a survey that 29 private contracting firms are involved and the choice is demanded through 37 different factors thought to be decisive in decisions in bidding and effective in bid prices. In this survey, the size of the firms and the interrelations of them are taken into account.

Table 2.1 *Top ten factors affecting the bid decision and price (Dikbaş, 1991)*

Order of Importance	Factor Description	Importance Level (%)
1	Progress Payment Conditions	87
2	Reliability of the Entrepreneur	83
3	**Provisions of Price Adjustment**	**77**
4	Amount of Advance Payment and Repayment Terms	76
5	**Inflation**	**74**
6	Size and Type of Work	71
7	Work Experience	71
8	Acquision Terms	70
9	Continuity of Work	69
10	Offer Terms	68

When Table 2.1 is probed, it is seen that the regulations and provisions related to the price adjustment considerably affect the decision of companies giving or not giving a proposal to a tender. Moreover, in the fifth list of the table, "Inflation" is placed. It is observed that regarding the most important factor in paying price difference issue is an increase in input costs, therefore inflation, inflation factor can be taken into account with price difference together, thereby firms bid considering the inflation factor.

The most comprehensive study on this area outside of Turkey is generally carried by considering the construction works done by The State Transportation Department of United States. In this regard, with the collaboration of Texas State Transportation Department and USA Federal Highway Administration, this kind of study is conducted to specify the methods for the deducements in highway project costs and a report is prepared by Damnjanovic et al. (2009). Separate state departments contributed in this study. In this scope, to decrease the project costs, project-based 35, program-based 21 and total of 56 suggestions are proposed. As it is shown in Table 2.2, in the 8th list of program-based suggestions of ensuring the decrease in project costs, "including the price adjustment implementations in the long-term project contracts" is placed. Under favour of price adjustment implementation,

tenders stay low amount of prices, in another word, the risks premiums that contracting authority has to pay is reduced by price adjustment implementation.

Table 2.2 *Top ten most accepted program-based advice to reduce project cost (Damnjanovic et al., 2009)*

Rank	Method	Score(out of 4.00)
1	Standardize designs and provide more design repetition.	2.21
2	Educate and train designers, consultants, and contractors.	2.21
3	Evaluate restrictions on imported materials.	2.04
4	Create material sources by TxDOT.	2.04
5	Evaluate local market condition for availability of resources to effectively plan construction lettings.	2
6	Implement formal risk identification and management program.	1.96
7	Utilize owner buying power.	1.92
8	**Add price adjustment clause to contracts.**	**1.83**
9	Cross-district sharing of lessons learned.	1.63
10	State-owned batch plants and crews for small and isolated jobs.	1.58

Another important study for the results of the price adjustment implementations is carried by the US Transportation Research Board. 50 states of US Transportation Departments are included within the scope of the work and all of the state departments contributed to it, also 400 contractors are included into the survey and one-fourth of the firms replied to them. They concluded that, as it is shown in Table 2.3, price adjustment implementation mostly lead to obtaining low bid price. Additionally, it showed that the Engineers spend 86 hours a month per contract on average administering the adjustment provision (Skolnik and Faucett, 2011).

Table 2.3 *Benefits of price adjustment in terms of bid price (Skolnik and Faucett, 2011)*

Answer Options	No Benefit	Small Benefit	Significant Benefit
Increased Number of Bidders	35.60%	40.00%	24.40%
More Contractor Stability	21.70%	21.70%	56.50%
Better Pricing	4.30%	17.40%	78.20%
Fewer Bid Retractions	88.10%	9.50%	2.40%

Table 2.4 *Benefits of price adjustment in terms of cost component (Skolnik and Faucett, 2011)*

Answer Options	No Benefit	Small Benefit	Significant Benefit	No Index
Fuel	0.00%	20.00%	60.00%	20.00%
Liquid Asphalt	0.00%	17.40%	63.10%	19.60%
Cement	2.40%	2.40%	4.80%	90.50%
Steel	0.00%	25.00%	13.70%	61.40%

As it is shown in Table 2.4, implementing price adjustment on fuel and asphalt as cost components creates a big amount of returns. On the other hand, the return of the price adjustment of cement and steel is not significant; therefore price adjustment implementation is not applied in these cost components.

Another study on this topic is conducted by Kosmopoulou and Xueqi, 2014. This study has a particular importance due to being empirical and depending on the objective inputs. The research topic is specified as Oklahoma Transportation Department which is the employer is paying price differences to petroleum-based construction materials since 2006. This department is chosen due to being the first state transportation department which pays the price difference. According to the empirical study, procurement between 2003 and 2009 data is used. As a conclusion, low bid prices are observed when price risks of firms are decreased. Therefore, in the eligible projects when the price adjustment implementation is constituted, 5% low bid prices are obtained. In terms of work items, in the eligible items, 12.7% low bids are observed compared to the other types of items. As a conclusion, between the initial period of price adjustment implementation, 2006 and 2009, 22 Million US Dollar savings are achieved (Kosmopoulou and Xueqi, 2014).

CHAPTER 3

ESCALATION CLAUSE PARAMETERS IN CONSTRUCTION CONTRACTS

3.1 Introduction

The construction sector has been challenged with the rise of construction delivery costs which in some cases do not tally with the budgeted ones owing to the continuous and unpredictable change of the macroeconomic environment. Due to the enormous rise in construction materials, escalation clauses have been developed for construction contracts to provide for the optimal recovery of cost changes. Afterward, various forms of escalation clauses have been developed and revised from time to time (Ndihokubwayo and Haupt, 2009).

Indeed, the inflation rate was low until the 1970s and most of the contractors were able to bear the cost escalation. They prepared their tenders by accepting and taking the risk of an increase in the cost of construction materials. On the other hand, as a result of the world petroleum crisis in the 1970s, most of the prices started rising in an incalculable manner. Due to the enormous price increases, it was not logical to sign a construction contract in a fixed base manner because contractors were at risk regarding the recovery of profit. Unlike the 1970s, contractors could not bear the cost escalation alone anymore and escalation clauses have begun to appear into the construction contracts in which all or most of the cost increases have been compensated by clients since the date of bidding. Thenceforth various types of escalation methods for compensation of cost changes have been formed (Ndihokubwayo and Haupt, 2009).

As an example, escalation formula which was formed by Cran in 1976 was very simple and practical which had just two parameters:

$$(Index)_{Cran} = 7.0 * I_{Labor} + 3.0 * I_{Steel} \qquad (3.1)$$

Where;

I_{Labor} is the labor price index and

I_{Steel} is the steel price index

After introducing of the escalation clauses in the construction contract, various different formulas, and different provisions were formed by government agencies and clients. Additionally, as it can be seen from the Cran simple formula, a new debate began such that what kind of inputs or materials should be compensated and how the price changes will be calculated. Is it appropriate to use indices such as Consumer Price Index or Wholesale Price Index to calculate price changes, or is it appropriate to measure the price changes based on actual price changes such as invoice method. In addition, whether there will be a risk shared between client and contractor and percentage of risk sharing etc. have been argued.

In fact, construction projects are unique and they are different from each other in many ways such as construction site and location of project, type of project, the countries local conditions, the macroeconomic trends in the world, and local regulations of each country etc. Therefore there is not an absolute and only escalation formula that can compensate the material price changes in all conditions. However, with the time and experience, most of the escalation clauses have shared common points. In this chapter, the basic parameters of escalation clauses are discussed with examples from different countries applications.

3.2 Global Examples Related to Price Adjustment System in World

First of all, considering United States escalation applications, price adjustment provisions are mostly important for Transportation project contracts because the main construction materials used in transportation projects are petroleum and asphalt that price fluctuations of asphalt and petroleum products are high. Therefore, 47 state

Departments of Transportation have used escalation clause in their construction contract and escalation provisions of 85% of these states are related to the price adjustment of liquid asphalt and fuel. Roughly, 75% of all contracts that are signed by these states in each year include an escalation clause and regulation. Adjustment parameters and provisions of escalation clause are mostly determined based on the formal regulations such as United States Department of Transportation's Technical Advisory 158 (Seneviratne, 2013).

Queensland Department of Main Roads and government legislation in Australia let the application of escalation clause for the construction contract. Price adjustment (rise and fall) is performed according to the specified formula for the construction contracts that take time 365 days or more. Road and Bridge Construction Index published by Australian Bureau of Statistics is used as a basis for calculation of price adjustment. In Australia, 85% of the value of material or a work item is adjusted (Seneviratne, 2013).

In the United Kingdom, indices used in price adjustment and formulas are published by Building Cost Information Service and it presents guidance on their use.

Since 2008, Hong Kong government has adopted an escalation policy that it provides adjustment for materials and labor price changes in all public construction projects of any duration. Indeed previously price adjustment was performed for the construction contracts that take more than 17 months. After 2008 due to the sharp increase in raw materials in all over the world, they have made studies, panels, interviews and surveys with different parties then they have realized that 61% of the tenderers were small companies who cannot bear the price changes, and most of them probably experience cash flow problems when prices increases. Therefore they have made changes in provisions of escalation regulation. The indices used in price adjustment for materials and labor are monthly published by Census and Statistics Department of Hong. The escalation formula that is used in Hong Kong is similar to the Building Cost Information Service formula (Seneviratne, 2013).

In India, different government agencies such as Central Public Works Department, Military Engineer Services, Airports Authority of India, Tamil Nadu Public Works

Department etc. have used different escalation formulas. For instance, Central Public Works Department categorized the projects according to their construction period to apply price adjustment such that project completion time is less than 6 months, between 0 and 18 months and more than 18 months. According to the duration of each construction project, different escalation formula and provisions are formed. For example for projects shorter than 6 months, price adjustment is performed only for labor and material on the other hand, for projects longer than 18 months price adjustment is performed for cement, formwork, labor, steel. In addition, different escalation formulas have been used by different agencies because government agencies have carried out different construction projects (Kalidindi et al., 2011).

In Pakistan, Engineering Council is the formal and authorized body to make regulations related to the engineering profession. It has published guidelines related to escalation provisions and all public works contracts' escalation provisions have been prepared according to its publications and guides. On the other hand, clients and tenderers can determine the coefficients for inputs and determine cost elements for compensation up to some points (Seneviratne, 2013).

There is a comprehensive guide for designing the structure of escalation clause in construction contracts in the Philippines. The Government Procurement Reform Act includes 52 formulas for different work items such as formulas for earthwork, rock excavation, structural backfill, asphaltic materials, concrete structures etc. In these formulas, different coefficients and inputs have been determined based on the types of work items (Seneviratne, 2013).

FIDIC includes price escalation clause 13.8 in Red Book. Most of the development banks use the FIDIC formula for price adjustment in their projects. Most of the developing countries also have legislation for terms of price adjustment to be followed even when FIDIC is used. However, guidelines of these countries are just in the form of rules that make price adjustment mandatory-no instructions on how to construct the escalation clause.

For example, Vietnam Ministry of Construction issued a regulation which specified the FIDIC multi development bank formula for price adjustment since 2010 but this

regulation actually does not specify the parameters and thresholds. Construction Training and Development Institution in Sri Lanka have specified a formula similar to the FIDIC multi development bank for different work items, however, the guidelines related to price adjustment actually are not helpful and user-friendly for clients and tenderers (Seneviratne, 2013).

The effects of escalation parameters such as inputs, indices, calculation method etc. on contract price and the sensitivity of contract price to these parameters are not widely reported. Seneviratne (2013) conducted a study to figure out the effects of parameters in the formula to the Final Contract Price. In this study, it was found that some parameters do not have a considerable impact on final contract price such as non-adjustable portion but some of them have a considerable impact on final contract price such as start date of adjustment. Details of this study are given in Literature Review chapter.

3.3 Adjustment Parameters

A typical escalation clause should define the conditions, the methods, and the terms of price adjustment. These are timing (base date, start date, and periodicity), trigger and cap values (i.e. limit on the price changes that up to this point contractors cannot claim adjustments), value or the amount of work that is going to be adjusted, and the calculation method. Contracting authorities should also determine a criterion to calculate completed construction amounts for adjustment (i.e. actual construction rate or scheduled construction rate), and computation method to calculate the price changes (i.e. index, invoices or a hybrid of these is used for calculation). Therefore, contracting authorities or the parties should be aware of the nature and structure of work, economic and other conditions in order to prepare the conditions, terms, timing and any other parameters of clause appropriately.

Considering the FIDIC formula that is either directly used for many countries or used as a basis for escalation formula, the form is:

$$\mathbf{Pn = a + b(Ln/\ Lo) + c(En/Eo) + d(Mn/Mo) +} \qquad (3.2)$$

Where:

Pn : It is adjustment multiplier to be applied to the contract value of the related currency of the work carried out in period "n", if not otherwise specified in the Contract Data, this period will be a month.

a : It is a fixed coefficient, specified in the contract, standing for the non-adjustable part of contractual payments.

b, c, d, etc. : coefficients indicating the estimated weight of every cost element related to the implementation of the Works, as specified in the contract; they represent the inputs such as labor, cement, materials etc.

Ln, En, Mn, etc. : They are the present cost/price indices or reference prices for period "n", and they are applied to the related cost elements.

Lo, Eo, Mo, etc. : They are the base cost/price indices or base reference prices, and they are applied to the related cost elements on the Base Date.

The contracting parties can state either one formula for escalating the total value of all the works that is completed in a given period or they can state different formulas for the different work packages. After deciding the formula, contracting parties should determine the parameters of formula such as the non-adjustable portion, coefficients of cost element, indices or reference prices etc. In FIDIC, the Base Date for Mo, Eo, Lo, etc. is stated as 28 days before the last day of submission of tender. Mostly, clients state the parameters of escalation formula but if they are not stated, every bidder has to propose their b, c, d values and other parameters. The applicable frequency of price adjustment is a month but this is default so the client can change the periodicity of adjustment such as three months. All of these data related to the adjustment clause are stated in the “adjustment data table” and also the particular conditions of contract in the tender document (Seneviratne, 2013).

According to different countries procurement guidelines, the price adjustment provision is put in contracts according to the project duration. Some government agencies put the adjustment clause in their construction contracts regardless of the project duration and some multi development banks contracts include the adjustment clause for a project that takes more than 18 months (Seneviratne, 2013).

After the decision for putting the price difference clause into the contract, clients and tenderers have to state the following terms, parameters, and conditions of escalation clause:

- ✓ Base date and Start Date
- ✓ Triggers and caps
- ✓ The non-adjustable portion (a);
- ✓ Cost elements (L, M, N, etc.)
- ✓ Weightings of the cost elements (b, c, d, ...)
- ✓ The source of the indices or reference prices for L, M, N, ...
- ✓ Computation method (formula for calculation)
- ✓ Computation of work rate for adjustment (scheduled or actual construction rate)
- ✓ Minimum elapsed period for escalation

Actually, especially in developing countries clients do not have enough experience about the preparation of adjustment clause. Moreover, the formal guidance in these countries generally is not explanatory and helpful. Therefore designing an adjustment clause becomes challenging for these owners. They are mostly dipping into the FIDIC seminars, textbooks or they just put the standard FIDIC Clause into the contract without investigating the provisions in detail. The parameters that are listed above are explained in below:

Base Date: The default Base Date in FIDIC is stated as 28 days before the last day of submission of tender. The default Base Date in escalation decree in Turkey is not expressed as day; it was stated as the month before the last date of submission of tender. Afterward it is changed in 2013 as that base date is the last month of the

submission of tender. According to the contract conditions, Base Date can be determined as different from default date. An example for this condition is that a project funded by Asian Development Bank in Afghanistan in 2011. Duration of this project was 48 month and in this project, the default start date is counted from the first day of the 25th month or 692 days after the Commencement Date. The same bank funded a project in Armenia in which the default base date is counted before the start of the 18th month (Seneviratne, 2013).

Start Date: This is the date of the first adjustment period. Start Date is stated as Commencement Date in FIDIC and Turkey escalation decree. On the other hand, in the Philippines Start Date is stated as six months after the signing the contract. In the Afghanistan contract mentioned above, the first adjustment period initiated on the date 24 months after the Commencement Date. Actually, there can be various reasons for the determination of start date different from the Commencement Date. One of them is to discourage unrealistically low bids from candidate firms because they can expect to delay the works and benefit from rising prices. Additionally, the structure and nature of the work are important for specifying the Start Date. For example, in transportation projects, the first work that has to be executed is generally expropriation and the last work items that executed are electro-mechanic works, signals and pavement works. In this type of projects, the Start Date can be stated as separate for pavement works and other works. For pavement works, Start Date can be determined according to the work schedule. An example for this condition is that a project funded by Asian Development Bank in Tajikistan in 2011. The Start Date for asphalt works adjustments was stated as 12 months after the Beginning Date of the project (Seneviratne, 2013).

Linking the base date to either start date or commencement date instead of tender submission date is risky for tenderers because commencement date and start date are dependent on the preceding approval stages and conditions that must be fulfilled. Therefore due to this uncertainty, tenderers can add a risk premium to their offers and this condition may undermine the logic and the benefit of escalation clause.

Triggers and caps: Indeed most of the clients and contractors are not aware of the triggers and caps because many standard contracts do not state any triggers and caps value. Actually, a triggers value is determined for escalation clause of construction contracts that they are executed in stable economic condition. Triggers value can be expressed as that it is a minimum price increase level that enables for a contractor to request a price adjustment. The important point is that what will be the rate or the appropriate level of price changes for adjustment. In the Philippines, there is a technical and legal threshold for price adjustment, starting six months after the date of the contract. The technical thresholds are either more than 10% increase in the related index if there is not historical data or 2 standard deviations from the thirty-month mean of the related price index. In Japan, minimum price increase that enables for a contractor to request a price adjustment is set as 1.5%. If the increases in prices are more than 3% in any period, Oklahoma DOT has preferred to allow price adjustment payment. Generally, the aid financed and multi development bank contracts do not contain threshold-based adjustment clause. Most of the clients avoid putting a triggers value in the provision of escalation clause due to the cost of monitoring and administering of the adjustment provisions (Seneviratne, 2013).

Cost Elements: One of the most important points in escalation clause is the determination of inputs elements that adjustment will be made. When considering the Cran (1976) formula, the labor and steel were determined as cost elements. FIDIC determines the equipment, labor, and materials, as possible cost elements. However formulation of FIDIC affords the opportunity to the parties to put additional cost inputs to the adjustment formula. In Turkey, escalation decree states the cement, steel, formwork, fuel, other construction materials and equipment amortization as cost elements for all type of public construction projects. In India, cost elements are determined according to the project duration such that for projects shorter than 6 months, price adjustment is performed only for labor and material on the other hand, for projects longer than 18 months price adjustment is performed for cement, formwork, labor, and steel. Actually, the cost elements that price adjustment will be performed should be determined according to the nature, type, and the work package of the project. In Pakistan, to determine the cost elements several steps has described

for users to follow and the Philippines describes the cost elements for each of the 52 work items (Seneviratne, 2013).

Weightings: Another important point in escalation clause is the determination of the weight of cost elements. Indeed either client can determine the weight of cost elements into the contract or it can require the bidders to determine and offer them into their proposal. The determination of the weights of each cost element takes time but it is necessary to have a fair and useful adjustment clause. When considering the escalation decree in Turkey, it required for the contracting authority to determine the weight of cost elements according to the nature of work. There is a detailed price adjustment formula in Turkey which is formed based on the determination of cost element weight. On the other hand, if the contracting authority cannot determine weights of cost element, a simple formula is used for adjustment. In this condition, General Index (i.e. average of Domestic Produced Price Index) has to be used in adjustment of work value. New Zealand's Transport Agency has determined cost element weights for five types of road works. In India, clients tend to determine some of the cost element weights and leave the others to be proposed by the candidate of tenders. Indeed there is a risk in leaving the determination of cost element weights to tenderers. They generally assign a higher weight to the most volatile element and zero to the least volatile element if there is no requirement that bidders have to attach the cost composition to the owner. In Indian bidders determine the weights in their offer but also they define and attach their cost composition.

Non-Adjustable Portion: This can be defined as the risk sharing between clients and contractors due to changes in construction materials. It can also be viewed as overheads and profits that deemed to be unaffected by inflation. There are different perspectives on the appropriate value of “non-adjustable portion” depending on whether it is considered the contractor's risk or its profit. When considering the escalation decree in Turkey, it is set as 10 %. In Turkey, Unit Prices for construction work items are published by government agencies. In Unit Prices, the overhead cost has been assumed as 15% and profit of contractor has been assumed as %10 of the cost of work items. Therefore, non-adjustable portion in escalation decree may be

viewed as profits of the contractor in Turkey. In the UK, the BCIS has fixed the "non-adjustable portion" as 10% for highway maintenance works. India, South Africa, and the Philippines have set non-adjustable portion as 15%, but Pakistan has set upper and lower bounds for non-adjustable portion as 35% and 65% respectively. The nonadjustable value used by multi development bank funded project changes between 10-55% according to the location and type of project (Seneviratne, 2013).

Index and Price Sources: One of the most important points in designing escalation clause is the determination of cost/price index or reference prices that will be used to measure the price changes. Various cost/price indices have been published by Statistics Institutions of countries. Mostly Consumer Price Index, Wholesale Price Index, Producer Price Index have been used to measure the price changes. On the other hand, construction cost indices have been developed to measure the price changes in construction materials in recent years. In some countries, several construction cost indices have been published to measure price changes based on the type of construction projects such as Building Cost Index, Road Construction Cost Index. Even in some countries, local price indices or locational factors to represent the price changes locally have been developed and published. For example, Construction Cost Index has been releasing for six major regions in India. Local Price Indices has been releasing in Ghana to measure price changes locally (Asumadu, 2013). One of the reasons behind developing construction cost index is that Wholesale Price Index or Producer Price Index consist of many inputs which of them are irrelevant with construction resources. Therefore, Wholesale Price Index or Producer Price Index does not reflect the actual price changes in construction materials truly. It is beneficial to use such kinds of construction cost indices in price adjustment. On the other hand, it is important to note that, if the price adjustment will be calculated by using construction cost indices; these indices should be reliable, relevant to the project, easily accessible and published in a regular manner (Yadav et al., 2011).

Another important point related to the cost/price index parameter of escalation clause is that some of the escalation clauses do not state an additional provision for price adjustment of imported goods or materials (Yadav et al., 2011). In other words,

general provisions have been also implemented for these imported materials and domestic price indices have been used to measure the price changes taking place in these materials. For example in a hydraulic power plant project constructed in Turkey, it is not logical to perform price adjustment for a turbine machine that is imported from abroad by using Domestic Producer Price Index.

The recommended method for these types of conditions is that if it is required to import special materials in the scope of the construction project, client or tenderers should determine either an official source-country index or a global index if available. On the other hand, if reliable and relevant index is not available, invoice prices should be used for price adjustment.

When applications of different countries are considered, Domestic Producer Price Index has been taken as a reference index to perform price adjustment in Turkey. There is not any provision related to the price adjustment of imported materials such that domestic indices have been used to measure price changes taking place in these materials. Additionally, escalation decree states that it is mandatory to use Domestic Producer Price Index for price adjustment, and escalation decree has not allowed clients to ask bidders to propose an index for imported materials and it also has not allowed clients to use invoice prices for price adjustment. In FIDIC multi development bank contracts, the client can require bidders to use national sources or ask them to propose sources. Tenderers can propose a national index or a global index or official host country index for imported material. However, this index has to be reliable, relevant, easily accessible and published in a regular manner. In fact, regular publication of index is a very crucial issue for the administration of adjustment clause. Late publication of index will increase the engineer's workload because adjustment has to be performed twice in this condition such that a calculation will be made based on interim data and subsequently when data is available another calculation will be made based on later data. It is important to note that continuity in the publication of index another important point so that contracting parties should be aware of this issue and it will be beneficial to determine an alternative index against the risk of discontinuity in the case of using the index for imported materials in escalation clause. Countries such as the UK and New Zealand

ensure for using alternative national sources if the used index is discontinued (Choi et al., 2006).

Computation method (formula for calculation): Clients should state computation method for price adjustment in the preparation of escalation clause. In some of the countries, it has been allowed clients to use FIDIC or World Bank standard formula to perform price adjustment. On the other hand, government agencies have developed escalation formula, and it has been obligatory to use these specified formulas to perform the price adjustment in some of the countries. Turkey and India can be given as an example for this condition. Additionally, client can determine different formulas for the different parts of work to perform price adjustment. The Philippines has determined 52 formulas for different work items such as formulas for earthwork, rock excavation, structural backfill etc.

Actually, it is beneficial to mention about the measuring methods of price changes. It is stated in literature that there are three methods for measuring the price changes taking place in a construction material which are invoice method, index method, and a hybrid of these two methods. In invoice method, contractors submit an invoice form or a certificate that are provided by supplier to the client to show the current market price of any products. Price changes in this product is measured such that difference between the present invoice price and contract date invoice price. Indeed, the invoice method is the most simple and accurate method in its pure form. However, client should control that the materials purchased were actually integrated into the project. Additionally, client also should control the truth of the value of invoice to discourage fraud. If it will be allowed to use invoice method to perform price adjustment, client should state the provisions of method in escalation clause before tender. In fact, invoice method measure price changes more accurately, but this method may open the door to manipulation of the price adjustment such that tenderers may lower the prices intentionally to win the tender, and then they may request adjustment payment based on unrealistic bid prices. Therefore clients should prepare the provisions of escalation clause taking into account these types of conditions. A precaution example for invoice method may be given that tender

discount rate of contractors may be applied to the price adjustment payment (Ndihokubwayo and Haupt, 2009).

Another method for measuring the price changes taking place in a construction material is the index method. This method is widely used to perform price adjustment. Index numbers measure relative price changes from one time period to another. In fact, this method recovers the client from the control of invoices values and other possible tricky behavior of contractor but indices may underestimate or overestimate the price changes in the market because it is not always possible to find an index that actually reflects all the materials used for the construction of the project.

In addition to this, most of the escalation formulas provide price adjustment for main construction materials such as steel, cement, labor etc. and they determine indices related to these materials. On the other hand, when it is required to use special materials other than stated in escalation formula, indices specified in formula may not truly reflect the price changes taking place in these materials. Indices are calculated on a country basis therefore they may not sufficiently take into account local cost variations. They may be appropriate for large cities but they may not appropriately reflect the cost changes in rural areas.

Third method for measuring the price changes in price adjustment is using combinations of the invoice and index method which called the hybrid method. In this method, price adjustment can be performed for some of the construction materials by using escalation formula and indices; on the other hand changes in price of special materials can be adjusted based on invoice method. Hybrid method indeed centered on a certified bid cost which means in the beginning of tender, the contractor should certificate its cost estimate for a specific product according to its present supplier price. In the implementation phase, the price adjustment can be performed according to the tender date price and present market price for this specific product (Ndihokubwayo and Haupt, 2009).

Computation of work rate for adjustment (scheduled or actual construction rate): The client should determine which rate or work value will be taken into account in

the computation of price adjustment in the preparation of escalation clause such that scheduled progress rate or actual progress rate. In Turkey, the work that is executed according to the approved schedule is taken into account as a work rate.

Minimum elapsed period for escalation: The client should determine a minimum elapsed time for adjustment that contractor can request price adjustment payment from the commencement date or from the previous adjustment date. Actually, when the elapsed period is determined, the budgeting and accounting systems of the public projects, publishing periods of indices and the general price movements should be considered. In FIDIC and Turkey, the minimum elapsed period for adjustment is stated as one month, on the other hand it is stated as 90 days in Korea and 6 months in the Philippines and a year in Japan. But in Japan if there is a sudden increase in cost of materials client can make a partial adjustment (Choi et al., 2006).

3.4 Adjustment Parameter Selection

It can be inferred from the various countries applications, regulations, and guidelines mentioned in this chapter that it is very crucial to take into account leading economic conditions, structure and type of the construction project, when determining the parameters and provisions of escalation clause. On the other hand, design of escalation clause in most of the construction contracts is still an ad hoc process driven by partially clients. Seneviratne (2013) stated that there is a large spread in the parameter values of escalation clause of construction contracts that were executed under Asian Development Bank even in the same country in the same time period. Actually, this situation is not different in Turkey and also in many countries. This condition presents that most of the clients and contractors are not aware of the importance of designing the escalation clause. They have not enough experience and not get sufficient emphasis on escalation clause. Indeed, this is due to the lack of apparent and directive guidance and information related to the escalation clause.

It is undeniable fact that construction material costs are at risk of fluctuation between the tender date and implementation time of project. An escalation clause based on wrong assumptions can be worthless to both the client and the contractor. It is very crucial designing the escalation clause appropriately because it minimizes risks not

only for contractors but also for clients. Appropriate designing of escalation clause also can enable reducing disputes among contracting parties. Therefore, contracting parties should use their knowledge as well as analytical tools to formalize and improve the price escalation system to carry out the construction projects successfully (Seneviratne, 2013).

CHAPTER 4

LITERATURE REVIEW ON PRICE ADJUSTMENT AND ESCALATION CLAUSES

4.1 Studies Related with Thesis Subject

Price changes in construction materials are an important issue not only for implementation phase but also the pre-tender phase of construction projects. Therefore many studies have been conducted related to price changes in the construction industry. However, in connection with the aims of this thesis study, researcher studies are grouped as following and for each group, one or two related studies are summarized here.

a) Studies that aim to check the suitability of using indices such as Consumer Price Index, Wholesale Price Index, Producer Price Index, Construction Cost Index etc. in determining of cost changes in construction materials. These indices are generally used for calculation of escalation payment. In addition, construction projects are unique and each of them has a unique set of construction resources. To make an estimation for changes in the cost of construction projects, many studies have conducted to form various cost indices.

b) Studies that aim to estimate the probable future values of cost indices by various methods. Actually, accurate estimation of future values of cost indices is important for both clients and contractors. Clients of construction projects can use this useful information to make more accurate budget planning and also it may be beneficial for clients in preparation of provisions of escalation clause. On the other

hand, contractors can use this useful information to prepare an appropriate tender offer.

c) Studies that aim to find out the effects of escalation clause parameters such as start date, non-adjustable portion etc. on the Final Contract Price. In another word, these studies try to find out the sensitivity of Final Contract price to the adjustment parameters. This analysis generally was done by using Monte Carlo Simulations

d) Studies that analyze the currently used escalation clause in a given country such as India, Korea, Pakistan. In these studies, firstly, authors investigate the current price adjustment system and then find out the problems or controversial issues related to the adjustment system and finally authors try to form suggestions to improve the adjustment system.

Kahraman (2005) have carried out a study on determination of a price index for escalation of building construction costs in Turkey. The aims of the study was to compare the cost indices (existing cost indices such as Consumer Price Index (CPI), Producer Price Index (PPI), Building Construction Cost Index (BCCI) and Cost Index (CI) as well as alternative Cost Indices produced by Kahraman) in terms of their adequacy for the representation of variations in the building costs in Turkey. In addition, it was aimed to develop models to predict the future values of the most precise two cost indices selected to assist for cost estimating of the building projects.

To create alternative cost indices, data was taken from completed 23 building project. The data to form Cost Indices consisted of total cost of projects, detailed bill of quantities and cost of work items, and contract date of the project. Kahraman (2005) developed four indices to represent the price variations in building construction cost in Turkey. Indices were developed similar ways but the inputs that used as variables to form the produced index varied such that steel, concrete, and formworks were taken as inputs to form first index $PBPI_1$, on the other hand, paint, polish and insulation materials, glazing materials and door and window metal parts were taken as inputs to form fourth index $PBPI_4$. After creating four different

produced indices, the adequacy of the indices in representing the building costs was examined using regression analysis in which the subject price indices were used as independent variables and unit cost of the projects as dependent variables. As a result of regression analysis, it was found that BCCI and $PBPI_4$ indices are adequate among the other indices in terms of representation of the variations in building construction costs for the civil works.

After determination of the BCCI and $PBPI_4$ as most adequate indices, Kahraman (2005) conduct linear and nonlinear regression analysis to predict the future values of these indices. After making required analysis, the prediction performances of the constructed regression analyses were compared and two indices were selected as the most influential which are $PBPI_4$, and BCCI.

