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Reasons for delays in public projects in Turkey

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The effects of construction delays are not confined to the construction industry but influence the state of the overall economy of a country. This is particularly so in Turkey where construction investments account for almost half of all investments and where delays have reached significant magnitudes in the 1970–80 decade. A large number of public agencies that are construction owners and a large number of contractors that undertake construction work for public agencies in Turkey were surveyed to identify and rank in an order of importance the causes for such delays. The results indicate that shortages of some resources; public agencies' and contractors' financial difficulties; organizational deficiencies and delays in design work, frequent change orders and considerable extra work are the most important sources of delay. While some of the causes are dependent on national economic policies, others may be overcome by measures to be taken by public agencies and contractors.

Keywords: Construction delays, public projects, developing countries

Introduction

Numerous public projects that were started in the last decade in Turkey have not been completed on schedule. Some of them took so long to complete that they have become worn out during construction and many of their parts had to be redone before construction came to an end (Chamber of Architects, 1979). Some had their functions or their ownership changed during an over-long construction period, thus necessitating modifications that in turn led to yet further increased construction time and cost. In some of the projects, construction activity totally stopped and the public lost hope regarding their completion.

While the ratio of the total cost of projects completed on schedule to the total cost of projects planned was about 15% in the first five-year national development plans, the ratio has gradually fallen to 8–10% in the last five-year plan. In 1975, for example, only 22%, by number, of the public projects were completed within their scheduled duration while 18% were completed with as much as 4 years delay (State Planning Organization, 1978a). Studies conducted in the education and health sectors indicate that the construction of hospitals and schools in the period 1967–1975 was delayed on average by 48% (Chamber of Architects, 1979). There are extreme examples such as the construction of a hospital for pulmonary diseases in Mus (Project No. 68I00027) expected to be constructed in 1968–71 that was completed in 1978 with a delay of

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233% (Chamber of Architects, 1979). The tendency to incur lengthy delays in public construction increased in the later parts of the 1970s (State Planning Organization, 1978a).

Thus it is well established that one of the most important problems related to public investments in Turkey during the period 1963–1980 consisted of delays and cost overruns. This is of special importance since in Turkey construction investments constitute 50% of all investments (State Planning Organization, 1979a) whereas they amount to 20% in most countries (Evans and Nicklin, 1966). Delays and cost overruns in Turkish construction projects prevent planned increases in production from taking place and this in turn affects, in a negative way, the rate of national growth.

Several investigations of the reasons why construction delays occur in Turkish public projects have been carried out in the last decade. Some of these studies concentrate on specific construction projects or types of construction (Kabatepe, 1972; United Nations Industrial Development Organization, 1976; Chamber of Architects, 1979; General Directorate of Highways, 1979a). Others identify the general problems created by delays and cost overruns, on a macro level in the Turkish economy (Hacaloglu, 1976; State Planning Organization, 1978a, 1978b, 1979a). In addition to the case studies, sectorial investigations, and general observations presented in the literature mentioned above, the necessity was felt for a more comprehensive study based on a more representative cross-section of the construction industry. As a result the causes of delays in Turkish public projects in the decade 1970–1980 were investigated by means of a national survey that covered a large number of public agencies and contractors. The results of this survey are presented in this paper.

Some delays may occur in the 'preconstruction' phase defined as the period between the initial conception of the project and the signing of the construction contract between the public owner and the contractor; some, on the other hand, may occur in the 'construction' phase that is basically the period when actual construction is under way. The findings reported in this paper are confined to the reasons for delays in the 'construction' phase.

Methodology of the study

Because of the large number of public agencies that sponsor construction projects and the large number of contracting companies that undertake work for public agencies, a survey by mailed questionnaire was appropriate. The questionnaire consisted of four sections.

The first section inquired about the context of the respondent organization and was composed of two questions: the location of the head office and the date of establishment. Contractors were also asked to identify the type and value of their contractorship licence.

The second section consisted of a closed question (a question and a number of answers). It asked respondents to select the five most important reasons for delays in the construction of public projects with which they had been involved and to put them in order of importance.