As a conclusion, there are two important issues to be drawn from this study. First, the main parameters that are required to create cost indices for the representation of variations in the building costs in Turkey are; unit rate (price) published by public agencies, detailed bill of quantities of construction projects prepared before tender by public agencies, cost of work items, and total cost of projects. All of these types of data related to the public construction project are available at the contracting authorities. Therefore, besides building projects, the cost indices for different types of construction projects, such as industrial plants, highways, dams and power plants, pipelines, etc., can also be developed by using the data about the past costs of such projects and can be used to represent the cost changes of the projects.

Second, it can be inferred from the conclusion of this study that, BCCI and $PBPI_4$ and can be used adequately for representing building cost variations in Turkey. By using these indices, one shall achieve more accurate results when escalating the cost of a building project. In addition, the predicted values of these indices will provide more precise results to estimate the future cost of a building project. More accurate estimations shall enable contractors to prepare a more reliable tender offer for public projects. Furthermore, contracting authorities shall also prepare appropriate escalation clause based on the predicted values of selected price indices.

Kibar (2007) have studied predicting changes in construction cost indices using Time Series Analysis. The selected cost indices for this study are BCCI for Turkey (building construction cost index published by TURKSTAT in quarterly basis), and BCI for USA (building cost index published by Engineering News Record, ENR, in monthly basis). In this study, regression analysis, time series analysis, and simple averaging method analysis have been done separately for BCCI and BCI. Actually, regression analysis and simple averaging method analysis have been used to compare the forecasting model that is developed based on time series analysis in terms of predictive accuracy. As a result, time series models were selected as the most accurate models in predicting cost indices for both Turkey and the United States. In this study, quarterly BCCI data from 1991 to 2003 was used as an input variable to forecast the future values of BCCI between 2004 1^{st} to 2005 4^{th}. The result of this study shows that future values of building construction cost indices can be predicted adequate precision using time series models. In fact, construction cost indices provide a comparison of cost changes from period to period for a fixed quantity of goods or services. Therefore, cost index forecast is crucial for the two main parties of the construction industry, contractor, and the client. Forecast information can be used in tender process in the estimation of project costs, which is one of the critical factors affecting the overall success of a construction project. Better cost estimates shall enable contractors to produce cash flow forecasts more accurately. In addition, this information can be used to increase the accuracy of estimate for the project cost to evaluate the bid price. Furthermore, contracting authorities shall also prepare appropriate escalation clause based on the predicted values of selected price indices.

Seneviratne (2013) has conducted a study on the costs and benefits of the price escalation clause in FIDIC multi development bank**.** Clients and contractors have been interested in the price escalation clause in construction contracts. Actually, the first question for the client is that it is necessary to put an escalation clause in contracts. If it is, how the clause should be designed such that what is the optimum values of escalation clauses parameters: start date, base date, source of price or index, weight of cost elements, how these parameters should be determined and which party (client or contractor) should determine which parameters and so on.

Another question for the client is that if the price adjustment is not awarded, how this condition can affect the bidding behavior of contractor. On the other hand, escalation clause is also important for contractors such that they prepare tender offer according to the cost of construction materials. Escalation clause is a guaranteed tool for contractors such that if a contractor knows at the bidding stage that material cost will be periodically indexed, he will have less of a need to add a premium to the bid price for possible cost increases during construction. Therefore, an escalation clause based on wrong assumptions can be worthy to both the contractor and the owner. Project owners and contractors should use their knowledge as well as analytical tools to improve and formalize the adjustment clause provisions.

Seneviratne (2013) focused on the selection of adjustment parameter to design an appropriate escalation clause. Monte Carlo simulation was used to test the sensitivity of the final Contract Price to different adjustment parameters under different economic scenarios. Provisions of escalation clause in FIDIC for multilateral development banks are taken as a basis in this study. Selected adjustment parameters for this study are start date and non-adjustable portion. The basic inputs to simulation model are shown in Table 4.1.

Table 4.1 *Basic inputs to simulation model (Seneviratne, 2013)*

Input	Value
Accepted Contract Amount	$100,000,000
Time for completion	36 months
Frequency of adjustment	Monthly
Base Date	As per FIDIC MDB, 2010
Base Index of All Cost Elements	1
Non-adjustable portion	30%
Cost Element 1 Weighting and Reference Index Probability Distribution Parameters	40%; Triangular; (0.98,1.0,1.05)
Cost Element 2 Weighting and Reference Index Probability Distribution Type Parameters	20%; Triangular; (0.98,1.0,1.06)
Cost Element 2 Weighting and Reference Index Probability Distribution Type Parameters	10%; Triangular (0.97,1.0,1.08)
Number of Simulations Per Test	1000

Firstly, the sensitivity of final contract price to start date was tested under three different scenarios. The simulation results for different scenarios tested are that:

Scenario 1: If the start date is Commencement Date, the mean final contract price will be $100.8 million but if the client has determined the start date as 24 months after the Commencement Date, contract price would be $100.4. In this condition, the client would save $400,000 by delaying the start date of adjustment 24 months.

Scenario 2: In this scenario, volatility of prices of cost elements was assumed to higher than scenario 1 such that the maximum value of the relative index probability distribution of each cost element was increased to 1.1. Simulation results indicated that client would pay $1,000,000 more than scenario 1. On the other hand, if the client has not put escalation clause into the contract, bidders probably would add an additional premium to their offer due to the higher uncertainty in input cost.

Scenario 3: In this scenario, prices of cost elements were assumed to increase by 5% of the previous month's rate in the 12th, 18th, and 24th month. Simulation results indicated that client would save about $1.5 million by delaying start date of adjustment 24 months.

Second, sensitivity of final contract price to non-adjustable portion was tested. In this case, client increased the non-adjustable portion and decreased the weight of cost element 1. Simulation results indicated that final contract price is not very sensitive to the non-adjustable portion such that if the non-adjustable portion has been increased from 10% to 50% under the high volatility scenario, the mean final Contract Price would be reduced by less than 1%.

Finally, the non-adjustable portion was set zero (0) and price adjustment was calculated using just a general index. It was assumed that the estimated cost for this project is $100 million and the distribution of general index is triangular with values 0.98, 1.0, 1.3. According to these assumptions, simulation results indicated that mean value of final contract price would be about $108 million. Furthermore, there is about 5% probability that final contract price would be less than $ 106 million and more than $110 million. From this result, it is reasonable to conclude that, in the absence of an escalation clause, a rational contractor would quote at least $8 million more than the estimated cost to be 50% certain of not losing money.

As it can be seen from this study, Monte Carlo simulation is a useful method of testing the sensitivity of the contract price to adjustment parameters. Therefore, contracting authorities can prepare the provisions of escalation clause based on the results of Monte Carlo Simulation under different scenarios. Furthermore, contractors also can use Monte Carlo Simulation to estimate the project costs in the tender process.

Choi et al. (2006) have conducted a study to suggest policies to improve the price escalation system in Korea. It was stated in this study that due to the sudden change in the price of materials between 2003 and 2004, clients and contractors began to argue the efficiency of escalation system in Korea. Authors aimed to define the arguing points related to escalation provisions and using Delphi Technique, tried to find the optimal solution for arguing points to improve the price adjustment system. In this study, ten main arguing points related to the escalation system in Korea were determined by making an interview with experts and coauthors such as clients, quantity surveyors, professors, researchers, and contractors. After defining the arguing points, by using Delphi Technique author tried to find the optimal solution for arguing points. Summary of results of this study is shown in Table 4.2.

Table 4.2 *Delphi results on the issues in contract price escalation (Choi et al., 2006)*

Question	Replies	Frequency	%
Indicator to determine the MFR (minimum flctuation rate)	Fluctuation rate of consumers price index Fluctuation rate of construction price index Average profit rate of constructors	8 5 1	57.1 35.7 7.1
Optimum level of the MFR that enables to request the price escalation	5/100 3/100 10/100	5 8 1	35.7 57.1 7.1
Initial date in reckoning the pric fluctuation	Design completion date Bidding date Contract signing date	6 6 2	42.9 42.9 14.3
Method to calculatie a flutuation rate	FRCA(fluctuation rate for the categories of articles) FRI(fluctuation rate for index)	9 5	64.3 35.7
Speciflying the method to calculate the fluctuation rate in a contract document	Necessary Unnecessary	13 1	92.9 7.1
Reasonable deduction rate	0/100 1/100 1.5/100 2/100 3/100	5 1 1 3 4	35.7 7.1 7.1 21.4 28.6
Minimum elapsed period	30 days 60 days 90 days 120 days 180 days 1 year	1 5 3 2 1 1	7.7 38.5 23.1 15.4 7.7 7.7
Progress rate to be adopted in price escalation	Actual progress rate Scheduled progress rate	4 10	28.6 71.4
Overhead and profit in price escalation	Include Exclude	12 2	85.7 14.3
Advance payment in price escalation	Necessary to deduct Unnecessary to deduct	13 1	92.9 7.1

Kalidindi et al. (2011) have conducted a study on the price escalation clause in building construction contracts in India. One of the objectives of this study was to study the adequacy and the extent of price escalation compensation to the contractor based on the currently used escalation clause in government contracts. In this study, a questionnaire was developed to analyze the escalation system for building projects in India and it was delivered to the contractors, governmental agencies and organizations.

The first groups of questions were related to the effects of cost escalation on the quality of the project, completion of the project, source of dispute between

contracting parties. In the last question, respondents were asked that is there a need to improve the currently used escalation clause in public construction contracts. The results indicated that 31% of the contractors and 90% of the clients agreed that cost escalation has an impact on the quality of the, 98% of contractors and 97% of the clients agreed that it affects the completion of the projects, and 98% of the contractors and 94% of clients agreed that cost escalation is a source of dispute. All of the participants agreed that there is a necessity to improve the presently used escalation clause in construction contracts.

The second group of the questions was regarding to what extent the currently used escalation clause regulations compensated the actual price changes in construction materials such as labor, petroleum, cement, oil, steel, and lubricant. The results of the survey indicated that most of the respondents agreed that they are compensated less than 60% of actual prices of cement, steel and other materials.

The third group of questions was related to that Wholesales Price Index is suitable for calculating the price changes in construction materials. And also is it logical to use Building Construction Cost Index in building projects instead of Wholesales Price Index when adjustment is performed. Results indicated that about 96% of participants were agreed that Wholesales Price Index is not a suitable index to use escalation and most of the participants agreed that it would be more appropriate to use building cost index in price adjustment for building projects.

The last questions were related to the satisfaction level of participants about the escalation system and also related to appropriate project duration for the inclusion of escalation clause into the contract. Results indicated that satisfaction level of most of the participants was low. About 50% of the contractors and 61% of clients were of the opinion that appropriate project duration for the inclusion of escalation clause into a contract is 6 months.

CHAPTER 5

GENERAL INFORMATION ABOUT PRICE INDICES IN TURKEY

5.1 Introduction

In construction contracts, price escalation clauses are used as a tool to compensate the contractor for an increase in material prices which are beyond the control of contractors. To measure price changes, various price indices have been developed and published by governmental agencies, international institutions, private organizations, and private sector companies in all over the world. In Turkey, Statistical Institute has published several price indices. Moreover, Istanbul Chamber of Commerce has also published indices to measure price changes taking place in Istanbul.

Cost indices have been developed to measure the level of changes in any kinds of prices in different kinds of sectors. Construction cost indices have also been developed to measure the level of price variations in construction resources. Sources and Methods Construction Price Index made by the Statistics Directorate of the OECD (1994 (a) , 1996, 1994 (b)) and EUROSTAT (1995, 1996) dictates that the need for price index for construction activity arises from the need to assess real changes in the output from construction activities which cannot be derived only from reference to regular building and construction statistics. Construction price indices have been used a wide range of purpose such as escalation clauses in construction contracts, adjustment of sales contracts for buildings under construction, guaranteed value clauses in rental or leasing contract, as the basis for indexation for insurance.

A variety of tools is used to measure price changes taking place in an economy. These include Consumer Price Indices (CPIs), Producer Price Indices (PPIs), price indices relating to specific goods and/or services (Sources and Methods - Construction Price Indices OECD, 1996). Thus before going into the details of the price escalation system in Turkey, it shall be better to present information about the published cost indices in Turkey.

5.2 Domestic Producer Price Index (DPPI) and Wholesale Price Index (WPI)

5.2.1 Wholesale Price Index (TURKSTAT)

Wholesale Price Index (WPI) is a measurement of the changes in the prices of goods and services that is sold as output by wholesalers and domestic producers in a given reference period. In WPI Prices are cash, wholesale prices of domestic products, including tax. TURKSTAT published three different WPI according to their base year. 1981-Based WPI published between 1982 and 2005, 1987-Based WPI published between 1988 and 2005 and 1994-Based WPI published between 1994 and 2013. The index numbers for WPI (1994=100) following January 2006 are derived using the monthly rate of change in Producer Price Index (PPI) (2003=100). WPI series were not updated since January 2014. Table 5.1 presents the detail of main groups and classifications of WPI. In addition, Table 5.2 presents the detail of subgroups of manufacturing group in WPI. Indices in subgroups of Manufacturing were used to perform the price adjustment calculations in public construction projects up to December 2013.

Table 5.1 *The detail of main groups and classifications of WPI (TURKSTAT)*

Groups	Clasification	No. of items
Group 1	General index	35
Group A	Agriculture, hunting and forestry	3
Group B	Fishing	1
Group C	Mining and quarrying	5
Group D	Manufacturing	23
Group E	Energy Supply	3

Table 5.2 *The detail of subgroups of manufacturing group of WPI (TURKSTAT)*

Subgroup of Group D Manufacturing	
Other non-metallic mineral products	Index for cement
Basic metals	Index for steel/rebar
Coke, refined petroleum products and nuclear fuel	Index for fuel/refined petroleum products
Wood and of products of wood and cork, except furniture	Index for timber
Machinery and equipment n.e.c.	Index for equipment amortization

5.2.2 Wholesale Price Index (ICC)

Istanbul Chamber of Commerce has published WPI for Istanbul city. WPI for Istanbul measures price changes of 8 groups of goods that are subject to wholesale trade in Istanbul. Due to the geographical coverage of index, WPI of ICC index generally different from WPI of TURKSTAT because WPI of TURKSTAT covers all Turkey. Table 5.3 presents the detail of main groups and classifications of WPI of ICC. WPI of ICC was taken as a reference index by some past escalation decrees to perform the price adjustment calculations.

Table 5.3 *The detail of main groups and classifications of WPI of ICC (Istanbul Chamber of Commerce)*

Groups	Clasification
Group 1	General index
Group 2	Food
Group 3	Raw materials
Group 4	Mines
Group 5	Fabrics
Group 6	Construction material
Group 7	Fuel and energy
Group 8	Chemicals

5.2.3 Domestic Producer Price Index (TURKSTAT)

Producer Price is the selling price of domestic production or manufacturing of the products excluding value added tax. TURKSTAT (2008) defines Domestic Producer Price Index (DPPI) is a measurement of the differences in the prices of goods and services that is sold as output by domestic producers in a given reference period. The

first resale prices of the products on the market that is sold by manufacturers operating in agriculture, hunting, forestry and fishing sector, mining and stone quarrying, manufacturing industry, electricity, gas, and water are monitored in DPPI.

The difference between WPI and DPPI comes from the price compilation. Prices in WPI are gathered partially from producers, partially from the mediators who are engaged with wholesale, and prices of mediators include taxes and the margins. On the other hand, prices in DPPI are gathered especially from producers and product prices are the domestic sales prices excluding value added tax (TURKSTAT, 2008).

TURKSTAT states that DPPI can be used for various purposes. The main purposes are:

- ✓ Determination of the government economic policy,
- ✓ Production and productivity accounts,
- ✓ The investment decisions.
- ✓ Adjustment of wages and prices,
- ✓ Monitoring of price movements and inflation in the economy,
- ✓ Accounting calculations
- ✓ Studies on the price analysis

When DPPI is investigated in detail, with the European Union harmonization process, TURKSTAT formed Producer Price Index based on the Statistical Classification of Economic Activities in the European Community NACE-REV.1 in 2003. Afterward, Eurostat has made a revision in NACE-REV.1 classification and has published NACE-REV.2 classification. Based on NACE-REV.2, TURKSTAT has also revised the Producer Price Index and started to publish new index called Domestic Producer Price Index. Therefore, there is a classification difference between PPI and DPPI and DPPI is more detailed than PPI.

DPPI is calculated in seven steps:

1) Item type index
2) Article index
3) Article subset index
4) Activity index
5) Sub-sector index
6) The main sector indices
7) General index

Industrial coverage of DPPI includes mining and quarrying, manufacturing, electricity, gas, and water and geographical coverage of it is the whole country. The weight of items that is in the basket of the index is updated every year. Data for prices are collected from firms, public organization, public institutions etc. Table 5.4 presents the detail of main groups, items numbers, and weights of groups in the DPPI. Table 5.5 presents main indices of DPPI used in price adjustment and Table 5.6 presents the detail of main indices of DPPI used in price adjustment. Indices in subgroups of Manufacturing group have been used to perform the price adjustment calculations in public construction projects since December 2013.

Table 5.4 *Detail of main groups, items numbers, and weights of groups in DPPI (TURKSTAT)*

Main Groups	Items Number	Weight of Main Groups
Agriculture, hunting and forestry	81	19.84%
Fishing	28	0.29%
Mining and stone quarrying	16	1.62%
Manufacturing	631	73.33%
Electricity, gas and water	3	5.21%
Total	759	100

Table 5.5 *Main indices of DPPI used in price adjustment (TURKSTAT)*

Subgroup of Group C Manufacturing	No. of sub Index in each group	Notation in escalation formula
Non-metalic products	7	Ç
Basic metal industry	5	D
Coke and refined petroleum	2	Y
Wood products, except furniture	2	K
Machinery and equipment, n.e.c.	4	M

Table 5.6 *Details of main indices of DPPI used in price adjustment (TURKSTAT)*

Subgroup of Non-metalic products	Subgroup of Basic metal industry	Subgroup of Machinery and equipment, n.e.c.
Glass and glass products	Basic iron and steel and of ferro-alloys (ECSC)	General-purpose machinery
Non-refractory ceramic goods other than for construction purposes; refractory ceramic products	Tubes	Other general purpose machinery
Ceramic tiles and flags	Other first processing of iron and steel and production of non-ECSC ferro-alloys	Agricultural and forestry machinery
Bricks, tiles and construction products, in baked clay	Basic precious and non-ferrous metals	Other special purpose machinery
Cement, lime and plaster	Casting of metals	**Subgroup of Coke and refined petroleum**
Articles of concrete, plaster and cement	**Subgroup of Wood products, except furniture**	Coke oven products
Cutting, shaping and finishing of stone	Sawmilling and planing of wood; impregnation of wood	Refined petroleum products
	Veneer sheets; plywood, laminboard, particle board, fibre board and other panels and boards	

5.3 Consumer Price Index (TURKSTAT)

TURKSTAT (2008) states that Consumer Price Index (CPI) measures changes in the current retail prices for services and goods that is purchased by consumers in a given period of time. CPI prices are a kind of cash price which includes value added tax and any other relevant taxes. CPI is aimed to calculate the inflation rate by using the change of the prices of goods and services existed in the market. For this purpose, all

of the final monetary expenditures of households, constitutional population such as population lives in hotels, schools etc. and foreign visitors are taken into account. Target Based Individual Consumption Classification (COICOP) is used to specify the weights and calculating the index. Based on CPI classification, expenditures are organized in 12 major groups and 44 subgroups. TURKSTAT states that 417 commodities are used in the compilation of the index. Table 5.7 presents the detail of main groups, items numbers, and weights of groups in the CPI. Prices are collected from 221 districts centers of 81 cities of Turkey. TURKSTAT divides Turkey in 26 districts and collects data from these 26 districts to calculate CPI. Table 5.8 presents the detail of Turkey statistical districts. Weights and items in the basket of CPI are periodically updated at the end of each year. CPI has been taken as a reference price index for labor input, to perform the price adjustment calculations in public construction projects.

Table 5.7 *Detail of main groups, items numbers, and weights of groups in CPI (TURKSTAT)*

Main Groups	**Items Number**	**Weight of Main Groups**
Food and non-alcoholic beverages	2	28.63%
Alcoholic beverages and tobacco	2	5.00%
Clothing and footwear	2	8.07%
Housing, water, electricity, gas and other fuels	4	16.60%
Furnishings, household equipment, routine maintenance of the house	6	7.42%
Health	3	2.54%
Transport	3	12.59%
Communications	3	4.30%
Recreation and culture	6	2.81%
Education	5	2.24%
Hotels, cafes and restaurants	2	5.64%
Miscellaneous goods and services	6	4.16%
Total	44	100.00%

Table 5.8 *Detail of Turkey statistical districts for CPI (TURKSTAT)*

Code	Statistical 12 District	Statistical 26 Sub District
TR1	İstanbul	İstanbul sub district
TR2	West Marmara	Tekirdağ and Balıkesir sub district
TR3	Aegean	İzmir, Aydın, Manisa sub district
TR4	East Marmara	Bursa, Kocaeli sub district
TR5	Western Anatolia	Ankara, Konya sub district
TR6	Mediterranean	Antalya, Adana, Hatay sub district
TR7	Middle Anatolia	Kırıkkale, Kayseri sub district
TR8	West Blacksea	Zonguldak, Kastamonu, Samsun sub district
TR9	East Blacksea	Trabzon sub district
TRA	Northeast Anatolia	Erzurum, Ağrı sub district
TRB	Middle East Anatolia	Malatya, Van sub district
TRC	Southeastern Anatolia	Gaziantep, Şanlıurfa, Mardin sub district

5.4. Cost of Living Index (ICC)

Istanbul Chamber of Commerce has published Cost of Living Index (CLI) for wage earners for Istanbul city. CLI measures the changes in prices of goods that are subject to the spending of living of employees in the border of Istanbul. CLI includes 8 groups of goods that are subject to retail price expense of employees in Istanbul. ICC has published four different CLI according to their base years 1963, 1968, 1985 and 1995. Due to the geographical coverage of index, CLI is generally different from CPI of TURKSTAT because CPI of TURKSTAT covers all Turkey and CPI also takes into account the expenditures of the constitutional population such as population lives in hotels, schools etc. and foreign visitors. Table 5.9 presents the detail of main groups, items numbers, and weights of groups in CLI.

Table 5.9 *Detail of main groups, items numbers, and weights of groups in CLI of ICC (Istanbul Chamber of Commerce)*

Main Groups	Items Number	Weight of Main Groups
Food expenditure	96	42.49
Expenditure on housing	10	20.72
Expenses related to household	30	8
Apparel spending	58	12.78
Health and personal care spending	16	2.82
Transportation expenses	11	5.95
Culture, education and entertainment expenses	16	4.44
Other expenses	5	2.8
Total	242	100

5.5 Building Construction Cost Index (BCCI)

TURKSTAT has published Building Construction Cost Index (BCCI) on a quarterly basis since 1991, to measure changes in the cost of input items used in building construction projects in Turkey. The index covers construction of houses and apartments, shops and commercial buildings, medical buildings, schools and cultural buildings, and administrative buildings. Most of the cost data are obtained through surveys of construction and other enterprises and as well as from price lists. The data is collected from 24 provinces which have been chosen to represent all the regions of Turkey. BCCI includes 109 items for the cost of material and 12 items for the cost of labor in total 121 items' prices are taken from around 1.300 construction supplier firms.

The Statistics Directorate of the OECD (1996) states that the selection of items for inclusion in the index was made after extensive consultation with interested bodies, including the Finance and Industry Statistics Divisions within the TURKSTAT, the Chamber of Civil Engineers and Architects, trade unions and a number of other institutions and associations. With the help of the Ministry of Environment and Urban Planning and their publication Construction Unit Price Analysis, the items were selected and weights determined through detailed examination of bills of

quantities for a sample of current projects representative in terms of regional distribution and project type of construction activity within the scope of the index. Table 5.10 presents the detail of BCCI.

Table 5.10 *Detail of Building Construction Cost Index (TURKSTAT)*

Index	Building (residential buildings + other usage)	Two and more dwelling residential buildings	One dwelling residential buildings	Residential buildings	Other buildings (commercial, administrative, medical buildings, schools)
General Index					
Labour Index					
Material Index					

5.6 Construction Labor Input Index

TURKSTAT prepares short-term business statistics for industry, construction, services and retail trade sectors. With this short-term statistics, it aims to measure monthly and quarterly productions, employment, working hours, wages and salaries in these sectors. In the scope of short-term business statistics, TURKSTAT applies quarterly Construction Industry Survey and based on this survey data, TURKSTAT has published Construction Labor Input Index (CLII). To form CLII, TURKSTAT calculates Construction Employment Index, Construction Hours Worked Index, and Construction Gross Wages-Salaries Index. Based on these indices, TURKSTAT has published CLII since 2010. Data for these indices is collected from enterprises which are related with directly to the construction sector and employ more than 20 employees.

Based on above-mentioned indices, TURKSTAT has also published Seasonally and Calendar Adjusted Construction Gross Wages-Salaries Index to measure the gross wage changes of employees in construction sector quarterly. This index reflects the cost of employ a construction worker for employers. Table 5.11 present the detail of Seasonally and Calendar Adjusted Construction Gross Wages-Salaries Index.

Table 5.11 *Detail of Seasonally and Calendar Adjusted Construction Gross Wages-Salaries Index (TURKSTAT)*

Economic activity	Types of construction (CC)	**Index**				
		Quarter				**Annual avg.**
		I	**II**	**III**	**IV**	
Construction	Total Index					
	Building Index					
	Civil engineering Index					

In most of the countries, various construction price indices have been published. Even in some of the countries, private organizations also have published price indices for certain sectors. Because of the fact that price escalation system is investigated in the scope of this study, relevant construction price indices published in various countries are given as an example in Table 5.12.

Table 5.12 *Construction cost indices published in countries (The Statistics Directorate of the OECD)*

Country	**Index Title**	**Frequency of Compilation**	**Main Data Sources**
Turkey	Building construction cost index	Quarterly	Surveys of construction enterprises and materials suppliers
Austria	Cost index for road construction	Monthly	Industrial wholesale price index; wages survey; collective agreements
	Cost index for bridge construction	Monthly	As above
Canada	Construction union wage rates	Monthly	Details of signed wage agreements from construction association
United Kingdom	Public sector housebuilding price index	Quarterly	Local authorities; relevant ministries
	Road construction tender price index	Quarterly	As above

CHAPTER 6

PRICE ESCALATION APPLICATIONS IN TURKEY: CONSTRUCTION CONTRACTS FROM PAST TO THE PRESENT

6.1 Introduction

The first law on public procurement in Turkey was the Auction, Negotiation and Import Law No. 661, dated 22.04.1925, which was issued during the foundation period of the Republic. Law 661 was published in Official Gazette which was issued in number 97 and dated 28.04.1925.

All kinds of purchasing, selling, leasing, construction, repair, exploration, transportation and similar works to be carried out on behalf of the government were regulated under this law. In addition, tender types that have to be used for the realization of these works were also determined based on the types of these works as closed envelope, auction, and negotiation. Thereafter, in addition to the Law 661, in 1926 and in 1933 new laws were enacted.

Law 661 remained in force for about 10 years and in 1934 the Bid up, Discount and Tender Law No. 2490 went into force.

Law 2490 remained in effect until 1983, and in 1983, the State Tender Law No. 2886 entered into force in accordance with changing circumstances and needs.

In accordance with changing circumstances and needs of Turkey and also within the framework of harmonization with the European Union Acquis, Public Procurement Law No. 4734 has been published in Official Gazette which was issued 24648 and dated 22.01.2002 (Yaşar, 2010).

In fact, Bidding type and Contract type are highly important in terms of price escalation calculations in Law 2490 and Law 2886.

Bidding type according to procurement procedures in Law 2490 and Law 2886;

- ✓ Closed envelope tender procedure
- ✓ Restricted procedure
- ✓ Open procedure
- ✓ Negotiated procedure
- ✓ Direct procurement

Contract type according to procurement procedures in Law 2490 and Law 2886;

- ✓ Unit Price contract based on Ministry of Public Works and Settlement
- ✓ Unit Price contract based on contractor proposal
- ✓ Turnkey or Lump-Sum contract

In Unit Price contract based on Ministry of Public Works and Settlement, MPWS published unit prices (rates) for construction labor, material, in the beginning of every year. To prepare the estimated cost of construction projects, quantities of work was prepared by contracting authority, then these quantities were multiplied by related unit prices and estimated cost was calculated. Afterward, contractor proposed an offer for each work items such that it proposed a discount rate for the unit prices of Ministry of Public Works and Settlement. For the first year, interim payment certificate was prepared according to contract year unit prices. For later years, MPWS updated unit prices, and interim payment certificate was prepared based on the updated unit prices. However, sometimes due to the high inflation in Turkey, for example in 1980, MPWS updated unit prices three times in a same year.

Due to the price changes that take place within the implementation year, contracting authorities paid an additional payment to the contractor which was called “material price changes payment”.

In Unit Price contract based on contractor proposal, quantities of work was prepared by contracting authority, then contractor proposed an offer for each work items. On the other hand, contracting authorities determined an upper price in each year that contractor could offer which called “maximum unit price”. For the first year, interim payment certificate was prepared based on contract year’s contractor proposal prices. For later years, updated “maximum unit price” was divided to contract year’s “maximum unit price” and an update coefficient was obtained. Afterward, contract year’s contractor proposal prices were updated by applying this coefficient to prices and interim payment certificate was prepared based on the updated prices. In addition, “material price changes payment” was also performed due to the price changes that take place within the implementation year.

In Turnkey or Lump-Sum contract payments were made by using the appropriate above-mentioned methods.

In the contracts executed under the above-mentioned laws, contracting authorities were granted various authorizations by issued Council of Ministers Decree such as determining new unit price according to certain principles, increasing the prices and accepting the contract termination request.

In the public procurements realized by public administrations in Turkey, **fixed unit prices** published by the MPWS has been used until 1977. In public investments conducted up to the end of 1960, payment certificate was prepared based on the fixed unit prices and contracting authorities compensated contractors for price changes of determined materials such as cement, steel, and fuel.

However, in the late 1960s and especially in the 1970s, the rapid increase in inflation in Turkey necessitated the application of **variable unit prices**.

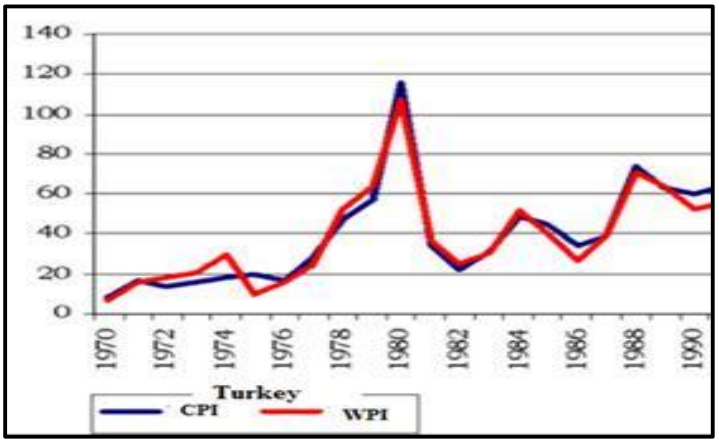

Figure 6.1 *Consumer Price Index and Wholesale Price Index in Turkey from 1970 to 1990 (www.afrkmnrc.blogspot.com.tr)*

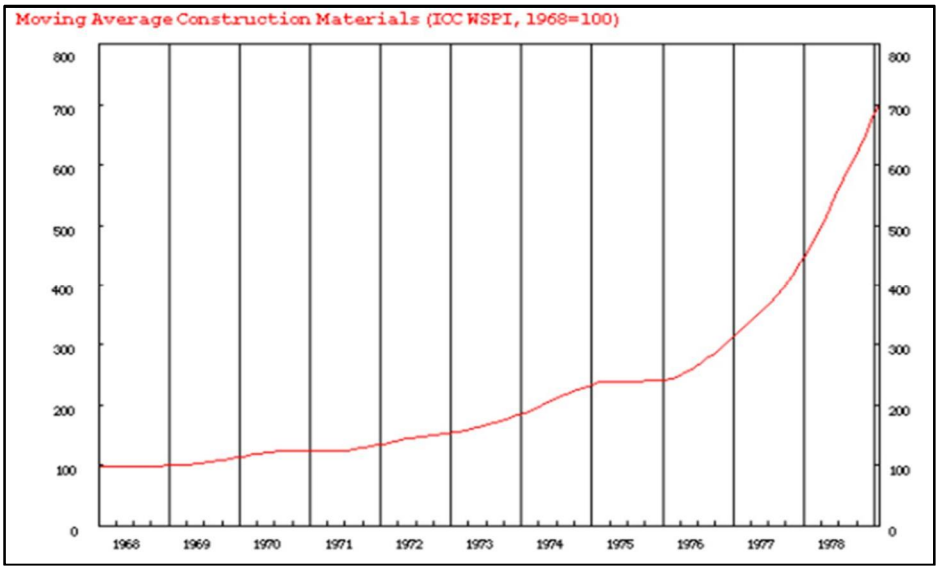

Figure 6.2 *Index value of Construction Material Index of Istanbul Chamber of Commerce in between 1968-1979 (Turkey Central Bank)*

It can be seen from Figure 6.1, there has been a considerable increase in Consumer Price Index and Wholesale Price Index in 1980. Also, it can be inferred from Figure 6.2, Construction Material Index was increased by 600 % between 1968 to1979.

Due to the sharp increases in construction material prices, **variable unit price** application was introduced for the first time with Council of Ministers Decree which

was numbered 7/13221 and dated 01.03.1977. With this decree, for the contracts which were signed in 1973 and continued in the following years, 90% of the difference between the contract unit prices and the implementation year unit prices has started to be paid to the contractors such that;

Payment = (Implementation years unit prices- Contract year unit prices) x 0. 9

It can be seen from the equation, either government assumes %10 inflation as normal, or government intends to share the price change risk with the contractor as % 90 and % 10 respectively.

After the implementation of Decree 7/13221, Decree No.7/15765 and Decree No.7/15990 have been published in order to take measures regarding rapidly changing conditions, but these Decrees have been in force for a short period of time.

From the past to present, Ministry of Council Decrees related to price escalation regulations in public construction projects are tabulated in Table 6.1.

Table 6.1 *Price escalation decrees (Oktar, 2014)*

Decree Date	Decree Number
03.04.1974	7 7793
11.03.1977	7/13220
11.03.1977	7/13221
22.05.1978	7/15765
14.07.1978	7/15990
11.03.1980	8/505
18.03.1981	8 2574
28.07.1988	88/13181
25.08.1994	94/6019
12.06.2001	2001/2862
24.12.2002	2002/5039
27.06.2013	2013/5217

The most important articles of the decrees published in 1970's and 1980's were articles regulating the calculation of the **price increase coefficient** which is applied to payments of the contractors in the years following the bidding years. For example, Decree No.7/13221 limited the **price increase coefficient** to 25%. That is, only 25% of the contract year's unit prices was paid to the contractor additionally by regardless

of the actual price changes. On the other hand, Decree No.7/15765 has left the right of determining the upper limit for **price increase coefficient** to the public institutions and organizations (Gönen et al., 1994). Likewise, Decree No. 7/15990 set the upper limit for **price increase coefficient** as 25% for 1978. Furthermore, in the Decree No. 7/15765 and Decree No 7/15990, normally expected material price increase was accepted as 10 percent and in calculation of price increase coefficient, a method was developed in which a deduction was applied for the first year price escalation payment as 10 percent, for the second year 2 x 0.1, and third 3 x 0.1 which means additional %10 reduction factor for each year was envisaged (Sağıroğlu, 1980).

Despite the increase in construction material prices by 50% and 74% respectively in 1978 and 1979, decrees in force limit the upper limit of price increase coefficient as a 25 % for payments to be made in these years, and the escalation regulations did not reach their aims completely (Sağıroğlu, 1980).

Decrees Nos. 7/13221, 7/15765 and 7/15990 and their annexes have not been applied to the work to be carried out after March 1, 1980, and the provisions of Decree No. 8/505 has entered into force for subsequent works from that date.

The biggest innovation introduced by the Escalation Decree No. 8/505 is the ability to apply more than one price increase coefficient in the same fiscal year. As a matter of fact, the Ministry of Public Works published the unit prices three times in the same year in 1980. Article 2.6 of the Decree No. 8/505 has laid out the principles for the price difference to be paid for works related to the manufacturing industry. However, the definition of "Manufacturing Industry" has not been defined and it has not been clarified exactly that to which inputs price adjustment will be performed.

On the other hand, unlike the Decree No. 7/15990 and Decree No. 7/15765, the reduction factor in the Decree No. 8/505 was applied only 10%, not 10% for each year.

Moreover, while the upper limit of the price increase coefficient was set at 25% in Decree No. 7/15990, in Decree No. 8/505, no upper limit has been set for price

increase coefficients, and in the first application year, the price increase factor of over 125% has been given (Sağıroğlu, 1980).

Due to rapidly changing circumstances, this Decree was not been long-lasting; as of 1.3.1981, Decree No. 8/2574 has entered into force and price adjustment was performed based on the principles of Decree No. 8/2574 in construction projects except for the contracts that the execution of the contract pursuant to Decree No. 8/505 has been accepted by the Contracting Authority.

According to Decree No. 8/505, in addition to the contract unit price, difference between the implementation years unit price and contract year unit price was paid to the contractor for each work item and payment was calculated as following;

Payment = (Implementation years unit prices - Contract year unit prices) x 0.95

As can be seen from the equation, the government shares the unit price risk with the contractor at 95% to 5%.

On the other hand, due to the price changes that taking place within the implementation year, contracting authorities also compensated contractors for price changes of determined materials.

Construction materials that "material price changes payment" was paid as following;

a) All kinds of iron and steel,

b) All kinds of cement,

c) Each kind of explosives,

d) Each kind of fuel,

e) Pressure-resistant iron and steel pipes,

f) Asphalt is not subject to any reduction, price increases in the year were paid as "material price changes" (Atmaca, 1991).

At this point, it is thought that there is a need to address the implementation of Decree No. 8/2574. First of all, MPWS determined and published unit prices for construction materials and work items at the beginning of each year. The estimated cost of construction projects was prepared based on the unit price of MPWS. The contractor proposed an offer to each work items with a discount rate taking into account the unit prices of MPWS and contract was signed based on contractor's bid prices. At the beginning of each implementation year, contract prices were updated with a coefficient such as 0,95 in other words contractor's bid prices for each work item was multiplied by 1,95. Additionally, due to the price changes that taking place within the implementation year, contracting authorities also paid "material price changes payment" to the contractor.

After more than seven years of implementation, as of 1.7.1988, Decree No.88/13181 has entered into force which protected the main principles of Decree No.8/2574 but removed 5% reduction factor and extended materials that "material price changes payment" was paid for (Gönen et al., 1994).

6.2 Price Escalation Decrees Applied to Construction Contacts Signed Under State Tender Law 2886

6.2.1 General

Principles to be applied in the price adjustment for the public construction projects according to the Tender Procedures and Types were determined by Council of Minister in 28.07.1988 and a new Price Escalation Decree No. 88/13181 published in Official Gazette which was issued 19905 and dated 20.08.1988.

Decree No. 88/13181 entered into force in 01.07.1988 and it was applied to works that executed since 01.07.1988. Decree No. 88/13181 remained in force until 2002, publishing of Public Procurement Law 4734, and Public Procurement Contracts Law 4735. Therefore, principles of Escalation Decree No. 88/13181 have been implemented to public construction projects approximately for about 15 years.

There was a definition for work in Decree 88/13181, as “all kinds of construction, installation, repair, installation and related transportation, acquisition of studies, design, engineering and consultancy services”. It took into account the unit price of MPWS as reference prices for public construction project tenders. In addition to this, according to the nature of work, it also accepted the unit prices issued by General Directorate of Highways, General Directorate of Hydraulic Works, General Directorate of Railways Ports and Airports Construction as reference prices. The important point in this escalation decree was that; it envisaged two types of price escalation payment. One of them comes from the change of unit price of MPWS and other public institutions, and the other comes from the price changes taking place within the implementation year. As it was stated before, the main difference of Decree No. 88/13181 from Decree No. 8/2574 was the expansion of the scope of material price changes payment. In addition to the materials stated in Decree No. 8/2574, it stated additional construction materials that included in the scope of material price changes payments. Additionally, various escalation formulations were developed to perform the material price adjustment. Additional construction materials that material price adjustment was performed are as follows;

- ✓ Aluminum profiles
- ✓ Glass
- ✓ Copper
- ✓ Brick
- ✓ Timber
- ✓ Hard plastic (PVC) pipe and materials
- ✓ Fittings
- ✓ Electrical equipment

From above-mentioned materials, formulations were determined for calculation of material price adjustment for brick, wood, hard plastic (PVC) pipe and materials, plumbing and electrical installation materials in the Decree No. 88/13181. On the other hand, although the scope of the materials that price adjustment was performed has been expanded, the Decree 88/13181 did not include some inputs such as labor, gravel/sand, plastic wall painting, whose price has changed unexpectedly during the

implementation year. Additionally, while the brick was in the scope of price adjustment, on the other hand, the hollow briquette did not fall within the scope of this escalation decree (Oktar, 2014).

In Decree No. 88/13181, how the institution would determine the quantities of material and the reference prices that used in calculations of the material price adjustment were comprehensively described.

There were two important points in the Decree 88/13181. Firstly, in the article 9.2, the materials subjected to material price adjustment were determined. However, in Article 9.8, it was stated that if the materials other than referred in Article 9.2 have to be used due to the nature of the construction project or work items, material price adjustment could be performed by the institutions for these materials such that institutions had to determine the names of these materials, their base and current reference prices and the methods of price adjustment calculation in tender document. This article provided to the institutions an opportunity for implementation of the price adjustment according to the nature of the projects. On the other hand, within the applications of this article, had been faced with many neglects such as the institutions' forgetting of the putting the names of materials in the contract, not proper determining of the calculation method, inclusion of some irrelevant materials (Altun, 1999).

Secondly, in article 9.3, it was stated that the difference between contract year price and implementation year price could be paid through price adjustment for materials purchased from the abroad with the written permission of the administration. But the current prices for materials had to be taken as the approved sales invoices price, of authorities and organizations which were accepted by an administration official. This article aimed to protect the contractor’s profit from price changes of material purchased from the abroad and the decreasing value of Turkish currency against foreign currencies. However, was also encountered various omissions in the implementation of this article.

In Decree No. 88/13181, contract prices were updated for each year according to the contract types and payment certificate was prepared based on the updated contract prices.

6.2.2 Price Escalation Calculations for Material Price Changes within Implementation Year in Decree No. 88/13181

As stated before, due to the price changes that take place within the implementation year, contracting authorities paid an additional payment to the contractor which was called "material price changes payment".

To calculate the material quantities that are subject to price adjustment analyses prepared by MPWS and by the contractor were taken as a basis.

On the other hand, in the scope of material types and groups, due to the using of market prices instead of the index in price adjustment, various reference prices were determined for taking into account to calculate price adjustment.

Moreover, for the materials purchased from governmental producer organizations, which organization's market price will be taken into account in the price adjustment was determined in Decree No. 88/13181. Accordingly, which organization's price was taken as reference price for which material is shown in Table 6.2.

Table 6.2 *Materials and organizations that was taken as reference (Oktar, 2014)*

Materials	Organizations that Unit Price was taken as a basis
Each kind of explosives	MKE General Directorate or TÜGSAŞ
iron and steel for use in reinforced concrete	Turkey Iron and Steel Enterprises
Lamar, iron and galvanized pipes, sheets,	Eregli Iron and Steel Works T.A.Ş.
Profile bars	Turkey Iron and Steel Enterprises
Pressure-resistant pig-iron pipes	Turkey Iron and Steel Enterprises
Iron, steel and pig iron to manufacture all kinds of fonts	Turkey Iron and Steel Enterprises
Aluminum profiles, flat and trapezoidal sheets, aluminum ingots	Etibank Seydişehir Factory
Normally, plain and double glazing	Turkey Bottle and Glass Factories
Cement	Nearest refinery or storage to workplace or administration deemed appropriate factory
Asphalt	Nearest refinery or storage to workplace or administration deemed appropriate factory
Blister copper	Etibank General Directorate

When the Decree No. 88/13181 was in force, governmental organizations were producing these construction materials. Therefore, to guarantee the truth of market price of material that was in scope for price adjustment, the government pursued in such a way. However, it has been faced a lot of drawbacks of this method in implementation. One of them was that these organizations were governmental organizations, and sometimes, government subsidized these institutions, so the price of these institutions was not reflecting the market price truly.

On the other hand, different formulas have been developed on the basis of the material type for the cases where the most important elements affecting the cost of materials were determined by public institutions.

The diesel has been identified as the most important cost element for all types of brick, pumice concrete block and gas concrete block used in wall construction.

- ✓ *Price adjustment formula for the bricks, pumice concrete block and gas concrete block as following*:

$$\mathbf{F=0.45\ T_0\ (M_1-M_0)/M_0} \qquad (6.1)$$

Where:

F = adjustment multiplier
(M1) = Dealer sales price of diesel in Ankara within the implementation year
(M0) = Dealer sales price of diesel in Ankara in the beginning of implementation year
(T0) = The contract unit price or implementation year unit price of construction of the wall work item

- ✓ *Price adjustment formula for lumber used for formwork, scaffolding, carpentry, roofing work items as following:*

$$\mathbf{F=1.50\ (K_1-K_0)} \qquad (6.2)$$

Where:

(K1) = Price of nearest governmental forest institution to workplace for third class pine logs within the implementation year

(K0) = Price of nearest governmental forest institution to workplace for third class pine logs in the beginning of implementation year

- ✓ *Price adjustment formula for hard plastic (PVC) pipes as following:*

$$F=0.70\ T_0\ (P_1-P_0)/P_0 \qquad (6.3)$$

Where:

(P1) = Price of PETKİM Inc. for raw materials to manufacture of PVC within the implementation year

(P0) = Price of PETKİM Inc. for raw materials to manufacture of PVC in the beginning of implementation year

(T0) = The contract unit price or implementation year unit price of PVC pipes, installation cost and profit margin were excluded from unit price

- ✓ *Price adjustment formula for materials used in building installation works as following*

$$F=0.80x(R)x(S)x(n) \qquad (6.4)$$

Where:

(R) = Price of work items excluding installation cost

(S) = Coefficient published by MPWS for installation work items

(n) = Increment rate published by MPWS for installation work items

- ✓ *Price adjustment for fuel as the following:*

While the price adjustment payment for fuel was calculated, dealer sales price of nearest fuel station to the workplace was taken into account as reference price. Therefore, the price difference between the beginning month of the year and the month that implementation took place was paid to the contractor as a fuel adjustment payment.

In calculating the price escalation of manufacturing, assembly, and assembly works made by industrial contractors, the raw materials used in these work items are grouped as the domestic or foreign origin and a formulation is formed for raw materials of indigenous origin.

- ✓ *The price adjustment formula for raw materials of indigenous origin as following:*

$$\mathbf{F = F_o[(axM/M_o) + (bxK/K_o)]} \qquad (6.5)$$

Where:

(F) = Adjusted value of the Turkish lira portion of the manufacturing cost of work item

(F_o) = Contact price of Turkish lira portion of the manufacturing cost of work item
($F-F_o$) = Amount of price adjustment payment for Turkish lira portion of the manufacturing cost of work item
(a) = Percentage of cost of domestic raw material part in total cost of Turkish lira portion of the manufacturing cost of work item
(M) = Domestic raw material price in the delivery date
(M_o) = Domestic raw material price in the contract date
(b) = Percentage of the cost of labor, within Turkish lira part of the manufacturing cost of work item
(K) = Civil servant salary coefficient in the delivery date
(K_o) = Civil servant salary coefficient in the proposal date

On the other hand, in terms of imported production inputs, the exchange rates declared by the Central Bank have been taken as the basis for calculating the price adjustment of inputs purchased in foreign currency. To perform price adjustment for imported inputs or products, the details of the manufacture substances of inputs in work items had to be submitted with the offer. Additionally, in order that the price adjustment for these inputs could be paid, they had to be used in the manufacture of the work items (Oktar, 2014).

Material price adjustment could be performed for only those construction materials listed in Decree 88/13181 according to the contract types and the tender procedures. In order to perform material price adjustment for materials other than stated in escalation decree, contracting authorities have to determine these materials before tender and also they have to state the provisions of price adjustment for these materials within contract draft and tender document (Altun, 1999).

6.2.3 Amendments in Price Escalation Decree No. 88/13181

Decree No. 88/13181 was implemented until 1994, after that, in 1991 to 1994, to prepare a new price escalation regulation, some studies have been performed. In 1991, a new price escalation decree draft was prepared by taking into account the regulations of The World Bank and other development banks. In 1994, a new Price Escalation Decree No. 94/6019 published in Official Gazette which was issued 22057 and dated 20.09.1994 and it brought some changes to Decree No.88/13181.

The Decree No.94/6019 can be seen as one of the first important steps in the calculation of price adjustment according to The Published Index used widely in today. As it was mentioned before, in Decree No.88/13181 governmental producer organizations' prices were taken as reference prices, and calculations were performed based on these prices for material price adjustment. In addition to the material price adjustment, the difference in unit prices between the contract year and the implementation year also was paid to contractors. In Decree No.94/6019, the basis for payment caused by the price differences throughout the year was regulated and entered into force. When considered that public institutions and organizations published the unit price as the annual period, due to changes in material prices taking

place within the year, a new parameter was needed. Therefore, this parameter was determined as the Wholesale Price Index published by Turkish Statistical Institute.

Due to the changes of material prices taking place within the year, a formulation determined for material price adjustment payment.

$$F_c=A\times 0,60((T/T_0)-1) \qquad (6.6)$$

Where:

(F_c) = Price adjustment payment for changes of material prices taking place within the year (TL)

(A) = Amount of interim or final acceptance payment certificate (TL)

(T) = Wholesale Price Index for implementation month (General Index of WPI)

(T_0) = Wholesale Price Index for the month before the date of the tender

In addition to the using of indices in material price adjustment calculations, another important regulation of Decree No.94/6019 was that no price adjustment payment would be made to the contractor due to the increase in foreign input prices or the depreciation of the Turkish Lira against foreign currencies.

In 2001, a Decree with the number of 2001/2862 published in the Official Gazette No. 24497 dated 18.06.2001 were adopted. This Decree has also brought some changes in Decree No.88/13181. In Decree No.2001/2862, the coefficient of 0,6 within the material price adjustment formula was revised to 0,75 for the projects tendered according to the lump sum basis.

6.3 Price Escalation Decrees Applied to Construction Contacts Signed Under Public Procurement Law 4734 and Public Procurement Contract Law 4735

6.3.1 General

In accordance with changing conditions and needs in Turkey and within the framework of harmonization with the European Union Acquis, Public Procurement

Law No. 4734 and Public Procurement Contract Law No 4735 have been published in Official Gazette dated 22.01.2002 and entered into force in 01.01.2003. In 2002, according to these new Laws' provisions, the Council of Ministers published the price Escalation Decree numbered 2002/5039.

In fact, after 1991, some studies, papers, seminar etc. were performed by governmental agencies, contracting parties, professional organizations, to improve the regulations related to the price escalation system in public construction projects. As stated before, decree 94/6019 and decree 2001/2862 brought some changes to decree 88/13181, and they can be seen as the important steps for the transition of price adjustment provisions of Turkey into the most of the worldwide applications.

Actually, Law 4734 and Law 4735 brought some significant changes to the logic of public procurement in Turkey. One of them is Article 5 of Law 4734. According to the Article 5 of Law 4734 with title "Basic Principles of the Public Procurement Law", contracting authorities are responsible for ensuring;

- ✓ Equal treatment
- ✓ Efficient use of resources
- ✓ Reliability
- ✓ Competition
- ✓ Public supervision
- ✓ Transparency
- ✓ Fulfillment of needs appropriately

When these principles are considered in terms of price escalation system, they are very important for not only contracting authorities but also contractors. These principles have made a great contribution to creating fairer and bilateral governmental construction contracts. In addition, these principles have accepted the public authorities and private companies as two separate individuals and aimed to provide equal rights to both. On the other hand, not only the governmental resources and funds but also the companies' resources have also been accepted as resources for the country and the efficient use of all resources have been aimed.

While in the construction contracts tendered and signed according to the State Tender Law provisions, there were two types of price escalation payment. One of them comes from the change of unit price of MPWS and other public institutions, and the other comes from the price changes taking place within the implementation year. On the other hand, in Law 4735 there is only one price adjustment payment reasoned from the price changes between the contract signed date and the implementation date for construction materials and the price changes have been measured according to the changes in Wholesale Price Index.

Before entering into force of Law 4734 and Law 4735, while there was a discussion of whether the Council of Ministers should involve in the management of construction contract, the Public Procurement Contract Law eliminated this discussion. According to this law, the provisions and regulations related to the public procurement contracts will be determined by the Council of Ministers upon the proposal of the Public Procurement Authority (Oktar, 2014).

6.3.2 Price Escalation Provisions in Decree No. 2002/5039

While decree No.88/13181 involved comprehensive and complex calculations for escalation, the Decree No.2002/5039 has greatly simplified the calculation of the escalation to a single formula;

$$[F = An \times B \times (P_n - 1)] \qquad (6.7)$$

Wherein;

F: Price Adjustment Payment (TL), In the first interim progress (n = 1), and in the (n)th interim progress, for unit price contracts it is the multiplication of contract price of work item and the quantities of work amount that is executed in implementation month (TL); and for lump sum contract it is the multiplication of contract value and the percentage of progress rate of implementation month (TL),

A: value of performed work subject to price adjustment,

B: is a coefficient and equal to 0.90,

Pn: In the first interim progress (n = 1), and in the (n)th interim progress, it is an adjustment multiplier which calculated based on the above formula by taking into account the input weights and related price index,

To calculate the Pn value, the formula is used shown below.

$$\mathbf{Pn} = [\mathbf{a}\frac{\mathbf{In}}{\mathbf{I0}} + \mathbf{b1}\frac{\mathbf{Çn}}{\mathbf{Ç0}} + \mathbf{b2}\frac{\mathbf{Dn}}{\mathbf{D0}} + \mathbf{b3}\frac{\mathbf{Yn}}{\mathbf{Y0}} + \mathbf{b4}\frac{\mathbf{Kn}}{\mathbf{K0}} + \mathbf{b5}\frac{\mathbf{Gn}}{\mathbf{G0}} + \mathbf{c}\frac{\mathbf{Mn}}{\mathbf{M0}}] \qquad (6.8)$$

Entries in this formula to be used in the performance of work under the contract;

a: the fixed coefficient representing the weight ratio of labor,

b1: the fixed coefficient representing the cement weight ratio,

b2: the fixed coefficient representing the steel weight ratio,

b3: the fixed coefficient representing the fuel weight ratio,

b4: the fixed coefficient representing the timber weight ratio,

b5: the fixed coefficient representing the other materials weight ratio,

c: fixed coefficient representing the weight ratio related to the depreciation of machinery and equipment.

I_n, $Ç_n$, D_n, Y_n, K_n, G_n, M_n; They are the current cost indices for related inputs in the month before the date of the Interim Payment Certificate (CPI 1994=100 for I_n and WPI 1994=100 for others).

I_o, $Ç_o$, D_o, Y_o, K_o, G_o, M_o; They are the base cost indices for related inputs in the month before the last date of the tender (CPI 1994=100 for I_o and WPI 1994=100 for others).

After performing the calculations based on the above formula, if the value of $\mathbf{P_n}$ is less than one (1), it means a price adjustment deduction has to be applied to the Interim Payment of contractor. Conversely, if the value of $\mathbf{P_n}$ is more than one (1) it means the client has to pay to the contractor an adjustment payment.

In 2013, some changes were made in the escalation decree 2002/5039. Escalation decree no.2013/5217 very similar to the previous one has been published. In decree 2013/5217, the scope of the price adjustment provisions has been expanded. According to the new decree, contracting authorities can be performed price adjustment for the procurements that are tendered according to the Direct Procurement method and also for the "exception construction projects" whose bidding is not governed by Law 4374. Actually, these amendments are very important, because, for similar construction work performed by the same entity, while price adjustment payment could be paid in favor of the one contractor, it could not be paid to another contractor because of its tender types like direct purchasing or exception bidding (Oktar, 2014).

Another amendment is related to the base date. In the new decree, the base date is updated as the month of the tender date. In this way, changes in input prices experienced in the month of the tender date will be reflected in the price adjustment calculation.

Another difference between decree 2002/5039 and decree 2013/5217 is the name of the coefficient in calculation formula. In new decree;

b1: the fixed coefficient representing the non-metallic products weight ratio

b2: the fixed coefficient representing the basic metal products weight ratio,

b3: the fixed coefficient representing the coke and refined petroleum weight ratio,

b4: the fixed coefficient representing the wood products, except furniture weight ratio,

b5: the fixed coefficient representing the other material weight ratio,

c: fixed coefficient representing the weighted ratio related to the depreciation of machinery and equipment.

In fact, with the change of the definition of the inputs coefficient, the related indices used to calculate the price changes are also changed. The main input index components are divided into sub-components such that:

$Ç_o$, $Ç_n$: Represent the price changes in the Domestic Producer Price Index (2003=100) for non-metallic products. Main Index for non-metallic is divided into seven subgroups such as;

1) Glass and glass products
2) Non-refractory ceramic goods other than for construction purposes; refractory ceramic products
3) Ceramic tiles and flags
4) Bricks, tiles, and construction products, in baked clay
5) Cement, lime, and plaster
6) Articles of concrete, plaster, and cement
7) Cutting, shaping and finishing of stone

In fact, with this amendment, the price adjustment calculation will be more realistic and by detailing of the used index in the calculation, the price changes in construction inputs will be measured more accurately. Therefore, this amendment is a very important step for creating special index for the construction industry in Turkey.

As a result, Turkish tender legislation has undergone significant changes in terms of changing conditions and needs in Turkey and at the same time in harmony with the world. These changes are closer to Turkey's worldwide practices. On the other hand, due to some problems arising in the implementation of the provisions of the new price escalation decree and the deficiencies in some parts of the provisions, some of the improvements in price adjustment system are needed. In the following chapters, these problems and the suggestion to improve the system are going to be discussed.

CHAPTER 7

ESCALATION CLAUSE IN CONSTRUCTION CONTRACTS IN TURKEY

7.1 Need for Proper Escalation Clauses in Government Construction Contracts

In principle, construction work is performed according to the pre-confirmed contract amount and contract agreement. There may be some changes in economic conditions such as sharp fluctuation of prices, however, based on which the construction contract is carried out over a long period. To cope with the possibility, most countries regulated the escalation clause in the law or conditions regarding construction contract (Choi et al., 2006).

When looking at the past decade, in fact, there has been an increase in the price of construction materials such as steel, cement, fuel, brick, coarse aggregates, sand etc. The average price of steel, cement, fuel, and brick for the past ten years i.e. from 2003 to 2013 is shown in Figures 7.1, 7.2, 7.3 and 7.4 respectively. The prices were taken from the Statistical Institute of Turkey "Producer Price Index -Average Prices". These prices were published up to December 2013. After this date, these data is not published. In fact, the real market prices of these materials steel, cement, bricks, and fuel may be different from the TURKSTAT prices because TURKSTAT prices are the all of the average prices of these materials in Turkey. Due to the not publishing of these data after 2013, the prices have been tabulated up to 2013. The main reason for using the TURKSTAT prices is that TURKSTAT is a governmental agency and it was thought that its data is more reliable.

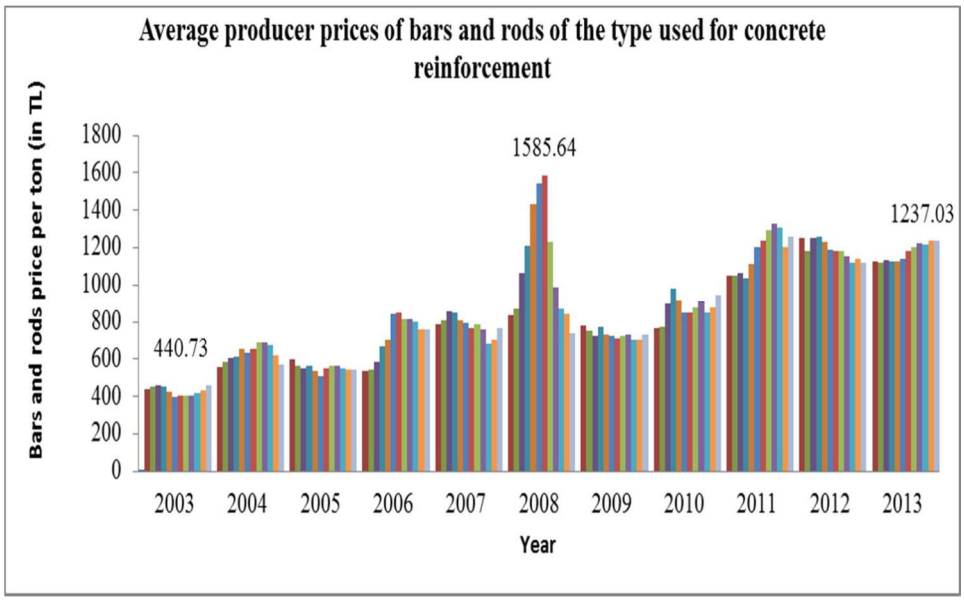

Figure 7.1 *Average producer prices of bars and rods of the type used for concrete reinforcement in between 2003-2013 (TURKSTAT)*

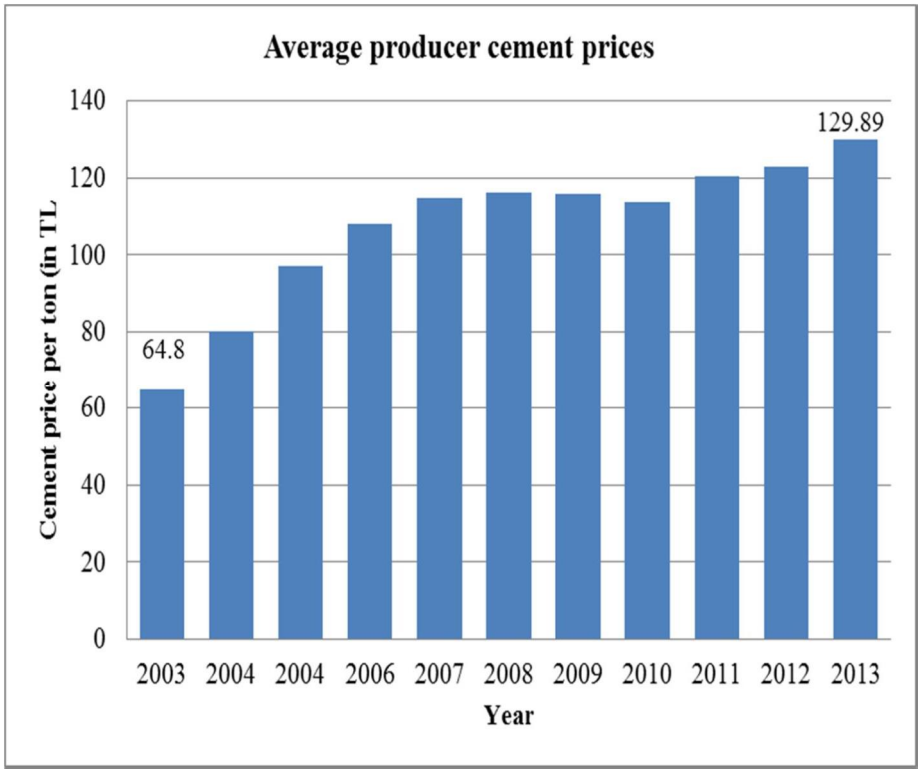

Figure 7.2 *Average producer prices of cement in between 2003-2013 (TURKSTAT)*

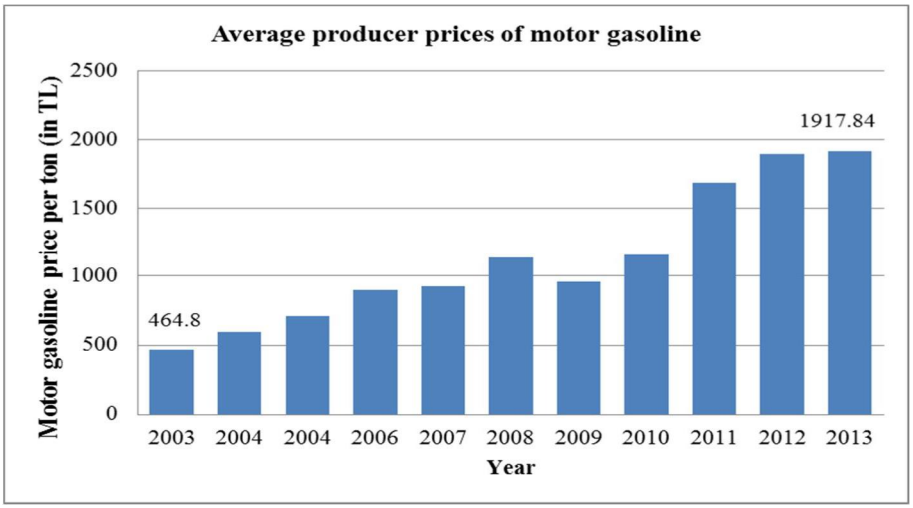

Figure 7.3 *Average producer prices of motor gasoline in between 2003-2013 (TURKSTAT)*

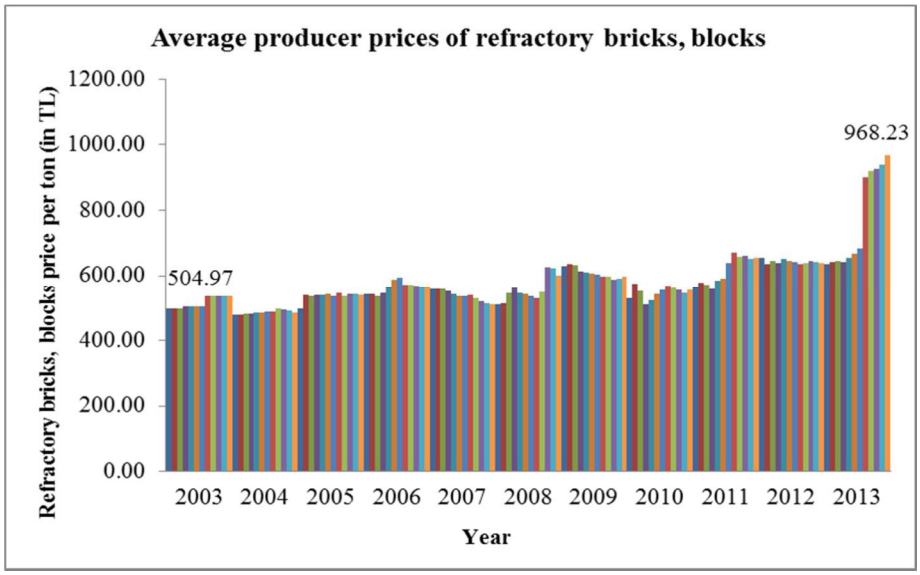

Figure 7.4 *Average producer prices of refractory bricks, blocks in between 2003-2013 (TURKSTAT)*

From Figures 7.1, 7.2,7.3 and 7.4 it is seen that price of steel products has gone up by about 181%; the price of cement has gone up by about 101%; the price of motor gasoline has gone up by about 313%, and price of bricks has gone up by about 92 %. There have been similar increases in the cost of sand, coarse aggregates and other items used by the construction industry. The rise in Consumer Price Index and the rise in Domestic Producer Price Index for all commodities, coke and refined

petroleum products, basic metals and other non-metallic mineral products from 2003 to 2016 are shown in Figures 7.5 and 7.6 respectively.