The third section consisted of a series of closed questions related to the reasons mentioned in the second section. Respondents were asked to interpret the reasons for delays which they had indicated were important.

The fourth section was organized in the form of a table where respondents were asked to fill in information about all the projects they had undertaken in the years 1977–1980. The information

required was the date of the bidding, the type and location of the construction, the owner of the project, the contract duration, actual completion and total time extension obtained by the contractor (or granted by the agency).

The survey covered investor public agencies and contractors that undertake projects for public agencies. The names and addresses of investor public agencies were obtained from the State Planning Organization's list of current projects in 1979 (State Planning Office, 1979a). The names and addresses of 250 contractors were retrieved from the records of the Ministry of Public Works, Directorate of Licences and Records and some from the Istanbul and Ankara telephone directories' yellow pages. In all 146 questionnaires were mailed to public agencies, and 327 to contractors. Of the 146 mailed to public organizations 44 were returned duly filled out (rate of return = 30.1%) and 34 were returned out of the 327 mailed to contractors (rate of return = 10.4%). The rates of return are satisfactory when compared with those obtained in other surveys in the construction industry (Gareis, 1979; Tezduyar, 1980).

The data obtained from the first section of the questionnaire indicates that the majority (66%) of the respondent public organizations had their head offices in the capital city, Ankara, and most of them (59%) were established prior to 1960. The head offices of the respondent contractors were located mostly (82%) in Ankara and Istanbul, and most of them (82%) were established after 1960. Of the 34 respondent contractors 22 (or 65%) held an 'A' type contractorship licence indicating they were large size companies that could undertake the largest public projects whereas 12 (or 35%) held a 'B' type licence indicating that they were companies of moderate size.

Findings and discussion

In the fourth section of the questionnaire, data for 126 projects were obtained from contractors and for 258 projects from public agencies. As shown in Table 1, more than half of the projects were building projects as opposed to civil engineering works. Table 2 indicates that most of them were situated in the central and western regions of the country.

Contractors' data related to the 126 public projects they had undertaken indicated that these were completed with an average delay of 34.60% over the average estimated project duration. The data obtained from public agencies resulted in an average delay of 43.65% in the 258 projects they had contracted out. As to the reasons why these delays occurred, the data obtained from both sets of respondents are presented in Table 3. The score for each reason is calculated by summing up the scores assigned to it by each respondent: 5 for the most important reason, 4 for less important, and so on. The percentage in front of each reason constitutes the relative importance accorded to it by the respondents. It is calculated by dividing the contractors' score for a reason by the total score of 527 for contractors; or by dividing agencies' score for the reason by the total score of 649 for public agencies. The reasons for delays are presented in descending order of importance as measured by the average relative weights given in the last column of Table 3.

The 22 respondents in contracting companies and the 36 respondents in public agencies who thought that problems in acquiring construction materials played some role in causing delays have indicated why they thought so by answering the appropriate question in the third section

Table 1. Distribution of projects according to their construction type.

Type of construction	Percent of projects reported by	
	Contractors (%)	Public agencies (%)
Building construction	56	63
Civil engineering construction	44	37
Total	100	100
Total number of projects	126	258

Table 2. Distribution of projects according to their geographical location.

Geographical region	Percent of projects reported by	
	Contractors (%)	Public agencies (%)
Central Anatolia	32	20
Marmara	24	25
Mediterranean/Aegean	28	17
Eastern/South Eastern Anatolia	8	22
Black Sea	6	16
Foreign countries	2	0
Total	100	100
Total number of projects	126	258

of the questionnaire. The results are presented in Table 4 and indicate an overwhelming concern on the part of both the contractors and the public agencies about shortages of cement and steel products. During the period 1972–1979, the annual rate of increase in the production of steel products in Turkey was approximately 7.6% and in this same period production had risen from 2.00 to 3.25 million tons year^{-1} (State Planning Organization, 1979a). In the period in question, demand has however been consistently higher than production: it increased from 2.2 million tons in 1972 to 3.45 million tons in 1979 (State Planning Organization, 1979a). Despite the continuous import of steel products in these years, demand could not be met in some years, e.g. 1973, 1976 and 1977. Also, in some cases, the import of steel products could not be realized in time for the peak construction season.