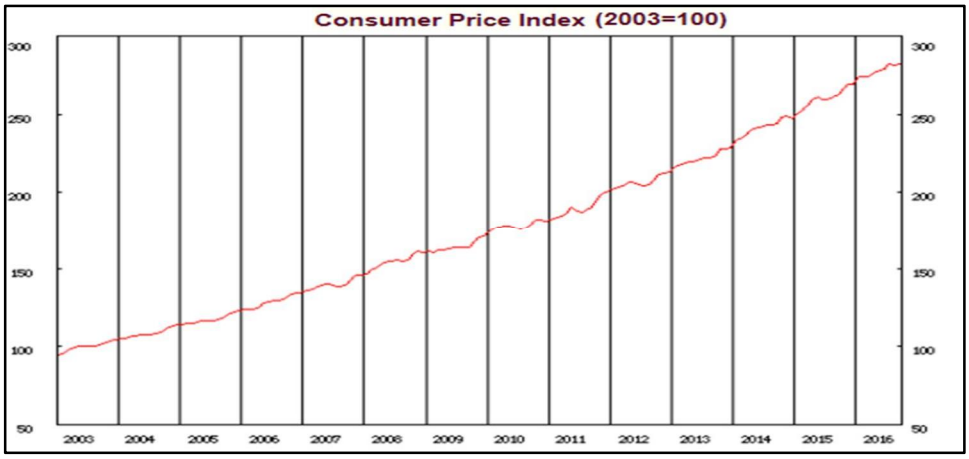

Figure 7.5 *Consumer Price Index in between 2003-2016 (2003=100) (TURKSTAT)*

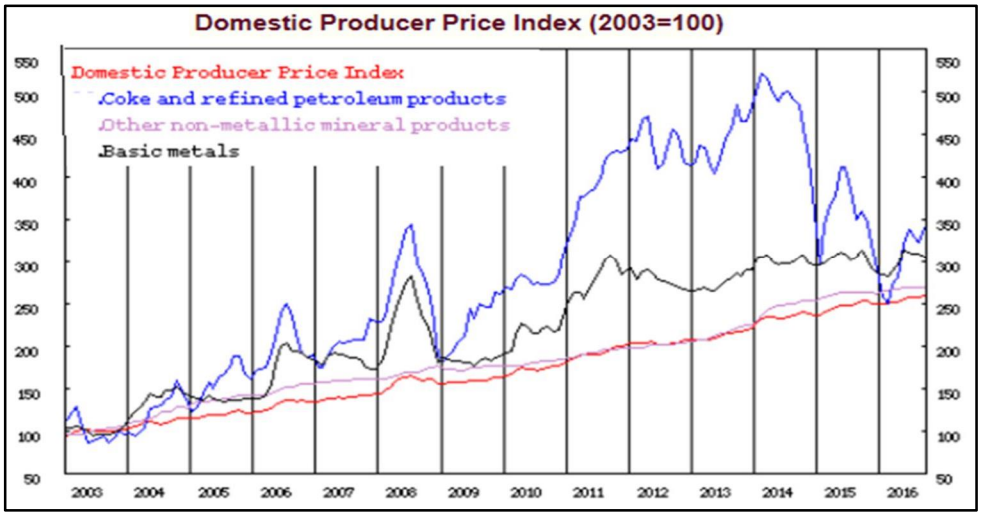

Figure 7.6 *Domestic Producer Price Index in between 2003-2016 (2003=100) (TURKSTAT)*

From Figures 7.5 and 7.6, it is seen that between 2003 and 2016, Consumer Price Index has gone up by about 170%; Domestic Producer Price of all commodities has gone up by about 160%; the index of basic metals price has gone up by about 200%; the index of coke and refined petroleum products price has gone up by about 240%; the index of non-metallic mineral products price has gone up by about 170%.

Therefore, considerable price fluctuations or price increase in Turkey actually is a fact. Considering the continuous fluctuation in material prices and wages of labor, there is a need to have proper escalation clauses in the construction contract. As it stated before, efficient use of resources and equal treatment are the two of the main principles of the Public Procurement Law in Turkey and the basic rationale for a price escalation clause is to compensate the contractor for an increase in construction costs which are beyond the control of both parties.

7.2 The Present Escalation Provisions in Turkey

In Turkey, from the past to present the public procurement and construction works have been undertaken according to the related laws. According to the procurement laws, The Council of Minister in Turkey has published "Escalation Decrees" which have stated the provisions and regulations of price escalation clause in public construction contract. As it is conducted in Chapter 6, in accordance with changing conditions and needs, several decrees have been published in Turkey. In fact, from the past to present, there is an undeniable improvement in the provisions of escalation clause in terms of equity, efficiency, and harmony with the world applications.

Due to some problems arising in the implementation of provisions and deficiencies in some parts of the provisions of escalation decree 2002/5039, a new decree 2013/5217 indeed very similar to the logic of the previous one has been published. In here the summary of the main provisions of presently used escalation decree 2013/5217 is stated.

Article 3 of the Escalation Decree 2013/5217 states that "the principles of this decree are prepared based on Article 8 of Act 4735". When the Article 8 of the Act 4735 is viewed; it states that "The Council of Ministers is authorized to identify the basis and procedures related to the granting price adjustment, according to the proposal of the Public Procurement Authority". In addition Article 7 of Act 4735 with title 'Essential issues have to be included in the contract' states that "for contracts signed under this Act, it is required to include the following information; 'in what way

price adjustment will be paid ’”. When the standard contract is viewed in terms of escalation clause; Article 14.2 of the standard contract with title ‘Price adjustment payment and calculation terms’ states that “there are two options for contracting authorities for escalation clause which are if the contracting authority does not envisage price adjustment, the expression ‘Price differences will not be awarded’ has to be written in the Article 14.2 of contract draft, otherwise the expression ‘Price differences will be awarded’ has to be written in contract draft. In addition to the contract draft, the contracting authorities have to prepare the Article 45.3 of administrative specifications with title ‘Escalation’ in accordance with the provisions of escalation clause of contract draft. If the price adjustment is envisaged, the terms of price escalation clause into the contract and administrative specifications have to be determined according to the principles of escalation decree.

First of all, Escalation Decree 2013/5217 states that price adjustment has to be calculated for the work value that executed according to the approved work schedule.

Price adjustment for public construction projects has to be calculated according to the following formula:

$$\mathbf{[F = An \times B \times (P_n - 1)]} \qquad (7.1)$$

Wherein;

F: Price Adjustment Payment (TL),

A: value of performed work subject to price adjustment,

B: is a fixed coefficient and equal to 0.90,

Pn: is the adjustment multiplier or fluctuation factor which representing the total increase or decrease in the price of materials that used for the execution of work as a result of fluctuation.

The value Pn varies for each interim payment certificate and is represented by the following:

$$\mathbf{Pn} = [\mathbf{a}\frac{\mathbf{In}}{\mathbf{I0}} + \mathbf{b1}\frac{\mathbf{Çn}}{\mathbf{Ç0}} + \mathbf{b2}\frac{\mathbf{Dn}}{\mathbf{D0}} + \mathbf{b3}\frac{\mathbf{Yn}}{\mathbf{Y0}} + \mathbf{b4}\frac{\mathbf{Kn}}{\mathbf{K0}} + \mathbf{b5}\frac{\mathbf{Gn}}{\mathbf{G0}} + \mathbf{c}\frac{\mathbf{Mn}}{\mathbf{M0}}] \quad (7.2)$$

Wherein;

a, b1, b2, b3, b4, b5, c: they are the coefficients representing the proportion of materials that used for the execution of work and sum of these coefficients is equal to one (1).

Io, Ço, Do, Yo, Ko, Go, Mo, In, Çn, Dn, Yn, Kn, Gn, Mn; they are the base and current cost indices for related inputs specified in formula respectively (CPI is used for labor and DPPI is used for others).

7.3 Arguing Points in Relation to the Present Price Escalation System

As stated above, latest price escalation decree for public construction projects has been published in 2013 which states the principles of price escalation system and implementation provisions of escalation clause. On the other hand, there are some arguing points related to the principles of escalation decree and applications of escalation clause. In fact, there is no absolute and only escalation regulation that can solve the price fluctuation problem in construction materials in terms of both client and contractor. On the other hand with the time and experience, suggestions have been provided to improve the escalation system for the construction contract. It is very important that to carry out the construction projects successfully, there is a need to have proper price adjustment system.

As stated before the purpose of this study is to investigate the price adjustment system for public construction projects in Turkey and to provide suggestions that enable us to formulate a rational approach to the escalation system for construction

projects. In order to achieve the aims of the study, separate questionnaires are developed for the administrations and contractors which are the contracting parties of public construction projects. However, before questionnaire survey, a literature review was conducted by analyzing the available sources such as the previous and current escalation decrees, articles, thesis, and web pages. Thereafter, arguing points related to the principles of escalation decree and problems related with the price adjustment applications are revealed. In this section, the main arguing points regarding the price adjustment system have been outlined and discussed.

7.3.1 Arguing Point One and Discussion

In Turkey, as it is stated before, government departments and organizations manage the construction contracts according to the Act 4734, Act 4735 and their annexes. The price adjustment applications are implemented according to the escalation decree. When considering the regulations of the escalation decree, there is no an explicit provision in "escalation decree" related with the necessary conditions for price adjustment, in other words, it is totally up to the decision of contracting authority. Also, there is no a determined project duration in escalation decree that the price escalation clause is applicable in the contract. Therefore in Turkey, some contracting authorities put an escalation clause in the contract to compensate the contractor for the price variations, on the other hand, some departments continued with fixed rates of contracts without allowing any compensation to the contractor. Even for similar construction project tendered by the same government department, while price adjustment payment has been given in favor of the one contractor, adjustment payment has not been given to another contractor because of this unclear situation. Therefore this situation is causing the administrations to be under suspicion, as well as actually, it is wholly contrary to the principle of equality.

By making changes in the provisions of escalation decree, this situation can be clarified and by this way, it can be created more fairly and bilateral escalation decree for the public construction contracts.

According to the current escalation decree, actually putting a price escalation clause into the contract is totally up to the decision of contracting authority. Therefore

contracting authorities should consider the basic principles of Act 4734 such as equal treatment, efficient use of resources, public supervision etc. when deciding to the escalation clause.

In general, construction projects are usually quite lengthy ranging from several months to several years and these projects are executed according to the pre-confirmed contract value. On the other hand, there is a strong probability that there will be fluctuations in the price of construction materials during the implementation of the project. When considering the price adjustment applications in Turkey, first of all, some of the contracting authorities do not put an escalation clause into the contract of projects that their duration is less than 12 months. Even there are many institutions that they do not put escalation clause irrespective of project duration. As it is stated before, before bidding estimated cost is calculated for each public project according to the published unit prices in Turkey. For example, for Ø 14-32 mm smooth steel bar, unit prices of Ministry of Environment and Urban Planning was determined as 730 TL in 2007 and 800 TL in 2008. Considering a building construction project that its contract was signed in July 2007 and project duration is 12 months and also there was not escalation clause into the contract. In Figure 7.7 the Basic Metals Index of DPPI and the Market Price of Steel are shown.

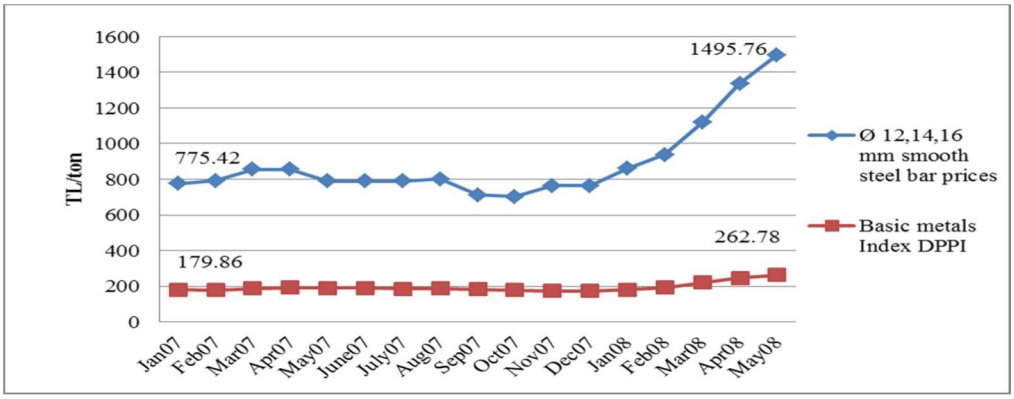

Figure 7.7 *Ø 12,14,16 mm smooth steel bar prices and Basic Metals Index of DPPI (Kardemir Iron Steel Industry Trade Company Inc., TURKSTAT)*

From Figure 7.7, it is seen that between July 2007 and May 2008 the Basic Metals Index of DPPI has gone up by about 46%; on the other hand, the market price of

steel has gone up by about 93% respectively. In this condition, if the contractors have forecasted the price changes before bidding and due to the possible increase in prices they put a considerable risk premium to their proposal and the contract was signed a higher value. On the other hand, if contractors have not estimated the probable price changes and the contract has been signed after competition based on the estimated cost, in this condition contractor most probably lost its profit, experienced financial difficulties and defaulted on their obligations and even if it was a small-medium sized company, most probably it went bankrupt. On the other hand, if the contracting authority has put the escalation clause into the contract, contractors would feel safe about the future price fluctuations and this would cause to be given more aggressive bidding in the auction and also would provide the market stability of construction sector in the country.

As stated before the contracting authorities think that the escalation clause is just an additional financial burden on the public budget. In fact, there is not a comprehensive study related to the cost and benefits of escalation clause in Turkey. However as denoted in Chapter 2, studies show that the regulations related to the price adjustment considerably affect the bid behavior of contractors and also escalation clause can be a way to reduce project costs especially for the long-term contract because thanks to the price adjustment regulation the tenders are awarded by a lower value of contract price, in other words, the risks premiums that government agency has to pay is reduced by escalation clause. In addition, studies also showed that market stability (i.e. a number of contractors leaving and entering the market) is affected by adjustment regulations.

7.3.2 Arguing Point Two and Discussion

In Turkey, Public Procurement Authority has been established according to the Article 53 of Public Procurement Law. Public Procurement Authority is authorized to evaluate and conclude any complaints and claims of contracting parties related to the tender procedures carried out from beginning of tender to the signing of the contract. Therefore contracting parties can apply to the Authority to solve the disputes related to up to the signing of the contract. In addition Article 57 of the Act

4374 with title “Judicial Review” states that the contracting parties can also apply to the Turkish courts for theirs complaints and claims after the decision of PPA so the Authority can be seen as a mediator. On the other hand, complaints and claims of contracting parties related to the execution of the contract are solved in the Turkish courts.

When considering the disputes between contracting parties related with the “Escalation Clause”, they can apply to PPA if there is a problem related to the preparation of escalation clause terms. When the decisions of PPA due to the complaints related with the escalation are investigated, there are about 200 decisions of PPA. Frequently encountered issues in disputes are: the terms of escalation clause should not be included in the tender documents appropriately means that being a mismatch between the administrative specifications and contract in terms of escalation clause; incorrect determination of the indices by administrations that will be used for price adjustment; faulty escalation calculation method of administration etc. (Oktar, 2014).

On the other hand, the disputes encountered in the execution stage of contract related to the escalation are not been subject to the PPA; such disputes are subjected to the judicial jurisdiction. However, Council of Ministers makes regulations related with escalation according to the proposal of PPA, in other words, PPA is authorized to offer proposal related to the principles of escalation system. Therefore actually it would be more appropriate to resolve the disputes encountered in the execution stage of contract related to the price adjustment by PPA. As it is known that court process takes a long time and contracting parties spend a lot of time and effort for the court process so by this way, contracting parties would get rid of defending them in court and they would save time and money. Because PPA can decide more quickly and accurately due to the fact that people who experienced in public procurement are employed in PPA and they investigate many different kinds of disputes related to the tender procedures. In addition, most of the courts are not experienced on these issues and they generally resort to experts to resolve the issues so this condition causes more time to be spent and causes to be taken different decisions on the same subject.

7.3.3 Arguing Point Three and Discussion

When considering the Article 5 of Escalation decree, it states the calculating method of price adjustment. According to the Article 5, the contracting authorities have to use following formula to calculate the adjustment multiplier.

$$\mathbf{Pn} = [\mathbf{a}\frac{\mathbf{In}}{\mathbf{I0}} + \mathbf{b1}\frac{\mathbf{Çn}}{\mathbf{Ç0}} + \mathbf{b2}\frac{\mathbf{Dn}}{\mathbf{D0}} + \mathbf{b3}\frac{\mathbf{Yn}}{\mathbf{Y0}} + \mathbf{b4}\frac{\mathbf{Kn}}{\mathbf{K0}} + \mathbf{b5}\frac{\mathbf{Gn}}{\mathbf{G0}} + \mathbf{c}\frac{\mathbf{Mn}}{\mathbf{M0}}] \quad (7.2)$$

Wherein;

Pn: Adjustment multiplier which calculated based on the above formula by taking into account the input weights and related price index

a, b1, b2, b3, b4, b5, c: These are the weight percentage of inputs that are project-specific representing labor, non-metallic products, basic metal products, coke and refined petroleum products, wood products except furniture, other materials and depreciation of machinery and equipment respectively.

Io, Ço, Do, Yo, Ko, Go, Mo, In, Çn, Dn, Yn, Kn, Gn, Mn; These are the base and current cost indices for related inputs specified in formula respectively and published by the TURKSTAT (CPI for labor and DPPI for others).

Article 5 of Escalation decree states that the sum of the coefficients "a, b1, b2, b3, b4, b5 and c" has to be equal to one (1.00) and contracting authorities have to determine these coefficients and show in tender document before bidding according to the nature and needs of the work and also coefficients are not modified for any reason during the execution of the contract.

On the other hand, Article 5 of Escalation decree also states that if the weight of inputs (the coefficients) is not determined by contracting authorities and shown in the tender document, the contracting authorities have to use following formula to calculate the adjustment multiplier.

$$[\mathbf{Pn = 1x\ (G_n/G_o)}\ ] \quad (7.3)$$

Wherein;

Gn, Go: The base and current cost index of Domestic Producer Price Index for all commodities respectively.

Obviously, the problem begins at this point. Because this provision of escalation decree generally leads being preferred the easier management way of price adjustment and some contracting authorities determine the inputs weight, on the other hand, some departments do not determine and use just general index in the calculation of escalation. Even for similar construction work tendered by the same government department, while inputs weight is determined for one project, but they are not determined for another project. As a result of this situation, price adjustment system will be separated from its general objectives because the general index of Domestic Producer Price Index does not reflect appropriately the price changes.

As it is stated before in Chapter 5, TURKSTAT publishes the Domestic Producer Price Index monthly and these indices are used in escalation clause to calculate the price variations in Turkey. When looking at the detail of DPPI it includes the Mining and Quarrying, Manufacturing, Electricity, Gas and Water sectors and geographical coverage is all Turkey. Table 7.7 shows the detail of main groups, items number and weights of DPPI. In addition, Table 7.8 shows the detail of subgroups of manufacturing group in DPPI. Indices are shown in Table 7.8 have been used for escalation calculations in Turkey.

Table 7.1 *Detail of main groups and items number and weights of DPPI (TURKSTAT)*

Main Groups	Items Number	Weight of Main Groups
Agriculture, hunting and forestry	81	19.84%
Fishing	28	0.29%
Mining and stone quarrying	16	1.62%
Manufacturing	631	73.33%
Electricity, gas and water	3	5.21%
Total	759	100

Table 7.2 *Detail of subgroups of manufacturing group in DPPI (TURKSTAT)*

Subgroup of Group C Manufacturing	**No. of Sub Group**	**Notation in Escalation formula**
Non-metalic products	7	Ç
Basic metal industry	5	D
Coke and refined petroleum	2	Y
Wood products, except furniture	2	K
Machinery and equipment, n.e.c.	4	M

From Table 7.7, it can be seen that around 759 items are involved in the DPPI and general index of DPPI includes agriculture, forestry, fishing, mining and many other commodities which are not actually related to the construction activity. Further going into details on a selective basis, as it can be seen from Table 7.8 around 3.29 % of listed commodities are determined in escalation formula such that they can reflect the construction activities directly or indirectly and the others are irrelevant to the construction industry.

In addition, the tendency of change of General Index and Indices used in escalation clause, are shown in Figure 7.8. From Figure 7.8, it is seen that between 2006 and 2016 the General Index and others has varied independently from each other. For example between 2011 and 2015 Basic metals Index and Coke and refined petroleum products Index considerably changed differently from General Index. From this, it is clear that the price adjustment calculated by using general index is not reflecting nature of fluctuation truly because it covers 759 items which are irrelevant to the construction industry.

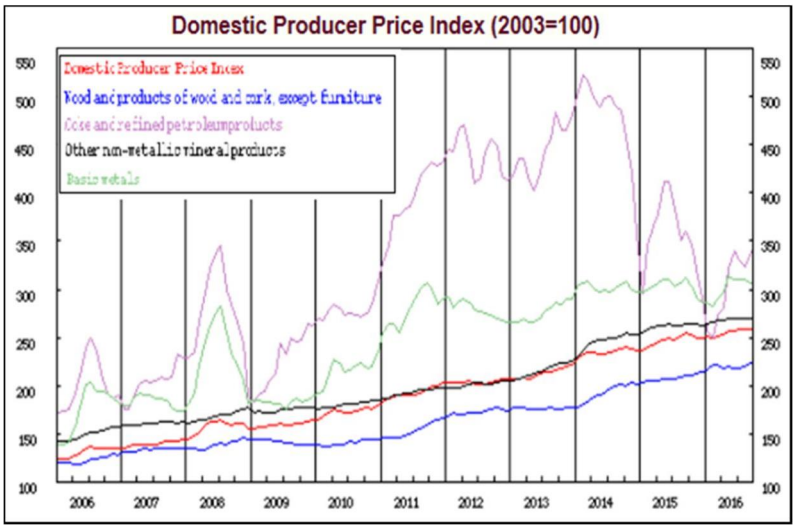

Figure 7.8 *Reference Price Indices used in price adjustment (TURKSTAT)*

As an example to illustrate the effects of a determination of inputs weight on the escalation calculation, considering a construction project that bidding date is August 2007 and project is going to be implemented between September 2007 and December 2008. The total contract value is 16 Million TL and each interim payment certificate value is 1 Million TL means there is a linear distribution of works. In this example, the escalation payment is calculated according to determined input coefficient and also calculated using the general index. Table 7.9 shows the weight of inputs. After making required calculations, (Pn-1) value and Escalation payment values are shown in Figure 7.9 and 7.10 respectively.

Table 7.3 *Weight of inputs*

Inputs	Weigh of Inputs
a: coefficient for labor	0.15
b1: coefficient for non-metalic products	0.1
b2: coefficient for basic metals	0.2
b3: coefficient for petroleum products	0.2
b4: coefficient for wooden products	0.1
b5: coefficient for other materials	0.1
c: coefficient for machinery and equipment	0.15
Total	1

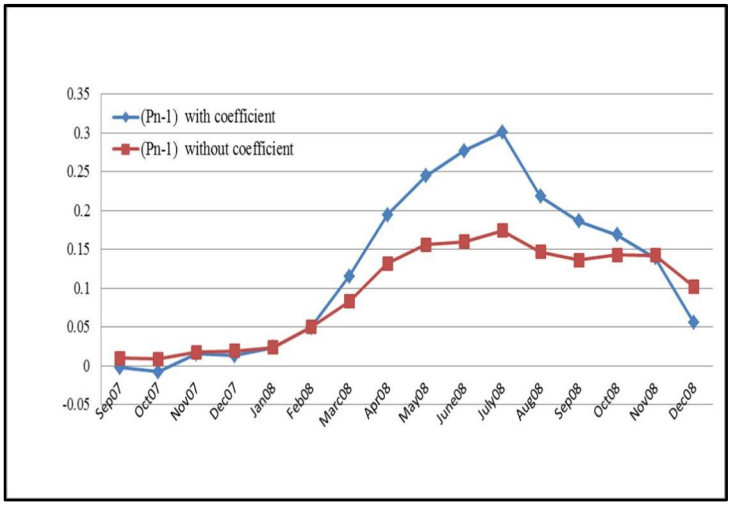

Figure 7.9 *(Pn-1) values*

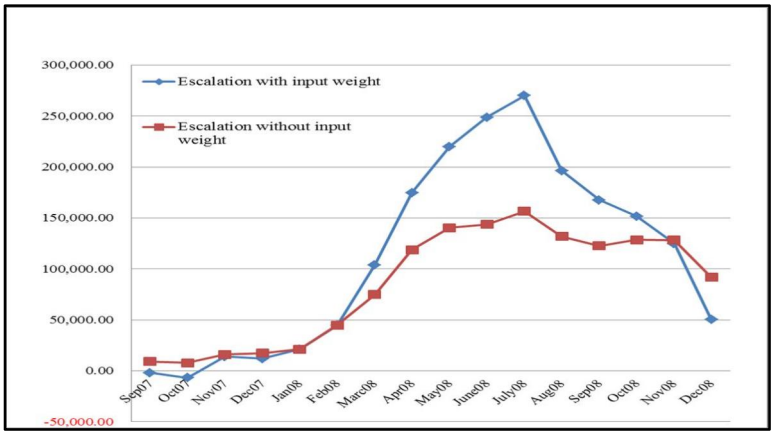

Figure 7.10 *Escalation payment values*

From Figure 7.9 and 7.10, it is seen that if escalation payment is calculated taking into account only the general index, the total value of payment will be 1,354,579.81 TL. On the other hand, if the contracting authority determines the inputs weight and performs calculations according to these inputs and related indices the total value of payment will be 1,791,989.68 TL. Since general index does not reflect the true picture of the variation in prices, the contractor will be paid %32 less than the real price variations and price adjustment system will be separated from its general objectives. In addition, as it is stated before if the (Pn-1) value less than one (1) it means a price adjustment deduction has to be applied to the Interim Payment

Certificate of the contractor. When looking at Figure 7.9, in October 2007 according to the value of (Pn-1) it is less than one (1) within coefficient case means indeed the price adjustment deduction has to be made from Interim Payment Certificate in this month. As it can be understood from the example, the contracting authorities should determine these coefficients very accurately before tender because the price adjustment amount to pay or to cut greatly varies according to the selected weight ratio and indices.

Construction projects are unique and they have a different composition of materials and specifications based on the type of project. Each has its own resources and the contracting authorities should determine the resources weights before bidding and the escalation calculations should be performed according to these weights. As it is stated before indeed escalation decree forces the contracting authorities to determine these coefficients but there is also an expression that "if weight of inputs cannot determined" general index has to be used to perform price adjustment and governmental agencies generally prefer the easier management way of price adjustment and they do not determine the inputs weight as a result of this unclear situations.

As a solution for this unclear situation, by making a change in escalation decree it should be made compulsory to determine the input weights and related indices in contract document depending on the nature of work.

7.3.4 Arguing Point Four and Discussion

When considering the Article 5 of Escalation decree, it states the calculating method of price adjustment. According to the Article 5, Consumer Price Index is used to measure the price changes for labor, and the Domestic Producer Price Index is used to measure the price changes for steel, cement, timber, fuel and any other construction materials. From Article 5 it is understood that governmental agencies have to use these indices for price adjustment for all types of projects. However, each specific type of project is a different combination of resources. In this condition, there is an argument that price changes for different kind of construction projects

should be measured by different types of price indices which are created by measuring the price changes regarding resources that used for those types of projects.

Now the question is that in order to measure cost escalation in a construction contract is it appropriate to use Consumer Price Index for labor and DPPI for other construction materials or are there any other alternatives such as using market prices or using special construction cost indices produced for specific types of project.

As stated Chapter 5 in detail, various price indices have been published by different governmental agencies in Turkey. TURKSTAT published Wholesale Price Index between 1994-2013 and up to this date WPI was used in price adjustment for construction materials. With the European Union harmonization process, TURKSTAT publishes Domestic Producer Price Index which takes NACE_REV.2 as a basis. Now contracting authorities use the DPPI in price adjustment for construction materials. The main difference between the Wholesale Price Index and Domestic Producer Price Index is emerging in the price compilation. Prices in WPI was a kind of mixed prices which means prices was taken partially from producers and partially from the mediators who do not make sales and who are engaged with wholesale. On the other hand, DPPI prices especially are taken from the producers and product prices are taken as domestic sales prices excluding value added tax taxes so DPPI comes now to set up a more significant index which measures the differences in prices during the production period.

In addition, TURKSTAT has published Building Construction Cost Index on a quarterly basis since 1991 to identify changes in the cost of input items used in construction projects. The index covers the construction of houses and apartments, shops and commercial buildings, medical buildings, schools and cultural buildings, and administrative buildings. TURKSTAT also has published Seasonally and Calendar Adjusted Gross-Wage Salaries Index to measure the gross wage changes of employees in construction sector quarterly.

First of all, when considering the escalation decree, it determines the Consumer Price Index to measure the price changes for labor. CPI is aimed to calculate the inflation rate by using the change of the prices of goods and services existed in the market.

For this purpose, expenditures of households, constitutional population such as population lives in hotels, schools etc. and foreign visitors all of the final monetary expenditures are taken into account and 417 commodities are used in the compilation of the index. The drawbacks of the using CPI for labor price changes in the calculation of escalation, actually it does not reflect the actual consumption pattern of the average construction worker.

As stated before escalation is not only related to the inflation but also related with supply-demand imbalance, market conditions, and local factors. Actually, CPI is related with average changes in the prices of goods and services but the wage of construction workers is not accurately related to the general consumption habits. In addition, construction projects are built in different parts of the country and the wage of workers that contractor has to paid considerably differs from place to place so the CPI may not be an indicator to measure the localized wage changes accurately and sufficiently. In fact, while CPI may be accurate for the larger cities but it may not reflect the cost in a rural area at the time of the contract and most of the time local labor is used by the contractors. In addition, the construction industry today employs predominantly large skilled labor force and the wages of these workers are generally different from an ordinary person wage. So CPI is not adequate to reflect the labor cost variations for construction projects.

Therefore as an alternative method to have a fair price adjustment system for labor component, first of all, regulations can be made in escalation decree for the use of different indices. Alternative indices can be formed and published by TURKSTAT to reflect the wage variations of construction workers. In fact, TURKSTAT has published Seasonally and Calendar Adjusted Gross-Wage Salaries Index to measure the gross wage changes of employees in construction sector quarterly. This index can be used or a new index similar to this can be created to use for price adjustment of labor component.

When considering the drawbacks of the using DPPI to measure the price changes for steel, cement, timber, fuel and any other construction materials, actually they are similar to the reasons of CPI. DPPI is released for the country as a whole but in

Turkey, the prices at different regions vary considerably. Thus, it can be unrealistic to use a single index for the whole country. Also construction projects being unique in nature have a different composition of materials and specifications based on the type of project. For example, the road project is different from hydropower project, etc. In fact, with the wide variety of materials used in construction, it is not always possible to find an index reflective of all the materials used but a specific index based on the sectors of construction can be formed.

Instead of using DPPI in price adjustment for all construction project, first of all, as it stated in Chapter 4 literature review, considering the study of Kahraman (2005), it concluded that BCCI is appropriate indices in terms of representation of the variations in building construction costs for the civil works. Therefore regulations can be made in escalation decree for the use of BCCI for building construction projects. Secondly, different construction cost indices can be developed to monitor variations in the overall cost of construction for various types of projects such as roads, bridges, railway construction, dams, power plants, transmission, infrastructure and maintenance and also these indices can be formed according to the major regions of Turkey. In fact when considering the main parameters that are required to create Kahraman (2005) produced four indices, first parameter is unit rate (price) that is published by governmental agencies, the second parameter is a detailed bill of quantities and cost of work items that is formed by BoQ. In Turkey, contract values of the public construction project are collected in PPA and also contacting authorities have data related to final contract amount and final work that is made under the contract. Therefore, these data related to the construction project can be collected in systematic ways under PPA, and new construction indices can be formed as the Kahraman (2005) study.

Another alternative can be using the market prices instead of using DPPI in price adjustment for some kind of construction project. Actually according to the Escalation decree using DPPI is mandatory. However, in some types of construction projects that are executed in Turkey, to measure the prices changes with DPPI is not fair. For example, there are a huge amount of mechanical and electrical procurement in power plants or a dams projects in which most of the related equipment are

imported. Since DPPI does not reflect the true picture of the variation in prices so for this kind of conditions hybrid method combinations of the market rate and index method can be used for price adjustment for this types of projects or work items. In this method, some materials can be adjusted by using formula and indices and some special materials can be adjusted according to their market prices. To use this method, regulations should be made in escalation decree such that, related prices or indices can be used to calculate the escalation similar to the sub-clause 13.8 of FIDIC. However as stated in Chapter 3, there are some limitations that contracting authorities should be careful when using market price method. First of all, to compare the market prices of any inputs, multiple vendors would be required to be determined. To overcome this problem the prices of Chamber of Trade and Commerce can be taken as a basis or some vendor's prices can be determined as a basis. Owners also have to control that the materials purchased were actually integrated into the project. Project owners have to determine a calculation way in invoice method before bidding such that the base price of the material that will be used for implementation of the project can be fixed on the date of tender and the current price can be taken as the price of the material in the implementation month.

CHAPTER 8

RESEARCH METHODOLOGY AND THE QUESTIONNAIRE

In this chapter the methodology used in the study has been outlined. The steps followed in the methodology adopted for this research are explained sequentially in order to provide a total picture of the thesis.

8.1 Introduction

The purposes of this study are;

- ✓ to examine the presently used escalation decree in public construction projects in Turkey
- ✓ to examine the escalation clauses in construction contracts adopted by various government agencies in Turkey
- ✓ to examine how price adjustment applications affect contractor's bid behavior
- ✓ to examine the effects of cost escalation on the outcome of construction projects in case of not existing an appropriate price escalation clause in contract
- ✓ to examine the arguing points related to the current price escalation decree and price adjustment applications
- ✓ to suggest policies to improve the price adjustment system in public construction contract

To achieve the purposes of this study, an opinion questionnaire survey is prepared and questionnaire is directed towards representatives from contracting parties of public projects. This questionnaire helps to discover the controversial points related to the price adjustment system in public construction projects with different

perspectives of contracting parties and also helps to find out suggestions to improve the price adjustment system based on the experience of the contracting parties.

8.2 Research Methodology

The steps of the research process are shown in Figure 8.

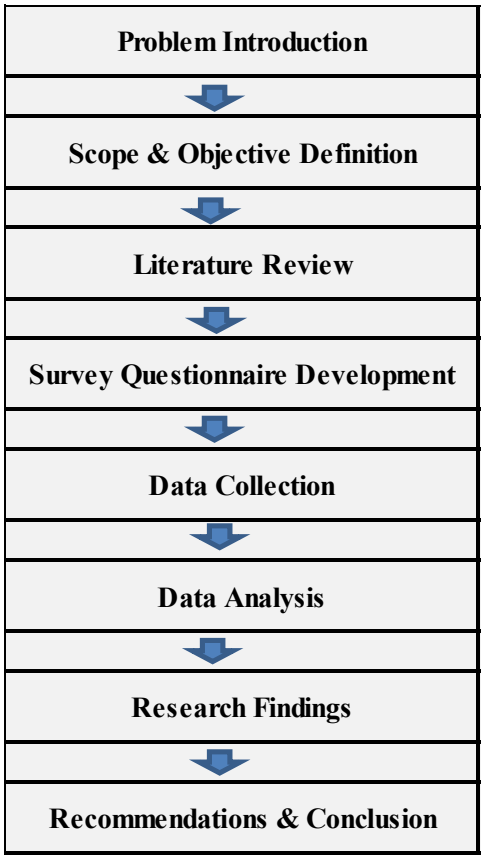

Figure 8.1 *Research steps (Mohammadi, 2015)*

A brief explanation of each step is provided to understand the overall methodology followed in this research:

Problem Introduction:

Construction projects generally take over a year for completion and material prices and wages of labor increase in the implementation phase of projects. Due to the cost increases in construction inputs, most contractors have to bear considerable financial damage and this condition causes major problems in administration of the contracts.

To cope with these types of problems, there is a need to have proper escalation regulations and provisions to carry out the construction projects successfully. In fact there is no perfect and only escalation regulation, clause, formula or provision that can solve the problems related to the construction input price changes in all conditions from the perspectives of both the a contractor and a client. However with time and experience, the escalation regulations and price adjustment system are being improved to solve problems related with price changes. Therefore to have a proper Price Escalation Decree and price adjustment applications, it is needed to analyze the escalation decree and price escalation clauses in public construction contracts, identify the problems related to applications and finally provide suggestions to improve the price adjustment system.

Scope & Objective Definition:

The scope of this thesis study is the price adjustment applications in Public Construction Projects in Turkey and objective of this study is to identify the problems related to price adjustment applications and provide suggestions to improve the system.

Literature Review:

A deep literature review was conducted to investigate the previous and current Price Escalation Decrees and their applications in public construction projects in Turkey. In investigating the previous and current escalation decrees, the problems faced in the application of these decrees are discussed. In the literature review different countries escalation regulations and applications are investigated and some studies are also analyzed to provide certain suggestions for formulating a rational approach to the escalation system in construction projects.

Survey Questionnaire Development:

In order to realize the purpose of this study, a web based questionnaire is developed to present the problems related to price adjustment applications, to identify the controversial points related to escalation decree and provide suggestions to improve the price adjustment system. The questionnaire survey was prepared with Google Forms and this survey sent to various governmental agencies and construction

companies. The research is mainly dependent on the perception of contracting parties of public construction projects. Therefore the research method chosen for this study is quantitative research through data collected from an online survey. In online questionnaire mostly Likert type of rating questions is formed in order to compare attitudes of participants. The detail of the questionnaire is provided in the Appendix.

Data Collection:

The questionnaire was distributed to respondents through email. The respondents chosen for this research are the participants who participated in public construction projects. Therefore, there are two types of respondents for this research such that the government agencies which tender and control the implementation of the public construction projects and the construction companies which take part in as a contractor in public construction projects. Therefore, the questionnaire was distributed to various governmental agencies and construction companies.

Data Analysis:

The collected data were analyzed to obtain the results of this study. Likert type of rating questions were prepared and frequency analysis, percentage analysis, the mean average analysis, relative importance index were used to analyze the results. The details of evolutions method of results are given later on in this chapter.

Research Findings:

After sending the questionnaire to the respondents and gathering the data, the research results and findings were tabulated and discussed in Chapter 9.

Recommendations & Conclusion:

According to research findings conclusions were drawn. At the end of this study, certain suggestions are provided to improve the price adjustment system in public construction project in Turkey.

8.3 Questionnaire Survey

A web based questionnaire was prepared and used to obtain the views of contracting parties i.e. public institutions and the private sector companies, on the topic of price

adjustment system in public construction projects. To make it easier to respond to survey questions, explanations were made about sections and questions and also most of the questions of survey were prepared as a Matrix Questionnaire in the digital platform. The advantageous aspect of online questionnaires is that the turnaround of data gathering process and the analysis is much faster and easier since the provided information is already in digital format (Mohammadi, 2015).

The questionnaire was distributed to client representatives in the level of Assistant Engineers to Chief Engineers of different governmental agencies such as Bank of Provenience, General Directorate of Highways, and General Directorate of State Hydraulic Works, Turkish Electricity Transmission Company, Municipality; and contractor representatives who have executed projects for these governmental agencies. This questionnaire survey was directed between December 2016 and January 2017.

8.3.1 Questionnaire Development

First, a deep literature review was conducted by analyzing the available sources such as the previous and current escalation decrees, articles, thesis, and web pages. Thereafter, problems related to the Price Escalation Decree and price adjustment applications are revealed. To develop the questionnaire, different countries escalation regulations and applications are also investigated. To provide suggestions to improve the price adjustment system, articles and thesis are investigated. After all, a preliminary questionnaire was created. To test the survey questions in terms of proper wording, ambiguities, and vagueness, contents, format and sequencing etc. experts who are working on position related to tendering of public construction project, supervision of public construction project, the inspection of projects, experts who are working at Public Procurement Authority and also experts from construction companies were interviewed to get feedback on the questionnaire. Experts offered some suggestions related with the questionnaire such that;

- ✓ In preliminary questionnaire a single questionnaire was prepared for contractors and clients, but there were some questions related with only contractors or clients and there was an expansion for these types of questions

such that “only for private sector” or “ only for public sector”. To prevent confusion and to make an easy going questionnaire, separate questionnaires were designed for the administrations and contractors.

- ✓ In preliminary questionnaire, the controversial points related to the price adjustment system in public construction projects and suggestions to improve the system were provided under same headings. For a better evaluation of participants, controversial points and suggestions were provided under different sub groups.
- ✓ To ensure better understanding of questions, experts suggested giving examples for some questions.
- ✓ Experts indicate a problem for current price escalation decree that the current price escalation decree does not envisage the price adjustment for the increase in foreign exchange rate and therefore unpredictable increases in exchange rates bring contracts to an incomplete state.
- ✓ Experts indicate a problem for current price escalation decree that according to the escalation decree; if it is needed to determine new unit price for a work item in execution phase of project, the unit price for this work items have to be prepared based on the rate of contract year and have to be updated by indices. Experts state that it is not fair determining the new unit price such a way because the price increases in the market price of a construction material or work item mostly more than the increase in the value of index.
- ✓ Experts indicate that while the price escalation decree is being prepared, all parties' opinions should be taken and reflected in decree.
- ✓ Experts indicate that the reduction factor B = 0.9 in the price adjustment formula, should be determined taking into account the economic and other conditions to reflect price changes more fairly.
- ✓ To be more effective in terms of time, expertise, practice association etc. PPA should be authorized to solve problems related to the price adjustment applications in the execution phase of project, instead of judicial jurisdiction.

Thereafter, according to the experts' opinions suggestions and warnings, the preliminary questionnaire was analyzed, expanded, detailed and modified and then the final questionnaire form was created based on;

- ✓ Literature Review
- ✓ Interview with Experts
- ✓ Past experiences related with price adjustment system

8.3.2 The Structure of the Questionnaire

Both questionnaire surveys consist of six parts:

Part A: This section contains general questions that help to define the participants' profiles, project and organization data of the respondents.

Part B: This section is prepared to examine how the price adjustment regulations affect the contractor's bid behavior.

Part C: This section is prepared to examine the effects of cost escalation on the projects in case of not existing an appropriate price escalation clause in contract.

Part D: This section is prepared to investigate the price adjustment applications in construction contracts in terms of The Principles of Escalation Decree.

Part E: This section is prepared to examine the controversial points related to the Escalation Decree and Price Adjustment Applications.

Part F: This section includes suggestions to improve the Escalation Decree and Price Adjustment Applications.

8.3.2.1 Profile of the respondents and information about contracting parties

In the first part of both questionnaires there are questions about the experience of respondents. In addition there is a question related to the types of construction projects that company or administration are undertaking. On the other hand, in questionnaire for Contractors, there are some questions related to the company's age, size, and labor force. In Contractors questionnaire, there is also a question related to the average annual value of public project that respondents' companies have

completed. At the same time, in questionnaire for Administrations, there is a question that describes the position of respondents in execution of construction projects, and also question that seeks to find out total yearly construction project tenders realized by respondents' administration.

8.3.2.2 The effects of price adjustment regulations on the contractor's bid behavior.

In this section, questions were prepared to identify the effects of price adjustment regulations on contractors' bid behavior. In both questionnaires, there is a validation question based on a 5-point Likert rating scale (1- Strongly disagree and 5- Strongly agree) to identify the effects of inclusion a price escalation clause into the contract in terms of the number of firms participating in the tender and bid price from the point of views of participants. In this section, there is also a 5-point Likert rating scale question for Contractors (1- Very low effect and 5- Very high effect) to identify the influence of price adjustment regulations on contractor's bid behavior in terms of bid/ no-bid decision, bid price, and also the effects of calculation method (General Index or Weight ratio method) of the price adjustment payment on the bid price. Moreover there is a question for contractors that seek to determine the method in use to take measures against price changes when determining risk premium and bid price. In this question there are three options such as formal methods (future index estimation methods etc.), intuitive methods (foresight of experienced workers, past project experience etc.) and sometimes formal sometimes intuitive methods.

8.3.2.3 The effects of cost escalation on the projects in case of not existing an appropriate price escalation clause in contract

In this section, there is a 5-point Likert rating scale question (1- Strongly disagree and 5- Strongly agree) for contracting parties to identify the effects of price changes on the construction projects in case of not existing an appropriate price escalation clause in contract. In this question, 5 prominent effects of cost escalation on the produced projects were listed such that;

- ✓ Delay of project
- ✓ Cancellation or termination of project

- ✓ Cash flow (financing) problems in the execution phase of projects
- ✓ Poor quality of construction work
- ✓ Dispute among contracting parties

The respondents were asked to assess these prominent effects of price changes on project in case of not existing an appropriate price escalation clause in contract.

8.3.2.4 Price adjustment applications in construction contracts in terms of the principles of price escalation decree

In this section, there are three 5-point Likert rating scale questions for contracting parties to identify reasons that why price escalation clause is not included in some contracts, to investigate the provisions and applications of price escalation clause in relation to the principles of Price Escalation Decree, and also to assign the importance of the listed factors on the decision of inclusion of price escalation clause in the construction contract.

In the first question, some reasons that are related to not inclusion of price escalation clause in some of the construction contract are listed and the respondents were asked to assign the importance level of these factors on the decision of inclusion the price escalation clause in the construction contract 1 to 5 where, '1' is Very low importance and '5' is Very high importance score. The listed reasons are;

- ✓ Contract duration is short (<12 month)
- ✓ The thought that it brings additional financial burden to the public budget
- ✓ The idea that input costs have not changed significantly
- ✓ Management of price escalation clause increase the workload of administrations
- ✓ Administrations have inadequate knowledge of market conditions and price changes

In the second question, in relation to the principles of Price Escalation Decree, cases related to the application of the price escalation clause included in the construction contracts are listed and the respondents were asked to indicate the frequency of encountering with these cases 1 to 5 where, '1' is Never and '5' is Very Frequently score. The listed price escalation clause applications in construction contracts are;

- ✓ In the contracts of the construction works, there is the price escalation clause
- ✓ In the contracts contain price escalation clause, price adjustment calculation is performed by using General Index.
- ✓ In the contracts contain price escalation clause, the input coefficients a, b1, b2, b3, b4, b5 and c are determined appropriately based on the nature of construction work.
- ✓ In the contracts contain price escalation clause, different input coefficients are determined for different part of (earth works, superstructure works, etc.) construction project.
- ✓ In the contracts contain price escalation clause, more than one index is used in price adjustment calculation based on types of inputs used for the related work item (For example, the use of the Base Metals index or sub-indices represented by the coefficient b2 based on the nature of work item).

In the third question, the respondents were asked to evaluate the importance of the listed factors that affect the decision of inclusion the price escalation clause in the contract based on their experience 1 to 5 where, '1' is Very low importance and '5' is Very high importance score. The listed factors are;

- ✓ The duration of the project
- ✓ Type of project (Infrastructure, Superstructure, Dam, Road etc.)
- ✓ The nature of work items (i.e. special technology and material-requiring work items)
- ✓ Size of the project (Estimated Cost)
- ✓ Economic conditions of the country
- ✓ Other

8.3.2.5 Problems related to price adjustment applications and controversial issues related to the current escalation decree

In the first question, to identify the perception of contracting parties related to the current Escalation Decree and price adjustment applications, the respondents were asked to evaluate applications and decree according to the 5-point Likert rating scale where, '1' is Very poor and '5' is Excellent score.

In the first section of second question, problems related to Price Adjustment Applications are listed and respondents were asked to indicate their responses based on their experience 1 to 5 where, '1' is Strongly disagree and '5' is Strongly agree score. The listed application problems are;

- ✓ Clients resist honoring the escalation clauses.
- ✓ In contracts without a price escalation clause, the administrations make work increases within the scope of contract.
- ✓ There are inconsistencies in terms of the price escalation clause provisions in the contract and the administrative specification.
- ✓ The indices to be used in the price adjustment formulas are determined incorrectly by the administrations.
- ✓ The input coefficients determined by the administrations do not fit the nature of project.
- ✓ Different price adjustment applications of departments within the same institution (i.e. input coefficients are determined in one Regional Directorate tenders but are not determined in another).
- ✓ Different price adjustment implementations of different government agencies (i.e. input coefficients are determined in one Regional Directorate tenders but are not determined in another).
- ✓ For similar projects, the same institutions perform different price adjustment applications at different times (i.e. a price adjustment is paid for a superstructure project in 2013, it is not paid for a similar project in 2015).

In the second section of second question, controversial issues related to the current Escalation Decree are listed and based on the experience of contracting parties, the respondents were asked to evaluate these issues according to the 5-point Likert rating scale where, '1' is Strongly disagree and '5' is Strongly agree score. The listed controversial issues are;

- ✓ The principles in the current price escalation decree are insufficient to meet the increases in price.
- ✓ The indices used for the price adjustment payment do not exactly reflect the market conditions.

- ✓ Items that constitute inputs to indices are not specific to the construction sector.
- ✓ For work items that the unit price is absent in the contract and whose contract year unit price is able to be determined according to the General Conditions of Construction Works, If the new unit price is determined based on contract year's terms and conditions, it does not reflect actual the price changes appropriately.
- ✓ Using deduction factor B = 0.9 in the price adjustment formula, causing a 10% underpayment or interruption in adjustment payment.
- ✓ As the price increases realized in the equipment supplied from abroad are valued over Turkish Lira, in contracts that require imports of materials from abroad, price increases cannot be met with the existing decree bases.
- ✓ Unpredictable increases in exchange rates bring contracts to an incomplete state because the current price escalation decree does not envisage the price adjustment depending on the increase in foreign exchange rate.

In the third question of contractor questionnaire, the main input materials for construction projects such as labor, cement, steel, fuel, timber, equipment and other materials are listed and the respondents were asked to evaluate the adequacy of compensation paid to the contractor based on presently used escalation clause in public construction contracts in Turkey according to the scale as Low (< %30), Medium (% 30- 60) and High (> 60).

The last question for both questionnaires in this part was prepared to identify the views of contracting parties related to the necessity of improving the current price escalation decree and its implementations according to a validation question based on a 5-point Likert rating scale where, '1' is Strongly disagree and '5' is Strongly agree score.

8.3.2.6 Suggestions to improve the price escalation decree and price adjustment applications

In the last part of questionnaire, suggestions to improve the price escalation decree and price adjustment applications were determined based on literature survey and

experts' opinion. The respondents were asked to evaluate these suggestions according to the 5-point Likert rating scale where, '1' is Strongly disagree and '5' is Strongly agree score. The listed suggestions are;

- ✓ The contracting authorities should be informed about the price escalation decree together with its applications and a platform should be established where Public Institutions should share their experiences with other Public Institutions.
- ✓ The contracting authorities should be trained in the preparation of the BoQ/ estimated cost and the determination of input weight ratios.
- ✓ The price escalation clause provisions in the contract and its annexes should exist in accordance with the price escalation decree.
- ✓ The practices of the contracting authorities should be united in terms of inclusion of the price escalation clause into contract.
- ✓ As stated in the escalation decree, based on the nature of project, different input coefficients (b1, b2, b3, b4, b5) and different indices should be determined to use in different parts/phases of the construction work (earthworks, superstructure works etc.) by contracting authorities before tender.
- ✓ For work items that the unit price is absent in the contract, if a new unit price is prepared during implementation of project, instead of escalating contract prices to the implementation time by using index, the new unit price should be determined according to the rate and conditions of the preparation time.
- ✓ In contracts in which the price adjustment payment is not foreseen and there is a time extension due to the problems arising from the contracting authority, the price difference should not be interrupted if the Pn value for the application month is less than 1.
- ✓ To have a reasonable price adjustment system, deduction rate B = 0.9 in the price adjustment formula should be determined by taking economic and other conditions into account.

- ✓ There is a need to make regulations in escalation decree for the payment of the price difference due to the unpredictable increase (Central Bank Forecasts etc.) in the foreign exchange rate.
- ✓ There should be made regulations in escalation decree to perform the price adjustment calculation for special kind of imported equipment, machinery, and materials by using prices published by market actors (Chamber of Commerce Industry prices) instead of using indices.
- ✓ Instead of the using Consumer Price Index to measure the price changes taking place in labor input, Construction Industry Gross Wage-Salary Index, Building Construction Costs Workers Index published by TURKSTAT should be taken as a basis or a new index for labor should be formed.
- ✓ Construction indices that are specific to construction project types and that consider construction sector inputs should be created and used in price adjustment (Building Cost Index, Road Cost Index, etc.).
- ✓ By taking into account local price differences, local price coefficients should be created to apply to price indices for local price differences.
- ✓ While the price escalation decree is being prepared, all parties' opinions should be taken and reflected in decree.
- ✓ To be more effective in terms of time, expertise, practice association etc. PPA should be authorized to solve problems related to the price adjustment applications in the execution phase of project, instead of judicial jurisdiction.
- ✓ In order to estimate future price changes, a web-based "Forecasting Module" which is open to the use of administration and contractors should be established on the web site of the PPA.
- ✓ In order to simplify the calculation of price adjustment calculations and to avoid differences in implementation, a web-based "Price Adjustment Calculation Module" which is open to the use of administration and contractors should be established on the web site of the PPA.

8.4 Evaluation of Responses

Some of the questions in questionnaire are multiple choice question types and most of the questions are Likert scale question types, such as scale of agreement, frequency of occurrence or importance of the question statement. These types of survey questions were designed as it limits the number of variations in possible responses. In fact 'It was noticed that a great number of the five-point statements, i.e. "the multiple choice" or "strongly approve" statements (in each case the subject being offered five alternatives from which to choose), yielded a distribution resembling a normal distribution' (Likert, 1932). Therefore, creation of five choices multiple questions presenting a normal distributed scale is the best alternative to measure expert opinions.

For the purpose of scoring, a numerical value is assigned to each possible choice. For the Likert scale question types, from one to five values were appointed to each alternative. The meaning of the scale numbers differs according to the statements of related questions. The scale consisting of numbers with the meanings is demonstrated in Table 1.

Table 8.1 *Scales in questionnaire*

Scale No	**Meaning**				
1	Very low effect	Strongly disagree	Never	Very poor	Very low importance
2	Low effect	Disagree	Sometimes	Poor	Low importance
3	Moderate effect	Undecided	Usually	Good	Moderate importance
4	High effect	Agree	Frequently	Very good	High importance
5	Very high effect	Strongly agree	Very Frequently	Excellent	Very high importance

To evaluate the data gathered by questionnaire, frequency analysis, percentage analysis, mean average analysis were used. Relative importance index (RII) was also

used to represent the results of the data collected. These methods have been mostly used in similar research works.

In the mean average analysis, a participant's response to each question is given a score and then all participants' scores are combined by finding out the mean average. To comment the mean average analysis results a four point scale was used. The meanings of the four point scale are expressed according to the statement of the questions. Although the answers of multiple choice ratings comprise of five alternatives, scale of the results comprises of four categories. This is just because of the fact that numerical values of results lay between two degrees or in other words lay in a range.

In addition, the ratings of the question made by respondents against the five-point scale were combined and converted to deduce the Relative importance indices RA_x of the various statements as follows:

$$RA_x = \frac{\Sigma r}{A \times N} \qquad (8.1)$$

Where Σr = summation of the weightings given to each factor.

A = highest rating and N= Total number of respondents for that factor.

As an example, an agreement type of a question for suggestions to improve the price adjustment system as 'The price escalation clause provisions in the contract and its annexes should be in accordance with the price escalation decree'. For this suggestion, the respondents score according to the 5 point scale and the Relative Importance of this suggestion was calculated as;

Weight = 1(1) + 2(2) + 3(5) + 4(7) + 5(15) = 123

Relative Importance index = 123/ 5(1 + 2 +5 +7+15) = 0.82

Thereafter, according to the Relative Importance Index, the questions were analyzed, investigated and interpreted. The factor with the highest relative importance index

was then ranked as 1, and then followed by two as the next higher rank and so on according to the statements of related questions (Adobor, 2014).

CHAPTER 9

RESEARCH FINDINGS

The questionnaires were distributed to client representatives of different government agencies and contractor representatives who have executed public construction projects. Of the questionnaires administered, 84 responses from private sector participants and 155 responses from public sector participants, totally 239 responses were obtained.

In this chapter, the questionnaire survey results are presented and analyzed according to the stated methods in the previous chapter to obtain meaningful conclusions. Furthermore, the results and findings are also discussed according to the characteristics of participants.

9.1 Profile of the Respondents and Information about Contracting Parties

In the first part of both questionnaires, the questions related to experience of respondents and the respondents' companies in construction industry, types of construction projects that company or administration are undertaking, total number of tenders that respondents' administration are undertaking per year, the position of participants in their institution, the number of workers at respondents' companies, average annual value of public project that respondents' companies have been completed are asked. The summary of the first part of survey responses are given in Table 9.1, 9.2, 9.3, 9.4 9.5, 9.6 and 9.7.

Table 9.1 *Details of participants experience in construction industry*

Respondent type		No. of respondents				
		Experience in construction industry				
		Less than 5 years	5 to10 years	10 to 15 years	15 years and above	Total
Client	No.	24	17	24	19	84
	%	28.57%	20.24%	28.57%	22.62%	100.00%
Contractor	No.	28	54	40	33	155
	%	18.06%	34.84%	25.81%	21.29%	100.00%
Total	No.	52	71	64	52	239
	%	21.76%	29.71%	26.78%	21.76%	100.00%

Table 9.2 *Details of the participants' company experience in construction industry*

Respondent type		No. of respondents			
		Company's experience in construction industry			
		Less than 5 years	5 to10 years	10 to 15 years	15 years and above
Contractor	No.	14	14	27	29
	%	16.67%	16.67%	32.14%	34.52%

From Table 9.1 it can be seen that, about 70 % of the clients and about 76 % of contractors that provided the data for this study have more than 5 years of experience in the construction industry. The experience of participants is important to obtain practical and persuasive answers to the questions asked. From Table 9.2 it can be seen that about 82 % of the respondents' companies have more than 5 years of experience in the construction industry.

In order to figure out the price escalation clause applications in public construction contract in Turkey, the participants are asked about "types of construction projects that company or administration are undertaking" and the classification of them accordingly are given in Table 9.3. From Table 9.3 it can be seen that there are participants for all project types.

Table 9.3 *Details of types of construction projects that participants are undertaking*

Respondent type		No. of respondents						
		Types of construction projects						
		Housing	Road, bridge, tunnel	Urban infrastructure (drinking water, sewage etc.)	Hydrolic structures (pond, dam, irrigation canal, etc.)	Energy projects (power lines, transformer centers, etc.)	Superstructure projects (administrative buildings, schools, hospitals, sports halls, etc.)	Special projects (airports, industrial facilities, etc.)
Client	No.	12	23	67	13	18	18	4
	%	7.74%	14.84%	43.23%	8.39%	11.61%	11.61%	2.58%
Contractor	No.	11	12	15	18	11	14	3
	%	13.10%	14.29%	17.86%	21.43%	13.10%	16.67%	3.57%
Total	No.	23	35	82	31	29	32	7
	%	9.62%	14.64%	34.31%	12.97%	12.13%	13.39%	2.93%

"The total number of tenders that respondents' administrations are undertaking per year" is asked to the public sector participants. The details of the responses are given in Table 9.4.

Table 9.4 *Details of the total number of tenders that respondents' administrations are undertaking per year*

Respondent type		No. of respondents				
		Number of yearly construction project tender				
		Less than 10 project	10 to 20 project	20 to 50 project	50 project and above	Total
Client	No.	15	24	34	82	155
	%	9.68%	15.48%	21.94%	52.90%	100.00%

From Table 9.4 it can be seen that about 52 % of the respondents' administrations have realized tender of more than fifty construction projects.