During the period 1972–1978 the anual rate of increase in the production of cement in Turkey was $\sim$10.7% with an increase from 8.4 million tons in 1972 to 15.3 million tons in 1978. Although production exceeded demand every year and although about 1 million tons per year were exported in the same period, the seasonal and regional shortages could not be prevented. The reasons for this deficiency are attributed to unscheduled production stops in many cement factories; these have occurred because of the difficulties in repairing machinery due to the unavailability of foreign currency to import spare parts, difficulties in importing and delivering fuel oil, and shortages of electrical power. The fact that cement cannot be stored for long periods of time and deficiencies in the delivery system of cement made shortages more acute.

Table 3. Importance scores and percentages of reasons for construction delays.

No.	Reasons for construction delays	Contractors		Public agencies		Average relative weights (%)
		Scores	Relative weights (%)	Scores	Relative weights (%)	
1	Difficulties in obtaining construction materials	76	14.42	133	20.49	17.46
2	Contractors' difficulties in receiving monthly payments from public agencies	80	15.18	40	6.16	10.67
3	Contractors' financial difficulties	58	11.01	66	10.17	10.59
4	Deficiencies in contractors' organization	26	4.93	75	11.56	8.25
5	Deficiencies in public agencies' organization	55	10.44	14	2.16	6.30
6	Shortage of qualified workers	36	6.83	35	5.39	6.11
7	Large quantities of extra work	17	3.22	49	7.55	5.39
8	Shortage of technical personnel	24	4.55	32	4.93	4.74
9	Delays in design work	23	4.36	31	4.78	4.57
10	Deficiencies in planning and scheduling	8	1.52	49	7.55	4.54
11	Inadequacy of site inspection	35	6.64	8	1.23	3.94
12	Frequent change orders	17	3.22	25	3.85	3.54
13	Deficiencies in equipment allocation	20	3.80	12	1.85	2.83
14	Unrealistic contract durations imposed by public agencies	16	3.04	15	2.31	2.68
15	Difficulties in obtaining energy (electricity, fuel)	8	1.52	22	3.39	2.46
16	Disagreements on contract clauses	11	2.09	3	0.46	1.28
17	Difficulties in obtaining construction licences	0	0.00	10	1.54	0.77
18	Unexpected meteorological conditions	3	0.57	4	0.62	0.60
19	Disagreements on specifications	5	0.95	0	0.00	0.48
20	Difficulties in transportation	0	0.00	4	0.62	0.31
21	Unexpected natural events (earthquake, flood, etc.)	0	0.00	0	0.00	0.00
22	Unexpected social events (mobilization, martial law)	0	0.00	0	0.00	0.00
23	Others	9	1.71	22	3.39	2.55
	Total	527	100.00	649	100.00	100.06

Table 4. Difficulties in obtaining construction materials.

Difficulties in obtaining materials	Contractors (%)	Public agencies (%)
Shortage of cement and steel products	95.45	97.22
Inadequate supply of sand, gravel and stone	0.00	41.67
Low quality of available material	0.00	30.56
Difficulty in obtaining imported materials	13.64	25.00
Others	4.55	13.89
Total number of respondents	22	36

Contractors' difficulties in receiving monthly payments from agencies is the second most important reason for delays in construction projects (Table 3). Contractors' and public agencies' interpretations of the situation are presented in Table 5. Again, there seems to be consensus between the overwhelming majority of contractors and public agencies that monthly payments are not made on time by public agencies despite the fact that standard agreement forms and general provisions (Ministry of Public Works, 1979; General Directorate of Highways, 1979b; Turkoglu and Egemen, 1980) explicitly define the timing of those payments. According to the respondents in public organizations, the reason for these delays lies in the timing of the cash flow from the general national budget to the agencies' budgets. According to State Planning Organization officials, however, payments to contractors are not made on time because public agencies do not have the necessary funds in their budget (due to budget cuts made in the meantime) or because they are not able to organize the flow of expenditures in their budget properly.

Statistics indicate that the funds allocated from the general national budget for investment projects are not adequate (State Planning Organization, 1979a). The ratio of the value of ongoing projects in a year to the funds allocated for these projects in that year is a measure of the average duration of the projects in that particular year. Table 6 indicates that this ratio has increased over the years, from 4.9 in 1974 to 8.4 in 1978, meaning that the duration of the projects is increasing because the allocated funds do not match the increase in planned investment projects. This interpretation supports the third point in Table 5, made by many respondents, that public agencies' budgets are not adequate for the amount of investment they undertake.

Table 5. Contractors' difficulties in getting paid by public agencies.

Difficulties in getting paid	Contractors (%)	Public agencies (%)
Payments not made on time	95.83	91.67
Limited possibility of advance payment	45.83	58.33
Insufficient public agency budget	62.50	33.33
Expensive surety bonds	33.33	16.67
Others	12.50	0.00
Total number of respondents	24	12

The third important reason for delays given in Table 3 is contractors' financial difficulties. Respondents' interpretations of this issue are presented in Table 7. It can be seen that the reasons for contractors' financial difficulties are closely interrelated with each other and very much dependent on government monetary policies.

Limitations imposed on the national money supply in the 1970s reduced contractors' liquid assets and therefore caused them to look for loans and credit purchases of materials and equipment. High interest rates severely limited such transactions and contractors' operations suffered considerably. Follow-up interviews with respondents indicated that this aspect is well beyond contractors' and public agencies' control and that it is governed by national economic policies.

The next two reasons for delays shown in Table 3 are related to the organizational characteristics of contracting companies and public agencies. After examining the relative importance attached to these reasons by respondents it is interesting to note that contractors regard public agencies' organizational problems to be a more important reason for delays (10.44%) than public agencies themselves think they are (2.16%); whereas according to public agencies, deficiencies in contractors' company organization have a bigger impact on delays (11.56%) than contractors themselves tend to believe (4.93%).

Respondents' interpretations of these issues are presented in Tables 8 and 9. The phenomenon mentioned above whereby contractors regard public agencies' organizational problems as a major reason for delays whereas public agencies attach more importance to contractors' organizational shortcomings is also observed in these tables.

Table 6. Relationship between value of ongoing projects and yearly funds allocated for those projects.

Years	Project stock (TL billions)	Funds allocated (TL billions)	Stock/allocation ratio
1974	194.0	39.6	4.9
1975	287.2	54.5	5.3
1976	449.3	83.5	5.4
1977	865.5	138.3	6.3
1978	1241.1	148.2	8.4

Table 7. Contractors' financial difficulties.

Contractors' financial difficulties	Contractors (%)	Public agencies (%)
Shortage of liquid funds	76.47	94.44
Limited possibilities of getting loans	64.71	44.44
Limited possibilities for credit purchases	64.71	38.89
Others	17.65	5.56
Total number of respondents	17	18

Table 8. Deficiencies in contractors' company organization.

Contractors' company characteristics	Contractors (%)	Public agencies (%)
Ill-defined duties and responsibilities	70.00	43.48
Site managers' lack of authority	40.00	56.52
Inadequate decision-making mechanism	20.00	13.04
Others	10.00	26.09
Total number of respondents	10	23

Table 9. Deficiencies in public agencies' organizational set-up.

Public agencies' organizational characteristics	Contractors (%)	Public agencies (%)
Slow decision-making mechanism	93.33	50.00
Multitude of bureaucratic obstacles	66.67	50.00
High turnover in technical personnel	53.33	25.00
Others	13.33	25.00
Total number of respondents	15	4

It is generally observed that contractors are slow at changing their organizational practices with changing times and volume of work. Site managers' administrative and financial autonomy, intraorganizational specialization and standardization, and the decision-making mechanism suffer if large projects are undertaken by companies with highly centralized 'unit' type organizations. The transition to functional and matrix types of organization seems to be a slow process in most contracting companies.