"The position of participants in their institution in the execution of construction projects" is asked to the public sector participants. The details of the responses are given in Table 9.5.

Table 9.5 *Details of the position of participants in execution of public construction projects*

Respondent type		No. of respondents			
		Position of participants			
		Preparing tenders for construction projects	Working on the supervision of construction project	Working as supervisor during the procurement and construction stages of the construction projects (Director, Chairman, Inspector)	Other (i.e. Public Procurement Agency employee)
Client	No.	47	76	26	6
	%	30.32%	49.03%	16.77%	3.87%

From Table 9.5 it can be seen that about 49 % of the respondents are working on supervision of construction project and also 30 % of the respondents are preparing the tender documents of public construction projects.

In order to visualize the size of the companies according to the number of workers and also the average annual value of the public project that respondents' companies have completed, Table 9.6 and Table 9.7 that are showing the size of the companies and their average annual value of completed public project were constructed respectively.

Table 9.6 *Details of the size of participants' companies in terms of the number of workers*

Respondent type		No. of respondents		
		Size of company		
		Small (less than 20 workers)	Medium (20 to 50 workers)	Large (50 workers and above)
Contractor	No.	26	33	25
	%	30.95%	39.29%	29.76%

From Table 9.6, it can be seen that the participants' companies provided data for this study had almost a homogenous distribution in terms of the size of the companies.

Table 9.7 *Details of the average annual value of public project that respondents' companies have completed*

Respondent type		No. of respondents				
		Value of average annual public project				
		Less than 5 million TL	5 to 50 million TL	50 to 100 million TL	100 million and above	Total
Contractor	No.	27	37	13	7	84
	%	32.14%	44.05%	15.48%	8.33%	100.00%

From Table 9.7 it can be seen that about 44 % of the respondents' companies have completed 5 to 50 million TL of public construction project annually and also about 8 % of the respondents' companies have completed more than 100 million TL of public construction project annually.

9.2 The Effects of Price Adjustment Regulations on the Contractor's Bid Behavior

In the second part of the questionnaire, in order to the find out the effects of price adjustment regulations on contractors' bid behavior, a question is asked to the private sector participants. Furthermore, to identify the methods in use to take measures against price changes by contractors when determining risk premium and bid price, a question is asked to the private sector participants. Finally, a question is asked to all respondents to find out the effects of inclusion a price escalation clause into the contract in terms of the number of firms participating in the tender and bid price. The summary of the second part of survey responses is given in following tables.

Table 9.8 *Summary of responses regarding the effect of price adjustment regulations on contractors bid behavior*

Respondent type Contractor		Very low effect	Low effect	Moderate effect	High effect	Very high effect
Does the absence of price adjustment clause in contract affect the bid/ no-bid decision?	No.	4	7	16	34	23
	%	4.76%	8.33%	19.05%	40.48%	27.38%
Does the absence of price adjustment clause in contract affect the offer price?	No.	4	4	6	28	42
	%	4.76%	4.76%	7.14%	33.33%	50.00%
Does the calculation method (General Index or Weight ratio method) of the price adjustment payment in contract affect the offer price?	No.	6	5	16	31	26
	%	7.14%	5.95%	19.05%	36.90%	30.95%

There is an undeniable fact that construction material prices are at risk of fluctuation between the tender time and implementation time of the project and the basic rationale for price adjustment system is to compensate the contractor for an increase in material prices which are beyond the control of contractors. From Table 9.8 it can be seen that; about 67% and 83%, of the contractor's representatives, are of the opinion that price escalation clause has a high effect on the bid decision, and bid price respectively. Even about 67 % of respondents agree that the calculation method of price adjustment highly influences the bid price. It is revealed from Table 9.8 that if the contractors feel safe about the future price fluctuations, it causes to be given more aggressive bidding in the tender. Under favour of the price adjustment regulations, the contracting authorities can obtain low-priced offers for tenders of construction projects.

Responses of participants for the effects of price adjustment regulations on contractors' bid behavior are also analyzed with respect to the size of companies of contractors' representatives. The results of responses are given in Table 9.9.

Table 9.9 *Summary of responses regarding the effect of price adjustment regulations on contractors bid behavior according to size of participants' companies*

	Size of company		Very low effect	Low effect	Moderate effect	High effect	Very high effect
Does the absence of price adjustment clause in contract affect the bid/ no-bid decision?	Small	%	0.00%	3.85%	11.54%	38.46%	46.15%
	Medium	%	3.03%	0.00%	24.24%	54.55%	18.18%
	Large	%	13.04%	21.74%	21.74%	26.09%	17.39%
Does the absence of price adjustment clause in contract affect the offer price?	Small	%	0.00%	0.00%	3.85%	23.08%	73.08%
	Medium	%	3.03%	0.00%	0.00%	48.48%	48.48%
	Large	%	13.04%	13.04%	21.74%	26.09%	26.09%
Does the calculation method (General Index or Weight ratio method) of the price adjustment payment in contract affect the offer price?	Small	%	0.00%	3.85%	7.69%	30.77%	57.69%
	Medium	%	3.03%	3.03%	21.21%	51.52%	21.21%
	Large	%	21.74%	8.70%	30.43%	26.09%	13.04%

From Table 9.9 it can be seen that; about 84 %, 96 % of the small companies' participants are of the opinion that price escalation clause has a high effect on the bid decision, and bid price respectively. About 88 % of small companies' respondents agree that the calculation method of price adjustment highly influences the bid price. Furthermore, the responses of medium companies' participants are parallel to the small companies' responses. On the other hand, when the responses of large companies' participants are considered, about 43 %, and 52 % of them are of the opinion that price escalation clause has a high effect on the bid decision, and bid price respectively. About 39 % of large companies' respondents agree that the calculation method of price adjustment highly influences the bid price.

It is revealed from Table 9.9 that; small and medium-sized construction companies are more affected by price changes and therefore they often take into account the price escalation clause and its provisions when setting the bid prices.

A question is asked to the contractors to identify "methods in use to take measures against price changes when determining the risk premium and bid price" and the results are given in Table 9.10.

Table 9.10 *Summary of responses regarding methods in use to take measures against price changes, when determining risk premium and bid price*

Respondent type		No. of respondents		
		Used methods		
		Use formal methods (future index estimation methods, inflation and exchange rate changes etc.)	Use intuitive methods (foresight of experienced workers, past project experience etc.)	Sometimes use formal sometimes use intuitive methods
Contractor	No.	9	51	24
	%	10.71%	60.71%	28.57%

In fact, it is very important for contractors to estimate the future cost of construction materials. Because they should prepare the proposal based on the cost of construction resources that will be used for the execution of the project. Therefore if the contractor does not appropriately forecast price changes before bidding, it may probably lose (a part of) its profit and experience financial difficulties in execution phase of projects due to the fluctuations in the cost of construction resources.

From Table 9.10 it can be seen that; when determining risk premium and bid price, about 60 % of contractors use intuitive methods (i.e. past experience or foresight of experienced workers) to take measures against price changes.

Responses of participants for the method in use to take measures against price changes when determining risk premium and bid price is also analyzed with respect to the size of companies of contractors' representatives. The results of responses are given in Table 9.11.

Table 9.11 *Summary of responses regarding methods in use to take measures against price changes, when determining risk premium and bid price according to size of participants' companies*

Size of company		**Use formal methods**	**Use intuitive methods**	**Sometimes formal sometimes intuitive methods**
Small	%	0.00%	100.00%	0.00%
Medium	%	6.06%	63.64%	30.30%
Large	%	30.43%	17.39%	52.17%

From Table 9.11 it can be seen that; when determining risk premium and bid price, all small companies use intuitive methods. On the other hand, about 30 % of large companies use formal methods and 50 % of them use a formal or an intuitive method.

A question is asked to the participants to identify "the effects of inclusion a price escalation clause into the contract in terms of the number of firms participating in the tender and bid price" and the summary of the results is presented in Table 9.12

Table 9.12 *Summary of responses regarding the effects of inclusion a price escalation clause in the contract in terms of the number of firms participating in the tender and bid price*

	Respondent type		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Putting a price adjustment clause into contract increases the number of firms participating in the tender.	Client	No.	15	14	7	70	49
		%	9.68%	9.03%	4.52%	45.16%	31.61%
	Contractor	No.	7	6	5	30	36
		%	8.33%	7.14%	5.95%	35.71%	42.86%
Putting a price adjustment clause into contract provide to take lower-priced offers for tender.	Client	No.	11	30	13	65	36
		%	7.10%	19.35%	8.39%	41.94%	23.23%
	Contractor	No.	5	8	5	19	47
		%	5.95%	9.52%	5.95%	22.62%	55.95%

From Table 9.12 it can be seen that; about 76% of the clients and 77% of contractors' representatives agree that inclusion of price escalation clause into the contract increases the number of firms participating in the tender and also about 64% of the clients and 77% of contractors' representatives agree that price escalation clause provides to take low-priced offers for tender.

9.3 The Effects of Cost Escalation on the Projects in case of not existing an Appropriate Price Adjustment Clause in Contract

In the third part of the questionnaire, a question is asked to the participants to identify "the effects of cost escalation on the projects in case of not existing an

appropriate price escalation clause in the contract" and the summary of the results is presented in Table 9.13

Table 9.13 *Summary of responses regarding the effects of cost escalation on the projects in case of not existing an appropriate price escalation clause in the contract*

Summary of responses regarding the effects of cost escalation on the projects in case of not having an appropriate price adjustment clause in contract							
	Respondent type		**Strongly disagree**	**Disagree**	**Undecided**	**Agree**	**Strongly agree**
Delay of project	Client	No.	21	22	13	83	16
		%	13.55%	14.19%	8.39%	53.55%	10.32%
	Contractor	No.	5	7	6	47	19
		%	5.95%	8.33%	7.14%	55.95%	22.62%
Cancellation or termination of project	Client	No.	41	63	29	16	6
		%	26.45%	40.65%	18.71%	10.32%	3.87%
	Contractor	No.	22	22	17	20	3
		%	26.19%	26.19%	20.24%	23.81%	3.57%
Cash flow (financing) problems in the execution phase of projects	Client	No.	17	21	17	66	34
		%	10.97%	13.55%	10.97%	42.58%	21.94%
	Contractor	No.	5	7	1	34	37
		%	5.95%	8.33%	1.19%	40.48%	44.05%
Poor quality of construction work	Client	No.	19	33	15	52	36
		%	12.26%	21.29%	9.68%	33.55%	23.23%
	Contractor	No.	9	10	8	36	21
		%	10.71%	11.90%	9.52%	42.86%	25.00%
Dispute among contracting parties	Client	No.	15	22	12	58	48
		%	9.68%	14.19%	7.74%	37.42%	30.97%
	Contractor	No.	6	4	3	31	40
		%	7.14%	4.76%	3.57%	36.90%	47.62%

It is revealed from Table 9.13 that; about 84% of the contractors' representatives agree that in the case of not having an appropriate price escalation clause in the contract, cost escalation causes both cash flow (financing) problems in the execution phase of projects and dispute among contracting parties. About 66 % of the clients' representatives and 52 % of the contractors' representatives are of the opinion that cost escalation does not cause cancellation or termination of the project.

9.4 Price Adjustment Applications in Construction Contracts in terms of the Principles of Price Escalation Decree

In the fourth part of questionnaire, in order to the find out the reasons that why price escalation clause is not included in some contracts, to find out the applications of price escalation clause in terms of the principles of Price Escalation Decree and to determine the importance of listed factors on the decision of inclusion the price escalation clause in the construction contract, questions are asked to respondents. The summary of the fourth part of survey responses is given in following tables.

A question is asked to the participants to the find out "the reasons that why price escalation clause is not included in some contracts" and the results are given in Table 9.14 and Figure 9.1.

Table 9.14 *Summary of responses regarding the reasons that why price escalation clause is not included in some contracts*

Reason	Reason Explanation	Respondent type		Very low importance	Low importance	Moderate importance	High importance	Very high importance	Relative Importance Index
R1	Contract duration is short (<12 month)	Client	%	5.81%	5.81%	22.58%	33.55%	32.26%	0.76
		Contractor	%	15.48%	25.00%	32.14%	15.48%	11.90%	0.57
R2	The thought that it brings additional financial burden to the public budget	Client	%	5.81%	12.26%	21.94%	34.84%	25.16%	0.72
		Contractor	%	9.52%	4.76%	13.10%	39.29%	33.33%	0.76
R3	The idea that input costs have not changed significantly	Client	%	7.74%	14.19%	25.16%	35.48%	17.42%	0.68
		Contractor	%	9.52%	5.95%	15.48%	32.14%	36.90%	0.76
R4	Management of price adjustment clause increase the workload of administrations	Client	%	17.42%	14.84%	14.19%	29.68%	23.87%	0.66
		Contractor	%	10.71%	7.14%	4.76%	27.38%	50.00%	0.80
R5	Administrations have inadequate knowledge of market conditions and price changes	Client	%	18.06%	18.06%	16.13%	23.23%	24.52%	0.64
		Contractor	%	8.33%	4.76%	8.33%	32.14%	46.43%	0.81

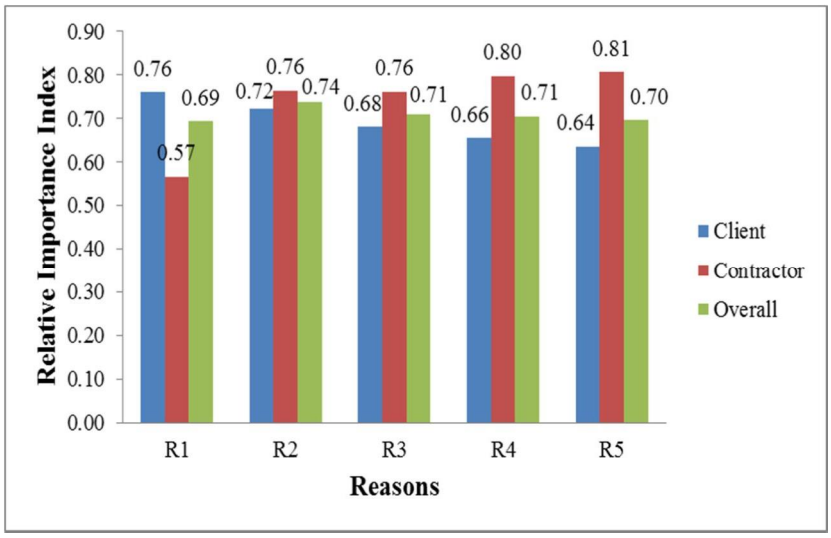

Figure 9.1 *Relative importance index values of the reasons that why price escalation clause is not included in some contracts*

From Table 9.14 and Figure 9.1 it can be seen that; according to the clients, from the perspective of the clients, the most important reason is a short Contract period (<12 months). From the perspective of the contractors, the most important reasons are i) Administrations have inadequate knowledge of market conditions and price changes, and ii) Management of price escalation clause increases the workload of administrations. All in all, the most important reason is that Price adjustment clause brings additional financial burden to the public budget.

The cases related to the application of the price escalation clause included in the construction contracts are listed. Based on overall experience, the participants are asked to indicate the frequency of encountering with these applications and the results are given in Table 9.15 and Figure 9.2.

Table 9.15 *Summary of responses regarding the applications of price escalation clause in terms of the principles of Price Escalation Decree*

Case	Case Explanation	Respondent type		Never	Sometimes	Usually	Frequently	Very Frequently	Mean ratings
C1	In contracts of the construction projects you have done, there is the price adjustment clause	Client	%	5.81%	5.16%	12.90%	50.97%	25.16%	3.85
		Contractor	%	3.57%	4.76%	32.14%	45.24%	14.29%	3.62
C2	In the contracts with price adjustment clause, price adjustment calculation is done using General Index.	Client	%	1.94%	19.35%	20.65%	37.42%	20.65%	3.55
		Contractor	%	7.14%	21.43%	23.81%	29.76%	17.86%	3.30
C3	In the contracts with price adjustment clause, the input coefficients a, b1, b2, b3, b4, b5 and c are determined appropriately according to the nature of construction work	Client	%	5.81%	23.87%	21.29%	32.90%	16.13%	3.30
		Contractor	%	11.90%	39.29%	15.48%	21.43%	11.90%	2.82
C4	In the contracts with price adjustment clause, different input coefficients are determined for different part of (earth works, superstructure works, etc.) construction project	Client	%	32.26%	13.55%	23.87%	19.35%	10.97%	2.63
		Contractor	%	48.81%	16.67%	11.90%	15.48%	7.14%	2.15
C5	In the contracts with price adjustment clause, more than one index is used according to the kind of inputs that is used for related work item. (For example, the use of the Base Metals index or sub-indexes represented by the coefficient b2 according to the nature of work item)	Client	%	47.10%	15.48%	14.84%	14.84%	7.74%	2.21
		Contractor	%	70.24%	8.33%	9.52%	8.33%	3.57%	1.67

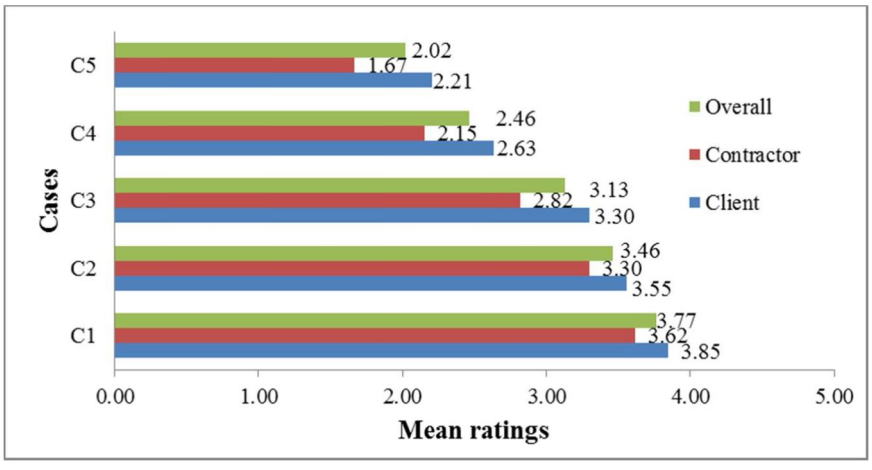

Figure 9.2 *Mean ratings of the cases related to the application of price escalation clause*

From Table 9.15 and Figure 9.2 it can be seen that; according to the overall responses, the price escalation clause is frequently included in construction contracts, and price adjustment calculation is frequently performed by using General Index, different input coefficients are sometimes determined for different part of (earthworks, superstructure works, etc.) project and in certain cases, more than one index is used in price adjustment calculation based on types of inputs used for the related work item.

Responses of participants for the cases related to the application of price escalation clause in construction contracts are analyzed with respect to the types of projects that contractors' representatives have undertaken. The mean rating values of responses are given in Table 9.16 and Figure 9.3.

Table 9.16 *Mean rating values of contractors' responses related to the application of price escalation clause according to types of projects*

Types of Project	C1	C2	C3	C4	C5
Housing	3.55	2.91	2.64	1.36	1.27
Road, bridge, tunnel	4.20	3.10	3.50	2.40	2.00
Urban infrastructure	3.93	4.20	2.73	2.07	1.67
Hydraulic structures	3.78	2.44	3.28	2.56	1.33
Energy projects	3.64	4.55	2.36	2.09	2.00
Superstructure projects	2.71	3.29	1.86	1.50	1.29
Special projects	5.00	2.33	5.00	5.00	3.67

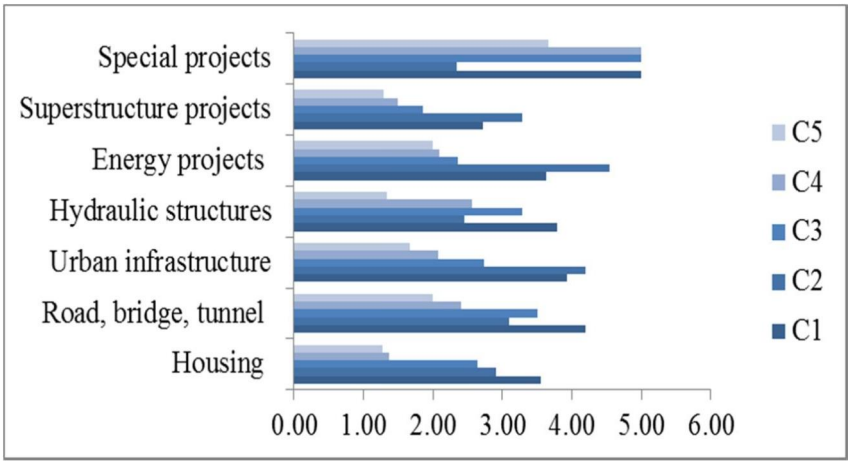

Figure 9.3 *Mean ratings of contractors' responses related to the application of price escalation clause according to types of projects*

The analysis of survey results in Table 9.16 and Figure 9.3 shows that; the price escalation clause is included in construction contracts. Price adjustment calculation is frequently performed by using General Index in Urban infrastructure projects and Energy projects. In addition, the input coefficients are sometimes appropriately determined according to the nature of construction work in superstructure projects. More than one index is never used in price adjustment calculation in housing, hydraulic structures and superstructure projects. Finally, different input coefficients are very frequently determined for a different part of (earthworks, superstructure works, etc.) works in Special projects.

Responses of participants for the cases related to the application of price escalation clause in construction contracts are also analyzed with respect to the types of projects that clients' representatives have undertaken. The mean rating values of responses are given in Table 9.17 and Figure 9.4.

Table 9.17 *Mean rating values of clients' responses related to the application of price escalation clause according to types of projects*

Types of Project	C1	C2	C3	C4	C5
Housing	3.75	2.75	3.33	1.83	1.58
Road, bridge, tunnel	4.05	3.36	4.00	3.55	2.00
Urban infrastructure	3.91	3.82	3.05	2.59	2.52
Hydraulic structures	3.62	3.23	4.23	3.54	2.08
Energy projects	3.67	4.06	3.17	2.17	2.33
Superstructure projects	3.78	3.28	2.61	1.67	1.61
Special projects	4.50	2.50	3.75	3.50	1.75

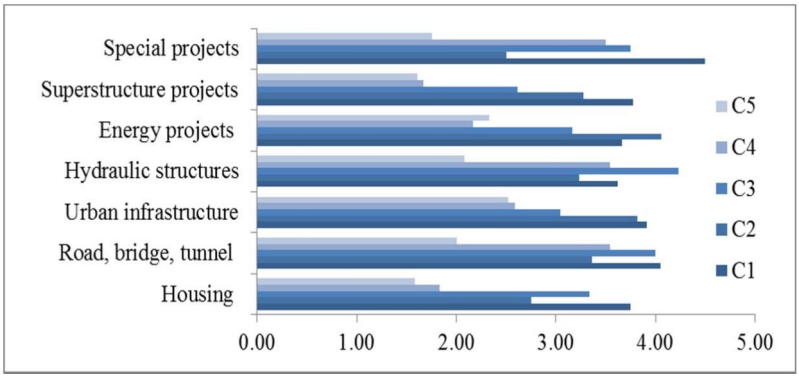

Figure 9.4 *Mean ratings of clients' responses related to the application of price escalation clause according to types of projects*

The analysis of survey results in Table 9.17 and Figure 9.4 shows that; the input coefficients are frequently determined appropriately according to the nature of construction work and also different input coefficients are frequently determined for different a part of (earthworks, superstructure works, etc.) works in road, bridge, tunnel projects and hydraulics structures projects. In addition, price adjustment calculation is frequently performed by using General Index in Urban infrastructure projects and Energy projects.

As understood from responses, price adjustment applications and provisions of a price escalation clause vary depending on the project types. Therefore, when it is considered that these projects are carried out by different government agencies, the implementation of principles of escalation decree varies depending on the contracting authority.

In the last section of fourth part of the questionnaire, to determine the importance of listed factors on the decision of inclusion the price escalation clause in the construction contract, the participants are asked to indicate the importance of listed factors based on their experience, and the results are given in Table 9.18 and Figure 9.5.

Table 9.18 *Summary of responses regarding factors that affect the decision of inclusion the price escalation clause in the construction contract*

Factor	Factor Explanation	Respondent type		Very low importance	Low importance	Moderate importance	High importance	Very high importance	Relative Importance Index
F1	The duration of the project	Client	%	5.16%	2.58%	9.03%	40.00%	43.23%	0.83
		Contractor	%	14.29%	9.52%	15.48%	23.81%	36.90%	0.72
F2	Type of project (Infrastructure, Superstructure, Dam, Road etc.)	Client	%	10.32%	9.03%	19.35%	30.97%	30.32%	0.72
		Contractor	%	15.48%	13.10%	11.90%	21.43%	38.10%	0.71
F3	The nature of work items (i.e. special technology and material-requiring work items)	Client	%	0.65%	7.74%	16.77%	30.97%	43.87%	0.82
		Contractor	%	13.10%	7.14%	27.38%	22.62%	29.76%	0.70
F4	Size of the project (Estimated Cost)	Client	%	3.23%	9.03%	14.84%	30.32%	42.58%	0.80
		Contractor	%	9.52%	7.14%	11.90%	27.38%	44.05%	0.78
F5	Economic conditions of the country	Client	%	3.23%	9.68%	14.84%	23.23%	49.03%	0.81
		Contractor	%	3.57%	2.38%	7.14%	15.48%	71.43%	0.90
F6	Other	Client	%	11.61%	14.84%	45.16%	14.84%	13.55%	0.61
		Contractor	%	4.76%	10.71%	33.33%	35.71%	15.48%	0.69

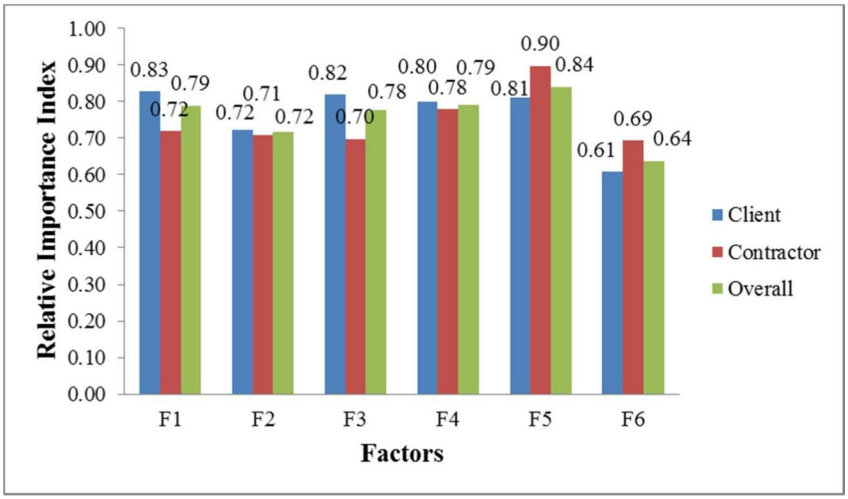

Figure 9.5 *Relative importance index values of the factors that affect the decision of inclusion the price escalation clause in the construction contract*

The analysis of survey results in Table 9.18 and Figure 9.5 shows that; from the perspective of clients, the most important factors are; duration of the project and nature of work. On the other hand, from the perspective of contractors, the most important factor is; economic conditions of the country. Overall responses indicate that the most important first three factors are; economic conditions of the country, duration of the project and size of the project.

Responses of participants for the factors that affect the decision of inclusion the price escalation clause in the construction contract are analyzed with respect to the size of companies of contractors' representatives. The relative importance index values of responses are given in Table 9.19 and Figure 9.6.

Table 9.19 *Relative importance index values of contractors' responses related to factors that affect the decision of inclusion the price escalation clause in the contract according to size of company*

Size of company	F1	F2	F3	F4	F5	F6
Small	0.51	0.52	0.50	0.58	0.90	0.70
Medium	0.79	0.79	0.75	0.87	0.93	0.65
Large	0.90	0.81	0.86	0.89	0.90	0.77

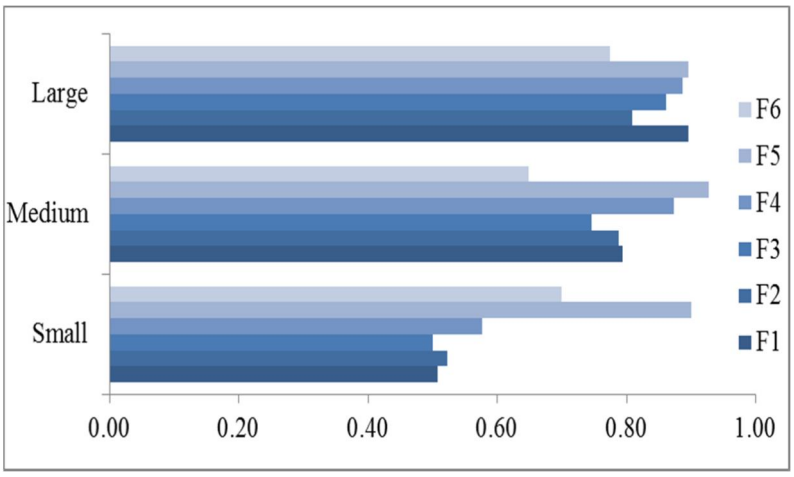

Figure 9.6 *Relative importance indices of contractors' responses*

The analysis of survey results in Table 9.19 and Figure 9.6 shows that; from the perspective of small companies' representatives the most important factor that affects the decision of inclusion the price escalation clause in the contract is the economic conditions of the country and duration, type, and nature of the project are the least important factors. In addition, from the perspective of medium companies' representatives, the most important factor is the economic conditions of the country. On the other hand, from the perspective of large companies' representatives, the most important factors are duration of the project, size of the project and economic conditions of the country.

9.5 Problems Related with Price Adjustment Applications and Controversial Issues Related to the Current Price Escalation Decree

In the fifth part of the questionnaire, the question regarding the perception of contracting parties related to the current Price Escalation Decree and price adjustment applications is asked to the respondents. In addition, problems related to Price Adjustment Applications and controversial issues related to Current Price Escalation Decree are listed and the participants are asked to indicate their responses based on their experience. A question is asked to the contractors' representatives to evaluate the adequacy of compensation paid to the contractor based on presently used escalation clause in government construction contracts in Turkey in terms of

labor, cement, steel, fuel, timber, equipment and other materials. Finally, the question regarding the need to improve the currently used escalation clauses in government construction contracts is asked to the respondents. The summary of the fifth part of survey responses is given in following tables.

A question is asked to the respondents to identify their perceptions related to the current Price Escalation Decree and Price Adjustment Applications and the results are given in Table 9.20 and Figure 9.7.

Table 9.20 *Summary of responses regarding the current price escalation decree and price adjustment applications*

	Respondent type		Very poor	Poor	Good	Very good	Excellent
What do you think about the current Price Escalation Decree?	Client	No.	16	65	59	14	1
		%	10.32%	41.94%	38.06%	9.03%	0.65%
	Contractor	No.	15	38	25	4	2
		%	17.86%	45.24%	29.76%	4.76%	2.38%
What do you think about the current price adjustment applications?	Client	No.	36	48	55	14	2
		%	23.23%	30.97%	35.48%	9.03%	1.29%
	Contractor	No.	27	46	6	3	2
		%	32.14%	54.76%	7.14%	3.57%	2.38%

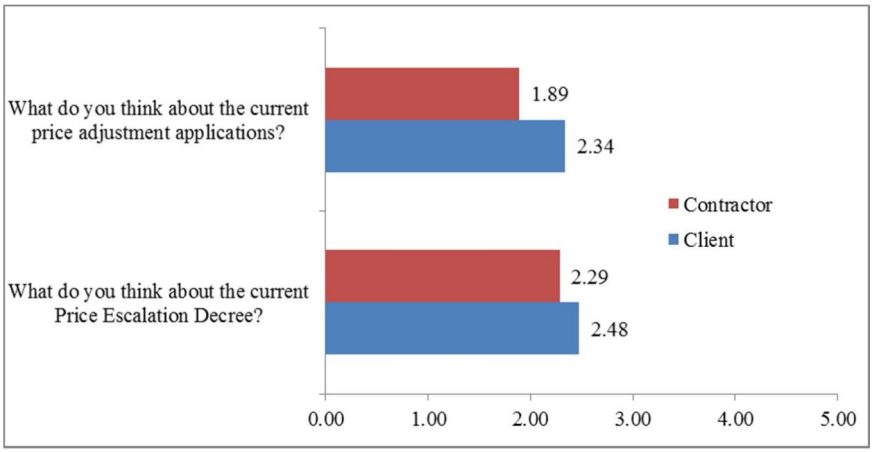

Figure 9.7 *Mean ratings of responses regarding the current price escalation decree and price adjustment applications*

It is revealed from Table 9.20 and Figure 9.7, clients and contractors are of the opinion that current price escalation decree and price adjustment applications are poor.