As far as public agencies' organizational problems are concerned, the most important complaint seems to be in the speed of the decision-making process. The many bureaucratic obstacles and the high turnover of technical personnel in public agencies contribute a great deal to the existence of this shortcoming. In a survey of 400 randomly selected contractors, aimed at finding the reasons for disputes between contractors and public agencies, it was determined that the majority of the contractors complained about the length of time it took public agencies to reach a decision in cases of conflict (Tezduyar, 1980). The same study found that resolving disputes at the Public Works Board or the Higher Technical Board of the Ministry of Public Works took an average of 113 days.

The sixth and eighth most important reasons for delays in public construction are given as shortages in qualified workers and technical personnel (Table 3). The importance attached to these factors by the two groups of respondents is nearly identical. Their interpretations are presented in Tables 10 and 11.

The demand for manpower in the construction industry has reached 549 000 persons in 1978 whereas it was only 30 000 in 1962 (State Planning Organization, 1979a). On the other hand, the number of qualified workers and technical personnel who were employed in foreign countries like Germany, Holland and France was 756 225 in 1978 (State Planning Organization, 1979a). Most of the reasons cited in Tables 10 and 11 for the shortage of qualified labour and technical staff are affected by this outflow of manpower to European countries that took place in the

1970s. Also since non-skilled construction workers in Turkey consist traditionally of villagers who go back to their villages at harvest time, the majority of contractors find it difficult to maintain continuous activity on their sites.

Finally, an important reason expressed by contractors and public agencies that seems to affect project durations is the large quantities of extra work ordered by construction owners during the execution of the project. According to article 19 of the Bidding Law No. 2490 'the contractor has an obligation to execute extra work in accordance with the conditions stipulated in the original contract and specifications as long as its value does not exceed 30% of the contract price'. In cases where the value of extra work exceeds the 30% limit, a new agreement is made with the existing contractor, or if this is not possible, with any other contractor to complete the portion of work in excess of the 30% limit. Not only does extra work require extra time, but also the legal formalities and procedures when the 30% limit is reached, cause significant delays. The main reason why considerable extra work is ordered by most construction owners is because sufficient time and effort are not spent at the preconstruction phase for feasibility studies, design and site exploration. This argument is supported by UNIDO's findings that only 10% of the total project cost is spent on preconstruction activities (United Nations Industrial Development Organization, 1976).

Table 10. Shortage of qualified workers for contractors' activities.

Difficulties in obtaining qualified workers	Contractors (%)	Public agencies (%)
Unavailability of workers for continuous jobs	81.82	46.67
Regional shortages of workers in certain trades	45.45	80.00
High wages demanded by qualified workers	27.27	53.33
Others	36.36	6.67
Total number of respondents	11	15

Table 11. Shortage of technical personnel in contractors' and public agencies' organizations.

Difficulties in obtaining technical personnel	Contractors (%)	Public agencies (%)
Unavailability of competent and experienced technical personnel	55.56	91.67
High salaries demanded by technical personnel	33.33	75.00
Regional shortages of technical personnel	55.56	41.67
Others	33.33	8.33
Total number of respondents	9	12

Conclusions

The construction industry has a considerable and direct bearing on a number of other industries, services, and professions both on the side of inputs because it purchases from other

sectors, and on the side of outputs since the products of the construction industry are used by almost all the other sectors of the economy. The effects of construction delays are not therefore confined only to the construction industry but influence the state of the overall economy of the country. The results of a survey of public construction owners and contractors that undertook public projects in Turkey in the decade 1970–1980 indicate that the most important reasons for construction delays can be summarized in four main groups:

1. There are shortages of many resources such as qualified manpower, technical personnel, construction materials and equipment. The national production statistics for basic construction materials like steel and cement show that periodic shortages did occur in the 1970s. The export of large numbers of qualified workers to foreign countries and the lack of proper training in the trades, lead to similar shortages in qualified manpower. The aspects related to the shortage of resources (Reason Nos. 1, 6, 8 and 13 in Table 3) have a relative weight of 31%.
2. Contractors and public agencies experience financial difficulties. Reason Nos. 2 and 3 in Table 3 have a total relative importance of 21%. While public organizations suffer from inadequate allocation of funds out of the general national budget for their projects, contractors have to overcome problems related to late monthly payments, inadequate advance payments, expensive surety bonds, and limited possibilities of getting loans and credit purchases. In addition to these, national economic policies are formulated by governments without due regard to their potential effects on construction activity and tend to have considerable impact on construction owners' and builders' financial comfort.
3. Public agencies and contracting companies suffer from organizational deficiencies. Among the reasons presented in Table 3, Nos. 4, 5 and 11 display a total relative weight of 19%. Whereas public agencies claim that site managers' administrative and financial autonomy is too limited for efficient operation and that contractors' organizational structure is not up to the size and type of work they undertake, contractors complain about the slow decision-making mechanism in public organizations and the bureaucratic obstacles they encounter all through the construction process.
4. Finally, delays in design work, large quantities of extra work, and frequent change orders seem to cause delays. The combined weight of these reasons (Nos. 7, 9 and 12 in Table 3) amount to 14%.

The total average weight of the reasons mentioned in the above four groups amount to 85%. There is little, individual contractors or public agencies can do to correct national problems such as manpower and equipment shortages, and high interest rates. But there are signs that measures taken by governments in the post-1981 era to improve political, economic and social conditions have led to improved project completion times. It is important to note that economic policies may change with each incoming new government but well established industry practices will remain if they are not identified as causing delays. To that effect, the results of the survey indicate that public agencies must make sure that sufficient time and effort are allocated to the feasibility study and design process, and they should devise ways to improve the authority structure and decision-making mechanism in their organizations. Contractors, for their part, should be aware of stock control problems with materials and should consider using more effective material scheduling techniques; they should also make sure that their company organization is compatible with the size and type of job they undertake.

References

Chamber of Architects (1979) *Delays and cost overruns in public construction investments.* Association of Turkish Chambers of Engineers and Architects, Ankara.

Evans, B.A. and Nicklin, E. (1966) *Building classification practices*, International Council for Building Research and Documentation, Rotterdam.

Gareis, R. (1979) Business practices in the construction industry, *Journal of the Construction Division*, ASCE, **105**, 317–29.

General Directorate of Highways (1979a) *Note on causes for delays in investment projects and proposals for preventing delays.* Turkish Ministry of Public Works General Directorate of Highways, Ankara.

General Directorate of Highways (1979b) Agreement form for highway works. Turkish Ministry of Public Works General Directorate of Highways, Ankara.

Hacaloglu, A. (1976) *The Construction Sector: Problems, Developments, Measures.* Turkish Prime Ministry State Planning Organization, Ankara.

Kabatepe, E. (1972) *Deficiencies observed in the implementation of project completion deadlines.* Turkish Prime Ministry State Planning Organization, Ankara.

Ministry of Public Works (1979) *Agreement Form.* Turkish Ministry of Public Works, Ankara.

State Planning Organization (1978a) Programme for 1978. Turkish Prime Ministry State Planning Organization, Ankara.

State Planning Organization (1978b) *Report on important projects.* Turkish Prime Ministry State Planning Organization, Ankara, 30 June, 1978.

State Planning Organization (1979a) *Fourth five year development plan 1979-1983.* Turkish Prime Ministry State Planning Organization, Ankara.

State Planning Organization (1979b) *Investment Projects for 1979.* Turkish Prime Ministry State Planning Organization, Ankara.

Tezduyar, M. (1980) *Analysis of Legal Disputes in Public Works.* MS thesis, Middle East Technical University, Department of Civil Engineering, Ankara.

Turkoglu, Y. and Egemen, E. (1980) *Court Decisions on Public Works Litigation.* Olgac Matbaasi, Ankara.

United Nations Industrial Development Organization (1976) *Upgrading the activities and improving the skills of the state economic enterprises in industrial construction in Turkey*, UNIDO, Vienna.