Problems related to Price Adjustment Applications and controversial issues related to current Price Escalation Decree are listed and the participants are asked to indicate their responses based on their experience. The results are given in Table 9.21.

First, when the problems related to price adjustment applications are considered, the results show that; from the perspective of clients, the most important problems related to the price adjustment applications is the different price adjustment implementations of different government agencies. In addition, from the perspective of contractors, the most important problems are the different price adjustment implementations of different government agencies and input coefficients determined by the administrations which do not fit the nature of the project. On the other hand, clients and contractors disagree that in contracts without a price escalation clause, administrations make work increases within the scope of the contract and also the indices to be used in the price adjustment formulas are determined incorrectly by the administrations.

Second, when controversial issues related to the current price escalation decree are considered, the results show that; from the perspective of clients, the most important problems is unpredictable increases in exchange rates bring contracts to an incomplete state. In addition, from the perspective of contractors, the most three important problems are; (i) items that constitute inputs to indices are not specific to the construction sector items, (ii) the indices used for the price adjustment payment do not exactly reflect the market conditions, and (iii) unpredictable increases in exchange rates bring contracts to an incomplete state. In addition, the results show that; clients and contractors agree on most of the controversial issues related with current price escalation decree.

Table 9.21 *Summary of responses regarding the problems related to price adjustment applications and controversial issues related with current price escalation decree*

Problem and controversial issue explanation		Respondent type		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Q1	Clients resist honoring the escalation clauses	Client	%	12.90%	21.94%	14.84%	42.58%	7.74%
		Contractor	%	2.38%	16.67%	10.71%	58.33%	11.90%
Q2	In contracts where the price difference is not paid, the administrations make work increases within the scope of contract	Client	%	18.06%	33.55%	25.81%	15.48%	7.10%
		Contractor	%	9.52%	27.38%	38.10%	16.67%	8.33%
Q3	There are inconsistencies in terms of the price adjustment clause provisions in the contract and the administrative specification	Client	%	7.74%	22.58%	18.06%	45.16%	6.45%
		Contractor	%	2.38%	11.90%	9.52%	58.33%	17.86%
Q4	The indices to be used in the price adjustment formulas are determined incorrectly by the administrations.	Client	%	21.94%	33.55%	18.06%	20.65%	5.81%
		Contractor	%	17.86%	22.62%	34.52%	17.86%	7.14%
Q5	The input coefficients determined by the administrations do not fit the nature of project	Client	%	7.74%	22.58%	19.35%	38.06%	12.26%
		Contractor	%	3.57%	4.76%	7.14%	51.19%	33.33%
Q6	Different price adjustment applications of departments within the same institution (i.e. input coefficients are determined in one Regional Directorate tenders but are not determined in another)	Client	%	7.10%	21.29%	24.52%	34.19%	12.90%
		Contractor	%	4.76%	9.52%	22.62%	40.48%	22.62%
Q7	Different price adjustment implementations of different government agencies (i.e. input coefficients are determined in one Regional Directorate tenders but are not determined in another)	Client	%	1.29%	10.97%	19.35%	35.48%	32.90%
		Contractor	%	3.57%	5.95%	8.33%	34.52%	47.62%
Q8	For similar projects, the same institutions have different price adjustment applications at different times (i.e. a price adjustment is paid for a superstructure project in 2013, it is not paid for a similar project in 2015)	Client	%	5.16%	12.26%	23.23%	40.00%	19.35%
		Contractor	%	5.95%	5.95%	11.90%	44.05%	32.14%
Q9	The principles in the current price escalation decree are insufficient to meet the increases in price	Client	%	2.58%	16.13%	19.35%	38.71%	23.23%
		Contractor	%	5.95%	3.57%	7.14%	32.14%	51.19%
Q10	The indices used for the price adjustment payment do not exactly reflect the market conditions.	Client	%	2.58%	12.90%	21.29%	32.90%	30.32%
		Contractor	%	5.95%	0.00%	9.52%	38.10%	46.43%
Q11	Items that constitute inputs to indices are not specific to the construction sector items.	Client	%	4.52%	12.26%	17.42%	40.00%	25.81%
		Contractor	%	3.57%	3.57%	5.95%	34.52%	52.38%
Q12	For work items that the unit price of its is absent in the contract and whose contract year price can be determined according to the General Conditions of Construction Works, If the new unit price determined by the contract year's terms and conditions, it does not reflect actual the price changes appropriately.	Client	%	5.81%	14.84%	17.42%	34.84%	27.10%
		Contractor	%	4.76%	5.95%	8.33%	29.76%	51.19%
Q13	Using reduction factor B = 0.9 in the price adjustment formula, causing a 10 % underpayment or interruption in adjustment payment	Client	%	8.39%	16.77%	24.52%	38.71%	11.61%
		Contractor	%	4.76%	4.76%	13.10%	44.05%	33.33%
Q14	As the price increases realized in the equipment supplied from abroad are valued over Turkish Lira, in contracts that require imports of materials from abroad, price increases can not be met with the existing escalation decree.	Client	%	0.00%	9.03%	22.58%	45.16%	23.23%
		Contractor	%	4.76%	3.57%	13.10%	33.33%	45.24%
Q15	Unpredictable increases in exchange rates bring contracts to an incomplete state because the current price escalation decree does not envisage the price adjustment depending on the increase in foreign exchange rate.	Client	%	0.65%	12.90%	17.42%	41.94%	27.10%
		Contractor	%	3.57%	5.95%	7.14%	33.33%	50.00%

Question regarding the what extent to which the compensation as per the currently used escalation clause in government contracts reflect the actual price escalation for the components of labor, cement, steel, fuel, timber, equipment and other materials is asked to the contractors' representatives. The results are given in Table 9.22 and Figure 9.8.

Table 9.22 *Summary of responses in regard to what extent does the compensation as per currently used escalation clause reflect the actual escalation*

Respondent type Contractor		**Low (< 30 %)**	**Medium (30-60 %)**	**High (> 60 %)**
Labor	%	22.62%	64.29%	13.10%
Cement	%	34.52%	61.90%	3.57%
Steel	%	78.57%	17.86%	3.57%
Fuel	%	80.95%	14.29%	4.76%
Timber	%	23.81%	58.33%	17.86%
Equipment	%	55.95%	33.33%	10.71%
Other Materials	%	28.57%	55.95%	15.48%

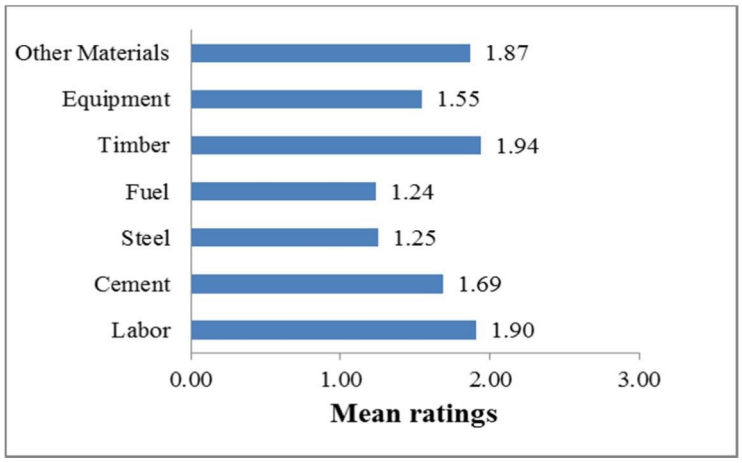

Figure 9.8 *Mean ratings of responses regarding compensation level of currently used escalation clause*

From Table 9.22 and Figure 9.8, the survey results show that about 78 % and 80 % of contractors' representatives are of the opinion that they are compensated less than 30 % of the actual escalation of the steel and fuel prices respectively. In addition, contractors' representatives agree that they are compensated between 30 to 60 % of the actual escalation of the labor, cement, timber and other material prices.

A question is asked to the respondents to identify the views of contracting parties related to the necessity of improving the price adjustment system and the results are given in Table 9.23.

Table 9.23 *Summary of responses regarding that current price escalation decree and implementations need to be improved*

	Respondent type		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Current price escalation decree and its implementations needs to be improved	Client	No.	4	12	11	82	46
		%	2.58%	7.74%	7.10%	52.90%	29.68%
	Contractor	No.	5	1	0	38	40
		%	5.95%	1.19%	0.00%	45.24%	47.62%

From Table 9.23 the survey results show that; about 81% of the clients and 92% of contractors' representatives agree that current price escalation decree and its implementations need to be improved.

9.6 Suggestions to Improve the Price Escalation Decree and Price Adjustment Applications

In the last part of the questionnaire, suggestions to improve the price escalation decree and price adjustment applications are listed and the participants are asked to indicate their responses based on overall their experience. The summary of the results is presented in Table 9.24.

The analysis of survey results in Table 9.24 shows that; from the perspective of clients the most popular suggestions to improve the price adjustment system are as follows respectively;

1. The price escalation clause provisions in the contract and its annexes should exist in accordance with the price escalation decree.
2. The contracting authorities should be informed about the price escalation decree and its applications and a platform should be established where Public institutions should share their experiences with other Public Institutions.
3. The contracting authorities should be trained in the preparation of the BoQ/ estimated cost and the determination of input weight ratios.

4. The practices of the contracting authorities should be united in terms of inclusion of the price escalation clause into the contract.

5. In order to simplify the calculation of price adjustment calculations and to avoid differences in implementation, a web-based "Price Adjustment Calculation Module" which is open to the use of administration and contractors should be established on the website of the PPA.

The analysis of survey results in Table 9.24 shows that; from the perspective of the contractors, the most popular suggestions to improve the price adjustment system are as follows respectively;

1. In order to simplify the calculation of price adjustment calculations and to avoid differences in implementation, a web-based "Price Adjustment Calculation Module" which is open to the use of administration and contractors should be established on the website of the PPA.

2. The practices of the contracting authorities should be united in terms of inclusion of the price escalation clause into the contract.

3. In order to estimate future price changes, a web-based "Forecasting Module" which is open to the use of administration and contractors should be established on the website of the PPA.

4. Construction indices that are specific to construction project type and take into account the construction sector inputs should be created and used in price adjustment (Building Cost Index, Road Cost Index, etc.).

5. The price escalation clause provisions in the contract and its annexes should exist in accordance with the price escalation decree.

6. The contracting authorities should be trained in the preparation of the BoQ/ estimated cost and the determination of input weight ratios.

Meanwhile, the least important suggestion to improve the price adjustment system is evaluated as the “In cases where the price adjustment payment is not foreseen and there is a time extension due to the problems originating from administration, the price difference should not be interrupted if the Pn value for the application month is less than 1”.

Table 9.24 *Summary of responses regarding the suggestions to improve the price escalation decree and price adjustment applications*

Suggestion explanation		Respondent type		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
S1	The contracting authorities should be informed about the price escalation decree and its applications and a platform should be established where Public institutions should share their experiences with other Public Institutions.	Client	%	2.58%	0.65%	6.45%	45.16%	45.16%
		Contractor	%	3.57%	1.19%	3.57%	35.71%	55.95%
S2	The contracting authorities should be trained in the preparation of the BoQ/ estimated cost and the determination of input weight ratios.	Client	%	3.23%	2.58%	3.87%	25.81%	64.52%
		Contractor	%	1.19%	3.57%	2.38%	27.38%	65.48%
S3	The price adjustment clause provisions in the contract and its annexes shall be in accordance with the Price escalation decree.	Client	%	3.23%	1.29%	4.52%	36.13%	54.84%
		Contractor	%	1.19%	3.57%	2.38%	26.19%	66.67%
S4	The practices of the contracting authorities should be united in terms of putting the price adjustment clause into contract.	Client	%	3.87%	1.94%	5.81%	30.32%	58.06%
		Contractor	%	1.19%	1.19%	3.57%	26.19%	67.86%
S5	As stated in the escalation decree, according to the nature of project different input coefficients (b1, b2, b3, b4, b5) and different indices should be determined for using in different parts / phases of the construction work (earth works, superstructure works etc.) by contracting authorities before tender.	Client	%	4.52%	4.52%	8.39%	38.06%	44.52%
		Contractor	%	2.38%	2.38%	7.14%	27.38%	60.71%
S6	For work items that the unit price of its is absent in the contract, if a new unit price is prepared during implementation of project, instead of escalating contract prices to the implementation time by using index, the new unit price should be determined according to the rate and conditions of the preparation time	Client	%	7.10%	5.81%	12.26%	40.00%	34.84%
		Contractor	%	5.95%	2.38%	3.57%	33.33%	54.76%
S7	In cases where the price adjustment payment is not foreseen and there is a time extension due to the problems originating from administration, the price difference should not be interrupted if the Pn value for the application month is less than 1.	Client	%	7.74%	13.55%	22.58%	31.61%	24.52%
		Contractor	%	3.57%	4.76%	15.48%	40.48%	35.71%
S8	The reduction factor B = 0.9 in the price adjustment formula, should be determined taking into account the economic and other conditions to reflect price changes more fairly.	Client	%	4.52%	12.90%	19.35%	40.00%	23.23%
		Contractor	%	2.38%	4.76%	11.90%	36.90%	44.05%
S9	There is a need to make regulations in escalation decree for the payment of the price changes due to the unpredictable increase (Central Bank Estimates etc.) in the foreign exchange rate.	Client	%	5.81%	5.81%	9.03%	43.23%	36.13%
		Contractor	%	2.38%	2.38%	3.57%	23.81%	67.86%
S10	In contracts that are required imported equipment, machinery and materials, for work items where the indices do not reflect price changes, there should be made regulations in escalation decree to make the price adjustment calculation by invoice method using prices published by market actors (Chamber of Commerce Industry prices) instead of using indices.	Client	%	7.10%	5.16%	17.42%	47.10%	23.23%
		Contractor	%	8.33%	4.76%	5.95%	33.33%	47.62%
S11	Instead of the using Consumer Price Index for the price changes taking place in labor input, Construction Industry Gross Wage-Salary Index, Building Construction Costs Workers Index published by TURKSTAT should be taken as a basis or a new index for labor should be determined to use price adjustment calculation for labor input.	Client	%	2.58%	7.10%	15.48%	47.74%	27.10%
		Contractor	%	2.38%	1.19%	7.14%	44.05%	45.24%
S12	Construction indexes that are specific to construction project type and take into account the construction sector inputs should be created and used in price adjustment (Building Cost Index, Road Cost Index, etc.)	Client	%	2.58%	3.23%	10.97%	39.35%	43.87%
		Contractor	%	3.57%	0.00%	3.57%	28.57%	64.29%
S13	Taking into account local price differences, local price coefficients should be created to apply to price indices for local price differences.	Client	%	3.87%	6.45%	12.90%	50.97%	25.81%
		Contractor	%	3.57%	7.14%	11.90%	29.76%	47.62%
S14	While the price escalation decree is being prepared, all parties' opinions should be taken and reflected in decree.	Client	%	1.29%	5.16%	7.10%	37.42%	49.03%
		Contractor	%	1.19%	2.38%	4.76%	29.76%	61.90%
S15	To be more effective in terms of time, expertise, practice association etc. PPA should be authorized to solve problems related with the price adjustment applications in the execution phase of project, instead of judicial jurisdiction.	Client	%	3.87%	3.87%	7.10%	50.32%	34.84%
		Contractor	%	2.38%	1.19%	5.95%	45.24%	45.24%
S16	In order to estimate future price changes, a web-based "Forecasting Module" which is open to the use of administration and contractors should be established on the web site of the PPA	Client	%	3.23%	2.58%	18.06%	38.71%	37.42%
		Contractor	%	4.76%	1.19%	1.19%	50.00%	42.86%
S17	In order to simplify the calculation of price adjustment calculations and to avoid differences in implementation, a web-based "Price Adjustment Calculation Module" which is open to the use of administration and contractors should be established on the web site of the PPA	Client	%	2.58%	1.29%	9.03%	34.84%	52.26%
		Contractor	%	1.19%	0.00%	3.57%	23.81%	71.43%

9.7 Discussion of Results

The results of survey analysis are summarized as follows:

At first, in part B of the questionnaire, questions are prepared to examine how the price adjustment regulations that are used to compensate contractors for price changes affect the contractor's bid behavior. As it is known, construction projects are usually of quite lengthy ranging from several months to several years and these projects are executed based on the pre- confirmed contract value. On the other hand, there is a strong probability that there will be fluctuations in the price of construction materials during the implementation of the project. Most countries has regulated escalation clause in their law, contracts or other legislations to cope with construction material price fluctuations. The basic rationale for price adjustment system is to compensate the contractor for an increase in material prices which are beyond the control of contractors and also price escalation clauses are intended to reduce the financial risk to project owners. In theory, if a contractor knows at the bidding stage that payments for his work will be periodically indexed, it will have less of a need to add a premium to the bid price for possible cost increases during construction. This reduces the risk of losing the contract by adding the premium. Adjustment provision in a contract also lowers the risk of contractors underestimating cost increases, and later experiencing financial difficulties and defaulting on their obligations. A project owner, on the other hand, ideally can benefit from lower bid prices, less likelihood of contractors going into bankruptcy mid-stream of a project, and lower final Contract Price, especially when costs are declining (Seneviratne, 2013).

When the results of the questionnaire are considered; contractors' representatives agree that the price escalation clause has a high effect on the bid decision and bid price. Even they agree that the calculation method of price adjustment highly influences the bid price. Additionally, when the effects of a price escalation clause on the contractor's bid behavior are considered with respect to the size of companies, small and medium-sized construction companies consider the price escalation clause more significant compared to large ones when setting the bid prices. In other words,

non-large construction companies are more influenced by price changes and they cannot afford high-cost increases.

As discussed previously, a comprehensive study related to the cost and benefits of price adjustment applications in Turkey does not exist. However, some studies were carried out on this issue outside of Turkey especially in the United States. Within the scope of this study, when the effects of inclusion a price escalation clause into the contract in terms of number of firms participating in the tender and bid price are considered, our study reveals the following outcome: clients and contractors agree that inclusion of price escalation clause into the contract increases the number of firms participating in the tender and it provides to take low-priced offers for tender. If contractors feel safe about the future price fluctuations, they can increase their competitiveness by not adding an escalation risk premium, while the contracting authorities can expect more realistic bid prices and tenders are awarded at a lower price. Therefore, owners and bidders can both benefit from the price escalation clause.

Price escalation clause is used to compensate the contractor for an increase in construction costs which are beyond the control of contractors. In fact, it is very important for contractors to estimate the future cost of construction materials especially in contracts where there is no price escalation clause because they should prepare proposals by considering the cost of construction resources. If the contractor does not appropriately forecast price changes before bidding, it may probably lose (a part of) its profit and experience financial difficulties in execution phase of projects due to the fluctuations in the cost of construction resources. Therefore, the question was asked from contractors to identify methods in use to take measures against price changes when determining the risk premium and bid price. Results show that; about 60 % of respondents use intuitive methods (i.e. past experience or foresight of experienced workers). Furthermore, responses to this question are also analyzed with respect to the size of companies and it is realized that all small companies use intuitive methods. On the other hand, about 30 % of large companies use formal methods and 50 % of them use a formal or an intuitive method. As it is known, intuitive methods cannot forecast the price fluctuations appropriately and small

companies are more prone to price changes and cannot afford the high-cost increases; hence, the escalation clause should be included in construction contracts to carry out the public construction projects successfully. Additionally, it will be also beneficial to form a web-based "Forecasting Module" which is open to the use of clients and contractors on the website of the PPA.

In part C of the questionnaire, questions are prepared to examine the effects of price changes on the construction projects in case of not existing an appropriate price escalation clause in the contract. According to the survey results; clients and contractors agree that cost escalation affects the delay in completion of the projects and the quality of the project and they also agree that it causes both cash flow-related problems in the execution phase of projects and dispute among contracting parties. In fact, there is a causal relationship between cash flow problems and other effects of price changes on the construction projects. When the contractor cannot bear the price increases, it begins to slow down the construction activities which directly causes delay of projects and eventually results in disputes among contracting parties. On the other hand, participants are of the opinion that cost escalation does not cause cancellation or termination of the project.

As discussed, the analysis of construction project contracts in Turkey reveals that while some contracting authorities put an escalation clause in the contract to compensate the contractor for the price variations, some departments continued with fixed rates which do not allow any compensation to the contractor. Moreover, some contracting authorities determine the inputs weight, while some of them use just general index for calculation of escalation payment. Hence, in government contracts, there is no uniformity in terms of inclusion of price escalation clause into the contract and the provisions of adjustment clause; and they vary with the organization.

In part D of the questionnaire, questions are prepared to examine the price adjustment applications in construction contracts in terms of The Principles of Price Escalation Decree.

First, when the reasons that why price escalation clause is not included in some contracts are considered, the results show that; from the perspective of the clients, the

most important reason is a short Contract period (<12 months). On the other hand, from the perspective of the contractors, the most important reasons are i) Administrations have inadequate knowledge of market conditions and price changes, and ii) Management of price escalation clause increases the workload of administrations. All in all, the most important reason is that Price adjustment clause brings additional financial burden to the public budget.

When the clients' responses are considered, there are two explanations for non-inclusion of price escalation clause into the contracts of short-term works. First, contracting authorities consider that material prices do not significantly increase over the course of the year. However, as discussed before, prices of steel and/or fuel sometimes escalate more than 50 % within a year. Second, contracting authorities spend times to administer the price escalation clause; so, it increases the workload of contracting authorities. Hence, contracting authorities do not prefer including price escalation clause into the contract of short-term projects. On the other hand, short-term projects are carried out by small companies and they are more affected by price changes. Therefore, due to the non-inclusion of price escalation clause into the contracts of short-term projects, price adjustment system will be separated from its general objectives.

Contractors respond that Administrations have inadequate knowledge of market conditions and price changes is considered one of the reasons of non-inclusion of price escalation clause into the contract. In fact, contracting authorities determine the cost of the projects by considering the rate (unit prices) that formed and published by government institutions based on previous year's prices. Therefore, contracting authorities take unit prices as a basis to estimate the price changes. However, unit prices reflect the average of construction material prices in the whole country and they are also being prepared annually which means that they are not adequate to reflect fluctuations within a year. Since unit prices do not reflect the true nature of fluctuation, contracting authorities have inadequate knowledge of market conditions.

According to the overall responses, the most important reason for why price escalation clause is not included in some contracts is that price escalation clause

brings additional financial burden to the public budget. In fact, there is not a comprehensive study related to the cost and benefits of escalation in Turkey. However, as stated above, results of questions in part B show that price adjustment system considerably affects the contractor's bid behavior. Therefore, it is not logical to consider the price escalation clause as an additional burden as contracting authorities may benefit from the price escalation clause in many aspects.

A question is asked to the respondents to analyze the application of the price escalation clause included in the construction contracts. Results show that the price escalation clause is frequently included in construction contracts, and in some types of projects, price adjustment calculation is performed by using the General Index while in some types of projects, the input coefficients are determined and calculation is performed based on those coefficients. Results also reveal that different input coefficients are determined for a different part of (earthworks, superstructure works, etc.) work especially in road, bridge, tunnel and hydraulics structure projects. In certain cases, more than one index is used in price adjustment calculation based on types of inputs used for the related work item.

As understood from responses, price adjustment applications and provisions of a price escalation clause vary depending on the project types. Therefore, when it is considered that these projects are carried out by different government agencies, the implementation of principles of escalation decree varies depending on the contracting authority.

As stated before, according to the escalation decree, the contracting authorities have to determine weight percentage of inputs and also cost indices for related inputs by taking the nature of project before bidding into account. On the other hand, if the weight of inputs is not determined by contracting authorities, only general index is used to calculate the price adjustment. Obviously, the problem begins at this point since this provision of escalation decree generally leads to being preferred the easier management way of price adjustment and some contracting authorities do not determine the inputs weight. On the other hand, as previously stated, in the calculation of General Index, 759 distinct items are assigned weights of which only

3.29 % are relevant to the construction industry. Thus, it is insignificant to use General Index for calculating escalation since it does not reflect the true nature of fluctuation. In addition, remember that, in previous chapters, an example is given to illustrate the effects of determination of inputs weight according to the nature of project on the escalation calculation. This example shows that the price adjustment amount to pay or to cut greatly varies depending on the selected weight ratio and indices. As it is known, construction projects are unique and they have a different composition of materials and specifications based on the type of project. So, the price adjustment calculation will be more realistic by determination of input weights and the price changes in construction inputs will be measured more accurately by diversification of indices.

In the last section of part D of the questionnaire, the respondents are asked to evaluate the importance of the listed factors that affect the decision of inclusion the price escalation clause in the contract based on their experience. The analysis results show that; from the perspective of clients, the most important factor is the duration of the project. On the other hand, from the perspective of contractors, the most important factor is economic conditions of the country. Overall responses indicate that the most important first three factors are; economic conditions of the country, duration of the project and size of the project.

Aforementioned responses show that economic conditions of the country, duration of the project and size of the project are considered by contracting authorities for the inclusion of price escalation clause into the contract. As stated before, when the duration and the size of project are taken as a basis for inclusion of price escalation clause into the contract, contracting authorities generally do not put the adjustment clause into the contract of small and medium term projects. When responses for this question are analyzed based on the size of companies, the results prove this condition such that; for small and medium companies, the most important factor that affects the decision of inclusion the price escalation clause in the contract is the economic conditions of the country and while duration, type and nature of the project are the least important factors. On the other hand, the results in part B shows that small and medium-sized construction companies pay more attention to the price escalation

clause when setting the bid prices. In fact, they are more influenced by price changes and cannot afford the high-cost increases; so, the escalation clause should be included in construction contracts to carry out the public construction projects successfully. Due to the non-inclusion of price escalation clause into the contracts of small and medium term projects, price adjustment system will be separated from its general objectives.

In part E of the questionnaire, questions are prepared to analyze the problems related to price adjustment applications and controversial issues related to the current price escalation decree.

First, when the problems related to price adjustment applications are considered, the results show that; from the perspective of clients, the most important problems related to the price adjustment applications are the different price adjustment implementations of different government agencies and same institutions have different price adjustment applications at different times for similar projects (i.e. a price adjustment is paid for a project in 2013, it is not paid for a similar project in 2015). In fact, these results prove that in government contracts, there is no uniformity in terms of the applications of adjustment clause and they vary with the organization.

From the perspective of contractors, the most important problems are the different price adjustment implementations of different government agencies and input coefficients determined by the administrations which do not fit the nature of the project. The appropriate determination of input coefficients is very important because price adjustment amount to pay or to cut greatly varies based on these coefficients.

On the other hand, clients and contractors disagree that in contracts without a price escalation clause, administrations make work increases within the scope of the contract and also the indices to be used in the price adjustment formulas are determined incorrectly by the administrations.

Second, when controversial issues related to the current price escalation decree are considered, the results show that; from the perspective of clients, the most important problems are; (i) unpredictable increases in exchange rates bring contracts to an

incomplete state, (ii) as the price increases realized in the equipment supplied from abroad are valued over Turkish Lira, in contracts that require imports of materials from abroad, price increases cannot be met with the existing escalation decree, (iii) items that constitute inputs to indices are not specific to the construction sector, (iv) the indices used for the price adjustment payment do not exactly reflect the market conditions.

From the perspective of the contractors, the most three important problems are; (i) items that constitute inputs to indices are not specific to the construction sector items, (ii) the indices used for the price adjustment payment do not exactly reflect the market conditions, and (iii) unpredictable increases in exchange rates bring contracts to an incomplete state.

In fact, when considering the problems related to the indices; CPI is used to measure the price changes for labor, and DPPI is used to measure the price changes for steel, cement, timber, fuel, and other construction materials. As stated before, escalation is not only related to the inflation but also related to supply-demand imbalance, market conditions, and local factors. CPI is aimed to calculate the inflation rate by using the change of the prices of goods and services existed in the market; on the other hand, the construction industry today employs predominantly large skilled labor force and wages of these workers are generally different from an ordinary person wage. So, CPI is not an adequate measure to reflect the labor price variations for construction projects. The drawbacks of using DPPI to measure price changes of construction materials are similar to the reasons of CPI. DPPI is released for the country as a whole; however, in Turkey, prices at different regions vary considerably. Thus, it can be unrealistic to use a single index for the whole country. Also, construction projects being unique in nature have a different composition of materials and specifications based on the type of project. For example, road projects are different from hydropower projects. Therefore, different construction cost indices are needed to monitor variations in the overall cost of construction for various types of projects. By this way, the price adjustment calculation will be more realistic and the price changes in construction inputs will be measured more accurately.

The principles of currently used escalation decree do not envisage price adjustment depending on the increase in foreign exchange. On the other hand, in contracts that require imports of materials from abroad, price increases cannot be met with the existing escalation decree because the price variations are calculated based on the indices that measure the domestic price changes. As a result, price adjustment system is separated from its general objectives.

The question regarding the what extent to which the compensation as per the currently used escalation clause in government contracts reflect the actual price escalation for the components of labor, cement, steel, fuel, timber, equipment and other materials is asked to the contractors' representatives. The results show that; contractors are compensated less than 30 % of the actual escalation of the steel and fuel prices and compensated between 30% to 60 % of the actual escalation of the labor, cement, timber and other material prices. The reason for inadequate compensation is that indices do not reflect the actual changes in the price of the construction materials. As stated before, there is a need to form indices related to the construction resources.

Questions are asked to the respondents to identify their perceptions related to the price adjustment system and to identify the views of contracting parties related to the necessity of improving the price adjustment system. Results show that the following outcomes: i) clients and contractors agree that current Price Escalation Decree and price adjustment applications are poor ii) they are not satisfied with the current price adjustment system iii) they agree that current price escalation decree and its implementations need to be improved. This is very important because the dissatisfaction with the price adjustment system may cause a dispute between clients and contractors.

As a conclusion, as stated before, the purpose of this study is to analyze the price adjustment system for construction projects in Turkey and to provide the solutions for formulating a rational approach to the escalation system in construction projects. In above sections, results show that there is a need for having proper escalation regulations and provisions to carry out construction projects successfully. In fact,

there is no perfect and only escalation regulation, clause, formula or provision that can solve the problems related to the construction input price changes in all conditions from the perspectives of both a contractor and a client. However, with the time and experience, the escalation regulations and price adjustment system are being improved to solve problems related to price changes. Therefore, in accordance with aim of this study, 17 suggestions are prepared based on the literature review, interview with experts and past experiences related to price adjustment system. Responses given by both clients and contractors show that the agreement rate of participants for most of the suggestions is more than 70 %. In the conclusion chapter, suggestions to improve the price escalation system are discussed in detail.

CHAPTER 10

SUMMARY AND CONCLUSIONS

Completion of construction projects takes a great deal of time ranging from several months to several years and these projects are executed based on pre-confirmed contract value. On the other hand, there is a strong probability that prices of construction materials will most probably fluctuate during the implementation phase of the project. Most countries regulated escalation clause in their law, contracts or other legislations to cope with changes in prices of construction materials. The basic rationale for price adjustment system is to compensate the contractor for an increase in material prices which are beyond the control of both parties. There is an escalation decree in Turkey which states the provisions of the price escalation clause in government construction projects. However, there are some arguing points related to the provisions and applications of the existing escalation decree. Therefore, the purpose of this study is to investigate the price adjustment system in Turkey and to provide certain suggestions for formulating a rational approach to the escalation system in construction projects.

In order to achieve aforementioned aims of this study, questionnaires are designed for the administrations and contractors which are the contracting parties of public construction projects.

As a result, based on the questionnaires, interview with experts and literature reviews, following conclusions are drawn.

First, results show that the price escalation clause and the calculation method of the price adjustment highly affect the bid decision and the bid price of contractors.

Additionally, clients and contractors agree that the inclusion of the price escalation clause into the contract increases the number of firms participating in the tender and provides to take low-priced offers for tenders. Results also reveal that if an appropriate price escalation clause does not exist in the contract, cost escalation causes not only a delay of projects but also the poor quality of the project produced. Moreover, cost escalation triggers cash flow problems during the execution phase and it may result in dispute among contracting parties. Therefore, it can be inferred that the price adjustment system creates a win-win situation for both the contracting parties.

Second, results show that while some contracting authorities put an escalation clause in the contract to compensate the contractor for the price variations, some departments continued with fixed rates of contracts without allowing for any compensation. In addition, some contracting authorities determine the weight percentage of inputs whereas some of them use the general index for calculation of escalation payment. Results also indicate that different input coefficients are determined for a different part of (earthworks, superstructure works, etc.) work especially in road, bridge, tunnel and hydraulics structure projects; and sometimes, multiple indices are used in price adjustment calculation based on types of inputs. Furthermore, results also reveal that there are certain inconsistencies in terms of the price escalation clause provisions in the contract and the administrative specification. Hence, in government contracts, there is no uniformity in terms of inclusion of price escalation clause into the contract and the provisions of adjustment clause and they vary depending on the contracting authority.

As stated before, use of General Index for calculating escalation is not appropriate since it does not reflect the true nature of fluctuations. In fact, according to the escalation decree, the contracting authorities have to determine weight percentages of inputs and also cost indices for related inputs by considering the nature of project before bidding. The appropriate determination of input coefficients is very important because price adjustment amount to pay or to cut greatly varies based on these coefficients. In addition, when the decisions of PPA due to the complaints related to the escalation are investigated, it is seen that frequently encountered issues are

related to the preparation of price escalation clause provisions. In other words, a price escalation clause based on wrong (or inappropriate) assumptions may be worthless for both the client and the contractor. Therefore, contracting authorities should use their knowledge as well as analytical tools to formalize and improve the price adjustment system.

The survey results show that nearly 90% of the participants agree on the following suggestions:

- ✓ The contracting authorities should be informed about the price escalation decree together with its applications and a platform should be established where Public Institutions should share their experiences with other Public Institutions.
- ✓ The contracting authorities should be trained in the preparation of the BoQ/ estimated cost and the determination of input weight ratios.
- ✓ The price escalation clause provisions in the contract and its annexes should exist in accordance with the price escalation decree.
- ✓ The practices of the contracting authorities should be united in terms of inclusion of the price escalation clause into the contract.
- ✓ As stated in the escalation decree, based on the nature of project, different input coefficients (b1, b2, b3, b4, b5) and different indices should be determined to use in different parts/phases of the construction work (earthworks, superstructure works etc.) by contracting authorities before tender.

Escalation decree states that for any work items that the unit price is absent in the contract, and whose contract year unit price is able to be determined according to the General Terms and Conditions of Construction Works, if it is needed to determine the unit price of this work item in execution phase of project, the unit price for this work items have to be prepared based on the rate of contract year. On the other hand, it is not fair determining the new unit price of this work item based on the rate of

contract year and updating the unit price of this work item by indices because the price increases in the market price of a construction material or work item mostly more than the increase in the value of index. Therefore, if the new unit price is determined based on the contract year's terms and conditions, it does not appropriately reflect actual price changes. To have a fair price adjustment system, it is recommended that if a new unit price is prepared during the implementation of the project, this new unit price should be determined according to the rate, price, and conditions of the preparation time instead of escalating contract prices to the implementation time by indices. Results show that more than 74% of the participants are agreed on this suggestion.

In price adjustment system, the client compensates the contractor due to increases in material prices and the client is also compensated if material prices decline during the implementation phase. Therefore, if the value of the price adjustment multiplier is less than one, it means a deduction have to be made from the interim payment certificate of the contractor. Escalation decree states that for a contract in which adjustment clause is not foreseen if the value of price adjustment multiplier is less than one, a deduction have to be made from the interim payment certificate of the contractor even if the delay is due to the client. On the other hand, according to the Public Procurement Law and Public Procurement Contract Law, any payment has not been envisaged to the contractor due to the extension of the project causing from the contracting authority, so it is not actually fair to cut back on contractor payment due to decreases in material prices during the extended period of contract. Therefore, it is recommended that in contracts in which the price adjustment payment is not foreseen and there is a time extension due to the problems arising from the contracting authority, the price difference should not be interrupted if the Pn value for the application month is less than 1. Results show that 55% of the clients and 75% of the contractors are agreed on this suggestion.

One of the adjustment parameters of escalation formulas is non-adjustable portion or deduction rate. This can be defined as the risk sharing between owner and contractors due to changes in construction materials. It can also be viewed as overheads and profits that deemed to be unaffected by inflation. There are different

perspectives on the appropriate value of deduction rate depending on whether it is considered the contractor's risk or its profit. In principle, it is not reasonable imposing the loss in relation to the change in price to only a project owner in terms of the characteristics of a construction contract. It is reasonable to recognize that the loss caused by the change in price be shared between the contractor and the project owner. In the Escalation Decree, the non-adjustable portion is set as 10% and a 10% deduction rate is applied to the price adjustment payment of contractor. In Turkey, contracting authorities determine the cost of the projects based on the rate (unit prices) that is formed and published by government institutions and the profit of contractor has been set as %10 of the cost of work. By considering this fact, it can be claimed that the profit of contractor has not been adjusted. However, profits of contractors are not fixed and actually vary by circumstances. Therefore, to have a reasonable price adjustment system, it is recommended that the deduction rate B = 0.9 in the price adjustment formula should be determined by taking economic and other conditions into account. Results show that 63 % of the clients and 80 % of the contractors agree on this suggestion.

The questionnaire results show that more than 70 % of the participants agree on the following suggestions:

- ✓ There is a need to make regulations in escalation decree for the payment of the price difference due to the unpredictable increase (Central Bank Forecasts etc.) in the foreign exchange rate.
- ✓ There should be made regulations in escalation decree to perform the price adjustment calculation for special kind of imported equipment, machinery, and materials by using prices published by market actors (Chamber of Commerce Industry prices) instead of using indices.
- ✓ Instead of the using Consumer Price Index to measure the price changes taking place in labor input, Construction Industry Gross Wage-Salary Index, Building Construction Costs Workers Index published by TURKSTAT should be taken as a basis or a new index for labor should be formed.

- ✓ Construction indices that are specific to construction project types and that consider construction sector inputs should be created and used in price adjustment (Building Cost Index, Road Cost Index, etc.).
- ✓ By taking into account local price differences, local price coefficients should be created to apply to price indices for local price differences.

Consumer Price Index is used to measure the price changes for labor, and Domestic Producer Price Index is used to measure the price changes for steel, cement, timber, fuel and other construction materials. On the other hand, it can be inferred from results of the questionnaire that contractors are compensated less than 30 % of the actual escalation of the steel and fuel prices and compensated between 30% to 60% of the actual escalation of the labor, cement, timber and other material prices. One of the reasons for inadequate compensation is that indices do not reflect the actual changes in the price of the construction materials. Because CPI aims to calculate the inflation rate by using the change of the prices of goods and services existed in the market. On the other hand construction industry, today employs predominantly large skilled labor force and CPI actually does not reflect the changes in salaries of these workers. In addition, construction projects are executed in different parts of the country and the wage of workers considerably differs from place to place; so, the CPI may not be an indicator to accurately and sufficiently measure the localized wage changes. Therefore, in order to have a fair price adjustment system which appropriately reflects price changes in the labor component, it may be appropriate to use Construction Industry Gross Wage-Salary Index Building Construction Costs Workers Index published by TURKSTAT or a new index similar to these. Moreover, the drawbacks of the using DPPI to measure the price changes for construction materials are similar to the drawbacks of CPI. As it is known, each type of construction is a combination of a unique set of materials. This leads to the fact that cost variations for different types of constructions should be measured by different types of cost indices, which actually are developed by measuring price variations regarding those specific sets of material and labor used. Lack of Construction Cost Indices forces the client to use DPPI for escalation payment. In many countries, special price indices for different types of construction projects have been developed such as Building Cost Index, Road Cost Index, and Bridge Construction Cost Index.

Therefore, it is recommended that Building Construction Cost Index published by TURKSTAT should be used for calculating the escalation payment instead of DPPI for building construction projects. In addition, new construction cost indices should be developed to monitor cost variations for various types of construction projects. As construction projects are executed in different parts of the country, material prices considerably differ from region to region. Several countries have been published local price indices or locational factors to represent local price changes. Construction Cost Index has been releasing for six major regions in India, Location Factor has been releasing for Tender Price Index of Road Construction to represent the price variations for different regions in England and Local Price Indices has been releasing in Ghana to use them in the calculation of price adjustment. In fact, TURKSTAT divides Turkey in 26 districts and it collects data from these 26 districts to calculate the price indices. Therefore, these data can be used to create local price factor or local price indices for the major regions of Turkey. By this way, price changes in construction materials in different regions can be measured more accurately.

Price adjustment for special kind of imported equipment, machinery, and materials should be reimbursed on actual procurement prices instead of using indices. Because price changes realized in the imported resources cannot be truly measured with the domestic price indices. In many contracts including the Central Public Works Department in India, Standard Procedure and Formula for Price Adjustment in Pakistan and FIDIC, the market prices (invoice method) are used to perform the price adjustment for special inputs. Therefore, it is recommended that regulations should be made in escalation decree to perform the price adjustment calculation for special kind of resources by using prices published by market actors.

The principles of currently used escalation decree do not envisage price adjustment depending on the increase in foreign exchange. On the other hand, it is found from results of a questionnaire that all small companies and most of the medium companies use intuitive methods to forecast the price changes spring from foreign exchange rate movements. Intuitive methods are not the convenient ways to forecast price fluctuations. Unpredictable increases (Central Bank Estimates etc.) in the

foreign exchange rate are beyond the control of contractors. Therefore, regulations should be made in escalation decree to compensate the contractors due to unpredictable increases in foreign exchange rate.

The Public Procurement Authority is authorized to evaluate and conclude any complaints, claims of contracting parties related to the tender procedures beginning from tender phase to signing of the contract. On the other hand, complaints and claims of contracting parties related to the execution of the contract are solved in the Turkish Courts. It is known that the court process takes a long time and requires lot of effort. Furthermore, most of the courts are not well-experienced on these issues and they generally resort to experts to resolve issues; therefore, this condition causes to spend more time and to take different decisions on the same subject. Due to the fact that people who are experienced in public procurement are employed in PPA and they investigate many different kinds of disputes related to the tender procedures, it is recommended that instead of judicial jurisdiction, PPA should be authorized to solve disputes related to the price adjustment encountered in the execution stage of the contract. Results show that more than 85 % of the participants are agreed on this suggestion.

It is very important for clients and contractors to estimate the probable future cost of construction materials. From the perspective of clients, the probable future cost is very crucial because it prepares the provisions of price escalation clause. According to the current escalation decree, actually, the inclusion of price escalation clause into the contract is totally up to the decision of contracting authority. Therefore, an adjustment provision based on wrong assumptions can be worthless to both the client and the contractor. On the other hand, it is very important for contractors to estimate the future cost of construction materials, especially in contracts where there is no price escalation clause because contractors should prepare the proposals according to the cost of construction resources. If the contractor does not appropriately forecast the price changes before bidding, it will probably lose its profit and it will experience financial difficulties in execution phase of projects due to the fluctuations in the cost of construction resources. Therefore, it is recommended that in order to estimate

future price changes, a web-based "Forecasting Module" which is open to the use of administration and contractors should be established on the website of the PPA.

Results show that more than 75 % of the participants are agreed on this suggestion.
Also, since contracting authorities spend ample time to administer the price escalation clause, it increases the workload of contracting authorities. Contracting authorities sometimes prefer not to include the price escalation clause into the contract of short-term projects. In this context, in order to simplify the calculation of price adjustment calculations and in order to avoid differences in implementation, a web-based "Price Adjustment Calculation Module" which is open to the use of administration and contractors should be established on the website of the PPA.

Results show that more than 86 % of the participants are agreed on this suggestion.
To conclude, to have a better and fairer price adjustment system for public construction projects in Turkey, it will be beneficial to avoid a one-sided clause protecting only the interest of the clients. The survey results show about 90% of the participants are of the opinion that while the price escalation decree is being prepared, all parties' opinions should be taken into account and reflected in escalation decree.

In this study, general evaluation is done about the problems related to price adjustment system and corresponding suggestions to improve the price adjustment system in Turkey. A further study may be carried out for detailing these problems and suggestions by making subcategorization. Further research may focus on developing cost indices to monitor cost variations for various types of construction projects. In addition, further study may focus on developing local price indices and assess the construction industry's perceptions on the use of these indices. Thus, both clients and contractors learn lessons from the results of future research which enrich the price adjustment system in Turkey.

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APPENDICES

APPENDIX A

A. SAMPLE QUESTIONNAIRE FOR ADMINISTRATIONS

PART A

This section contains general questions that help to define the participant profile.

Question 1: How many years of experience do you have in the construction industry?

a) Less than 5 years
b) 5 to10 years
c) 10 to 15 years
d) 15 years and above

Question 2: What types of construction projects your administration is undertaking?

a) Housing
b) Road, bridge, tunnel
c) Urban infrastructure (drinking water, sewage etc.)
d) Hydraulic structures (pond, dam, irrigation canal, etc.)
e) Energy projects (power lines, transformer centers, etc.)
f) Superstructure projects (administrative buildings, schools, hospitals, sports halls, etc.)
g) Special projects (airports, industrial facilities, etc.)

Question 3: Which of the following best describes your position in execution of construction projects?

a) Preparing tenders for construction projects
b) Working on the supervision of construction project
c) Working as supervisor during the procurement and construction stages of the construction projects (Director, Chairman, Inspector)
d) Other (i.e. Public Procurement Agency employee)

Question 4: How many yearly construction project tender are made by your administration?

a) Less than project
b) 10 to 20 project
c) 20 to 50 project
d) 50 project and above

PART B

This section is prepared to examine how the price escalation clause that used to compensate contractors against price changes affects the number of firms participating in the tender and tender price offers.

Question 1: The following table consists of the effects of putting a price escalation clause into the contract in terms of the number of firms participating in the tender and tender price offers. Please indicate your response based on your overall experience.

Q.N	The effects of putting a price adjustment clause into the contract	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
1	Putting a price adjustment clause into contract increases the number of firms participating in the tender.					
2	Putting a price adjustment clause into contract provide to take lower-priced offers for tender.					

PART C

This section is prepared to examine the effects of cost escalation on the projects in case of not having an appropriate price escalation clause in contract. Please indicate your response based on your overall experience.

Question 1: Effects of cost escalation on the projects in case of not having an appropriate price escalation clause

Q.N	The effects of cost escalation on the projects in case of not having an appropriate price adjustment clause in contract	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
1	Delay of project					
2	Cancellation or termination of project					
3	Cash flow (financing) problems in the execution phase of projects					
4	Poor quality of construction work					
5	Dispute among contracting parties					

PART D

This section is prepared to examine the price adjustment applications in construction contracts in terms of the Principles of Price Escalation Decree.

Question 1: The following table consists of some reasons that are related with why price escalation clause is not included in some contracts. Based on your experience, please rate the importance of the listed reasons.

Q.N	Reasons that why price adjustment clause is not included in some contracts	Very low importance	Low importance	Moderate importance	High importance	Very high importance
1	Contract duration is short (<12 month)					
2	The thought that it brings additional financial burden to the public budget					
3	The idea that input costs have not changed significantly					
4	Management of price adjustment clause increase the workload of administrations					
5	Administrations have inadequate knowledge of market conditions and price changes					

Question 2: In the following, in relation to the principles of Price Escalation Decree, cases related to the application of the price escalation clause included in the construction contracts are listed. Based on your experience, please indicate your frequency of encountering with these situations.

Q.N	The applications of the price adjustment clause included in the construction contracts	Never	Sometimes	Usually	Frequently	Very Frequently
1	In the contracts of the construction works you have done, there is the price adjustment clause in contract.					
2	In the contracts with price adjustment clause, price adjustment calculation is done using General Index.					
3	In the contracts with price adjustment clause, the input coefficients a, b1, b2, b3, b4, b5 and c are determined appropriately according to the nature of construction work					
4	In the contracts with price adjustment clause, different input coefficients are determined for different part of (earth works, superstructure works, etc.) construction project					
5	In the contracts with price adjustment clause, more than one index is used according to the kind of inputs that is used for related work item. (For example, the use of the Base Metals index or sub-indexes represented by the coefficient b2 according to the nature of work item)					

Question 3: The following table consists of factors affecting the decision to put the price escalation clause in the contract. Based on your experience, please rate the importance of the listed factors.

Q.N	Factors affecting the decision to put the price adjustment clause in the contract	Very low importance	Low importance	Moderate importance	High importance	Very high importance
1	The duration of the project					
2	Type of project (Infrastructure, Superstructure, Dam, Road etc.)					
3	The nature of work items (i.e. special technology and material-requiring work items)					
4	Size of the project (Estimated Cost)					
5	Economic conditions of the country					
6	Other					

PART E

This section is prepared to examine the controversial points related with the Escalation Decree and Price Adjustment Applications

Question 1: Current price escalation decree and price adjustment applications

Q.N	Current escalation decree and price adjustment applications	Very poor	Poor	Good	Very good	Excellent
1	What do you think about the current Price Escalation Decree?					
2	What do you think about the current price adjustment applications?					

Question 2: Problems related with Price Adjustment Applications and controversial issues related to the current Escalation Decree

Problem and controversial issue explanation		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Q1	Clients resist honoring the escalation clauses					
Q2	In contracts where the price difference is not paid, the administrations make work increases within the scope of contract					
Q3	There are inconsistencies in terms of the price adjustment clause provisions in the contract and the administrative specification					
Q4	The indices to be used in the price adjustment formulas are determined incorrectly by the administrations.					
Q5	The input coefficients determined by the administrations do not fit the nature of project					
Q6	Different price adjustment applications of departments within the same institution (i.e. input coefficients are determined in one Regional Directorate tenders but are not determined in another)					
Q7	Different price adjustment implementations of different government agencies (i.e. input coefficients are determined in one Regional Directorate tenders but are not determined in another)					
Q8	For similar projects, the same institutions have different price adjustment applications at different times (i.e. a price adjustment is paid for a superstructure project in 2013, it is not paid for a similar project in 2015)					
Q9	The principles in the current price escalation decree are insufficient to meet the increases in price					
Q10	The indices used for the price adjustment payment do not exactly reflect the market conditions.					
Q11	Items that constitute inputs to indices are not specific to the construction sector items.					
Q12	For work items that the unit price of its is absent in the contract and whose contract year price can be determined according to the General Conditions of Construction Works, If the new unit price determined by the contract year's terms and conditions, it does not reflect actual the price changes appropriately.					
Q13	Using reduction factor B = 0.9 in the price adjustment formula, causing a 10 % underpayment or interruption in adjustment payment					
Q14	As the price increases realized in the equipment supplied from abroad are valued over Turkish Lira, in contracts that require imports of materials from abroad, price increases can not be met with the existing escalation decree.					
Q15	Unpredictable increases in exchange rates bring contracts to an incomplete state because the current price escalation decree does not envisage the price adjustment depending on the increase in foreign exchange rate.					

Question 3: Current price escalation decree and its implementations need to be improved

a) Strongly disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly agree

PART F

This section includes suggestions to improve the price escalation decree and price adjustment applications.

Question 1: Suggestions to improve the price escalation decree and price adjustment applications

Suggestion explanation		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
S1	The contracting authorities should be informed about the price escalation decree and its applications and a platform should be established where Public institutions should share their experiences with other Public Institutions.					
S2	The contracting authorities should be trained in the preparation of the BoQ/ estimated cost and the determination of input weight ratios.					
S3	The price adjustment clause provisions in the contract and its annexes shall be in accordance with the Price escalation decree.					
S4	The practices of the contracting authorities should be united in terms of putting the price adjustment clause into contract.					
S5	As stated in the escalation decree, according to the nature of project different input coefficients (b1, b2, b3, b4, b5) and different indices should be determined for using in different parts / phases of the construction work (earth works, superstructure works etc.) by contracting authorities before tender.					
S6	For work items that the unit price of its is absent in the contract, if a new unit price is prepared during implementation of project, instead of escalating contract prices to the implementation time by using index, the new unit price should be determined according to the rate and conditions of the preparation time					
S7	In cases where the price adjustment payment is not foreseen and there is a time extension due to the problems originating from administration, the price difference should not be interrupted if the Pn value for the application month is less than 1.					
S8	The reduction factor B = 0.9 in the price adjustment formula, should be determined taking into account the economic and other conditions to reflect price changes more fairly.					
S9	There is a need to make regulations in escalation decree for the payment of the price changes due to the unpredictable increase (Central Bank Estimates etc.) in the foreign exchange rate.					
S10	In contracts that are required imported equipment, machinery and materials, for work items where the indices do not reflect price changes, there should be made regulations in escalation decree to make the price adjustment calculation by invoice method using prices published by market actors (Chamber of Commerce Industry prices) instead of using indices.					
S11	Instead of the using Consumer Price Index for the price changes taking place in labor input, Construction Industry Gross Wage-Salary Index, Building Construction Costs Workers Index published by TURKSTAT should be taken as a basis or a new index for labor should be determined to use price adjustment calculation for labor input.					
S12	Construction indexes that are specific to construction project type and take into account the construction sector inputs should be created and used in price adjustment (Building Cost Index, Road Cost Index, etc.)					
S13	Taking into account local price differences, local price coefficients should be created to apply to price indices for local price differences.					
S14	While the price escalation decree is being prepared, all parties' opinions should be taken and reflected in decree.					
S15	To be more effective in terms of time, expertise, practice association etc. PPA should be authorized to solve problems related with the price adjustment applications in the execution phase of project, instead of judicial jurisdiction.					
S16	In order to estimate future price changes, a web-based "Forecasting Module" which is open to the use of administration and contractors should be established on the web site of the PPA					
S17	In order to simplify the calculation of price adjustment calculations and to avoid differences in implementation, a web-based "Price Adjustment Calculation Module" which is open to the use of administration and contractors should be established on the web site of the PPA					

APPENDIX B

B. SAMPLE QUESTIONNAIRE FOR CONTRACTORS

PART A

This section contains general questions that help to define the participant profile.

Question 1: How many years of experience do you have in the construction industry?

a) Less than 5 years
b) 5 to10 years
c) 10 to 15 years
d) 15 years and above

Question 2: What types of construction projects your company is undertaking?

a) Housing
b) Road, bridge, tunnel
c) Urban infrastructure (drinking water, sewage etc.)
d) Hydraulic structures (pond, dam, irrigation canal, etc.)
e) Energy projects (power lines, transformer centers, etc.)
f) Superstructure projects (administrative buildings, schools, hospitals, sports halls, etc.)
g) Special projects (airports, industrial facilities, etc.)

Question 3: How long has your company been in the construction industry?

a) Less than 5 years
b) 5 to10 years
c) 10 to 15 years

d) 15 years and above

Question 4: What is the size of your company in terms of the number of employees?

a) Small (less than 20 employee)
b) Medium (20 to 50 employee)
c) Large (50 employee and above)

Question 5: How much the cost of average annual public project that your company has been completed?

a) Less than 5 million TL
b) 5 to 50 million TL
c) 50 to 100 million TL
d) 100 million and above

PART B

This section is prepared to examine how the price adjustment regulations that used to compensate contractors against price changes affect the contractor's bid behavior.

Question 1: The following table consists of the influence of price adjustment regulations on contractor's bid behavior. Based on your experience, please rate the effect levels of the listed conditions on bid behavior.

Q.N	The effect of price adjustment regulations on contractors bid behavior	Very low effect	Low effect	Moderate effect	High effect	Very high effect
1	Does the absence of price adjustment clause in contract affect the bid/ no-bid decision?					
2	Does the absence of price adjustment clause in contract affect the offer price?					
3	Does the calculation method (General Index or Weight ratio method) of the price adjustment payment in contract affect the offer price?					

Question 2: In order to take measures against price changes, when determining risk premium and bid price which of the following do you use?

a) Use formal methods (future index estimation methods, inflation and exchange rate changes etc.)
b) Use intuitive methods (foresight of experienced workers, past project experience etc.)
c) Sometimes use formal sometimes use intuitive methods

Question 3: The following table consists of the effects of putting a price escalation clause into the contract in terms of the number of firms participating in the tender and tender price offers. Please indicate your response based on your overall experience.

Q.N	The effects of putting a price adjustment clause into the contract	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
1	Putting a price adjustment clause into contract increases the number of firms participating in the tender.					
2	Putting a price adjustment clause into contract provide to take lower-priced offers for tender.					

PART C

This section is prepared to examine the effects of cost escalation on the projects in case of not having an appropriate price escalation clause in contract. Please indicate your response based on your overall experience.

Question 1: Effects of cost escalation on the projects in case of not having an appropriate price escalation clause

Q.N	The effects of cost escalation on the projects in case of not having an appropriate price adjustment clause in contract	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
1	Delay of project					
2	Cancellation or termination of project					
3	Cash flow (financing) problems in the execution phase of projects					
4	Poor quality of construction work					
5	Dispute among contracting parties					

PART D

This section is prepared to examine the price adjustment applications in construction contracts in terms of the Principles of Price Escalation Decree.

Question 1: The following table consists of some reasons that are related with why price escalation clause is not included in some contracts. Based on your experience, please rate the importance of the listed reasons.

Q.N	Reasons that why price adjustment clause is not included in some contracts	Very low importance	Low importance	Moderate importance	High importance	Very high importance
1	Contract duration is short (<12 month)					
2	The thought that it brings additional financial burden to the public budget					
3	The idea that input costs have not changed significantly					
4	Management of price adjustment clause increase the workload of administrations					
5	Administrations have inadequate knowledge of market conditions and price changes					

Question 2: In the following, in relation to the principles of Price Escalation Decree, cases related to the application of the price escalation clause included in the construction contracts are listed. Based on your experience, please indicate your frequency of encountering with these situations.

Q.N	The applications of the price adjustment clause included in the construction contracts	Never	Sometimes	Usually	Frequently	Very Frequently
1	In the contracts of the construction works you have done, there is the price adjustment clause in contract.					
2	In the contracts with price adjustment clause, price adjustment calculation is done using General Index.					
3	In the contracts with price adjustment clause, the input coefficients a, b1, b2, b3, b4, b5 and c are determined appropriately according to the nature of construction work					
4	In the contracts with price adjustment clause, different input coefficients are determined for different part of (earth works, superstructure works, etc.) construction project					
5	In the contracts with price adjustment clause, more than one index is used according to the kind of inputs that is used for related work item. (For example, the use of the Base Metals index or sub-indexes represented by the coefficient b2 according to the nature of work item)					

Question 3: The following table consists of factors affecting the decision to put the price escalation clause in the contract. Based on your experience, please rate the importance of the listed factors.

Q.N	Factors affecting the decision to put the price adjustment clause in the contract	Very low importance	Low importance	Moderate importance	High importance	Very high importance
1	The duration of the project					
2	Type of project (Infrastructure, Superstructure, Dam, Road etc.)					
3	The nature of work items (i.e. special technology and material-requiring work items)					
4	Size of the project (Estimated Cost)					
5	Economic conditions of the country					
6	Other					

PART E

This section is prepared to examine the controversial points related with the Escalation Decree and Price Adjustment Applications

Question 1: Current price escalation decree and price adjustment applications

Q.N	Current escalation decree and price adjustment applications	Very poor	Poor	Good	Very good	Excellent
1	What do you think about the current Price Escalation Decree?					
2	What do you think about the current price adjustment applications?					

Question 2: Problems related with Price Adjustment Applications and controversial issues related to the current Escalation Decree

Problem and controversial issue explanation		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Q1	Clients resist honoring the escalation clauses					
Q2	In contracts where the price difference is not paid, the administrations make work increases within the scope of contract					
Q3	There are inconsistencies in terms of the price adjustment clause provisions in the contract and the administrative specification					
Q4	The indices to be used in the price adjustment formulas are determined incorrectly by the administrations.					
Q5	The input coefficients determined by the administrations do not fit the nature of project					
Q6	Different price adjustment applications of departments within the same institution (i.e. input coefficients are determined in one Regional Directorate tenders but are not determined in another)					
Q7	Different price adjustment implementations of different government agencies (i.e. input coefficients are determined in one Regional Directorate tenders but are not determined in another)					
Q8	For similar projects, the same institutions have different price adjustment applications at different times (i.e. a price adjustment is paid for a superstructure project in 2013, it is not paid for a similar project in 2015)					
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Q10	The indices used for the price adjustment payment do not exactly reflect the market conditions.					
Q11	Items that constitute inputs to indices are not specific to the construction sector items.					
Q12	For work items that the unit price of its is absent in the contract and whose contract year price can be determined according to the General Conditions of Construction Works, If the new unit price determined by the contract year's terms and conditions, it does not reflect actual the price changes appropriately.					
Q13	Using reduction factor B = 0.9 in the price adjustment formula, causing a 10 % underpayment or interruption in adjustment payment					
Q14	As the price increases realized in the equipment supplied from abroad are valued over Turkish Lira, in contracts that require imports of materials from abroad, price increases can not be met with the existing escalation decree.					
Q15	Unpredictable increases in exchange rates bring contracts to an incomplete state because the current price escalation decree does not envisage the price adjustment depending on the increase in foreign exchange rate.					

Question 3: What extent does the compensation as per the existing price escalation clause reflect the actual price escalation for the following components?

Input	Low (< 30 %)	Medium (30-60 %)	High (> 60 %)
Labor			
Cement			
Steel			
Fuel			
Timber			
Equipment			
Other Materials			

Question 4: Current price escalation decree and its implementations need to be improved

a) Strongly disagree
b) Disagree
c) Undecided
d) Agree
e) Strongly agree

PART F

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This section includes suggestions to improve the price escalation decree and price adjustment applications.

Question 1: Suggestions to improve the price escalation decree and price adjustment applications

Suggestion explanation		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
S1	The contracting authorities should be informed about the price escalation decree and its applications and a platform should be established where Public institutions should share their experiences with other Public Institutions.					
S2	The contracting authorities should be trained in the preparation of the BoQ/ estimated cost and the determination of input weight ratios.					
S3	The price adjustment clause provisions in the contract and its annexes shall be in accordance with the Price escalation decree.					
S4	The practices of the contracting authorities should be united in terms of putting the price adjustment clause into contract.					
S5	As stated in the escalation decree, according to the nature of project different input coefficients (b1, b2, b3, b4, b5) and different indices should be determined for using in different parts / phases of the construction work (earth works, superstructure works etc.) by contracting authorities before tender.					
S6	For work items that the unit price of its is absent in the contract, if a new unit price is prepared during implementation of project, instead of escalating contract prices to the implementation time by using index, the new unit price should be determined according to the rate and conditions of the preparation time					
S7	In cases where the price adjustment payment is not foreseen and there is a time extension due to the problems originating from administration, the price difference should not be interrupted if the Pn value for the application month is less than 1.					
S8	The reduction factor B = 0.9 in the price adjustment formula, should be determined taking into account the economic and other conditions to reflect price changes more fairly.					
S9	There is a need to make regulations in escalation decree for the payment of the price changes due to the unpredictable increase (Central Bank Estimates etc.) in the foreign exchange rate.					
S10	In contracts that are required imported equipment, machinery and materials, for work items where the indices do not reflect price changes, there should be made regulations in escalation decree to make the price adjustment calculation by invoice method using prices published by market actors (Chamber of Commerce Industry prices) instead of using indices.					
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