COST ANALYSIS OF BILKENT UNIVERSITY HOUSING COMPLEX FROM A COST ACCOUNTING APPLICATION FRAMEWORK

A THESIS

SUBMITTED TO THE DEPARTMENT OF MANAGEMENT

AND

THE GRADUATE SCHOOL OF BUSINESS ADMINISTRATION

OF

BILKENT UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF BUSINESS ADMINISTRATION

BY

SÜEL, HASAN.

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Hasan Süel
tarafından bağışlanmıştır

I certify that I have read this thesis and in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Business Administration.

Assoc.Prof.Dr. Erdal EREL

I certify that I have read this thesis and in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Business Administration.

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I certify that I have read this thesis and in my opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Business Administration.

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ABSTRACT

COST ANALYSIS OF BILKENT UNIVERSITY HOUSING COMPLEX FROM A COST ACCOUNTING APPLICATION FRAMEWORK

BY

Hasan SÜEL

M.B.A. THESIS

BILKENT UNIVERSITY - ANKARA

SEPTEMBER, 1993

Supervisor: Assoc.Prof.Dr. Erdal EREL

The cost centers of the housing facility of Bilkent University are examined to determine the total expenditure figure for 1992. Data are separated for East and Center Campus housing areas and compared in terms of different unit-cost measurements. Some hypotheses are tested to find if any difference exists. Comparisons are reported by pareto, pie and control charts to end up with some standards. Some differences appeared between East and Center campuses' cost centers. These differences are highlighted and some suggestions have been made.

ÖZET

BİLKENT ÜNİVERSİTESİ LOJMANLARININ MALİYET ANALİZİNE AİT BİR MALİYET MUHASEBESİ UYGULAMASI

HAZIRLAYAN

Hasan SÜEL

İŞLETME YÜKSEK LİSANS TEZİ

BİLKENT ÜNİVERSİTESİ - ANKARA

EYLÜL, 1993

Denetleyen: Doç. Dr. Erdal EREL

Bu çalışmada, 1992 toplam giderlerinin tayini açısından üniversite lojmanları maliyet merkezlerinin bir analizi yapılmıştır. Merkez ve Doğu kampüs konutlarının birim maliyetleri ayrı ayrı hesaplanarak karşılaştırılmıştır. Aradaki farklılıkların tespiti amacıyla istatistiksel testler ve hipotezler uygulanmıştır. Karşılaştırmalarda Pareto, Pie ve Control grafikleri gibi istatistiksel araçlar kullanılmış ve sonuçta bazı birim maliyet standartlarına ulaşılmıştır. Doğu ve Merkez kampüs konutları maliyet merkezleri arasında farklılıklar bulunduğu ortaya çıkmıştır. Farklılıklara ait bulgular belirtilerek idareciler uyarılmıştır.

ACKNOWLEDGMENTS

I gratefully acknowledge the encouragement, guidance, advise and friendly supervision of Assoc. Prof. Dr. Erdal Erel during the preparation of this thesis. Helpful comments of Prof.Dr. Ümit Berkman and Dr. Selçuk Karabati is also appreciated.

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CHAPTER I

INTRODUCTION

1.1 University Concept

Since the middle ages, universities have been valued and respected as centers for intellectual life. They provide places for scholars to work for the advancement of the arts, letters and sciences. Universities perform the useful service of training leaders for the professions and for public life [Americana, 240].

1.1.1. University Administration

Because the most institutions of higher education lack a clear and ambiguous mission whose achievement can be assessed through agreed upon quantifiable measures such as "profits", the processes, structures and systems of university administration do not resemble typical business firms. In colleges and universities, profit sensibility is not as high as business firms.

If universities are studied as organizations , they are formed by groups of people filling roles and working together towards the achievement of common objectives within a formal social structure [Birnbaum,1]. The organizational characteristics of academic institutions are so different from other institutions by serving clients instead of processing materials. Their key employees are highly professionalized , they have unclear technologies based more on professional skills

than on standards. They have "fluid participation" with amateur decision makers who wander in and out of the decision process.

As a result, traditional management theories cannot be applied to educational institutions without carefully considering whether they will work well in that unique academic setting.

1.1.2. Private University Administration

Colleges and Universities can be grouped into two categories in terms of control and support; namely, private and public.

Private institutions are financed by tuition and fees, charities, gifts from individuals, business, foundations, endowment earnings and certain governmental appropriation [Americana, 245].

In analyzing private educational institutions as organizations, it is crucial to consider more profit sensibility than the public institutions. Executives should be more professionalized and be conscious on the service they are performing for the academic life.

The organizational status of Bilkent University can be expressed in a hierarchical manner as follows; President is managing the university at the top level. There are Vice-presidents responsible for administrative and financial affairs, academic affairs, student affairs. The effective management of administrative and financial affairs will directly affect the other academic affairs in the university. One

of the duties of the administrative and financial affairs Vice-presidency is to provide support (auxiliary) services for its academic personnel.

Being a private institution, Bilkent University is financed by Bilkent Holding, tuition and fees, government support etc. Thus, managerial perspective of the university administration should be well understood in order to perform cost-effective academic service.

1.1.3. Accounting for Academic Services

" Accounting is the art of recording, classifying, and summarizing in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the results thereof " [Americana, 84]. Accounting for academic services is a long-term effort that requires regular attention to be focused on trends toward and away from some general goals. University goals relevant to the academic service are efficient use of resources to provide responsiveness to the needs of profession and the society it serves [Tuckman, 48].

Cost accounting is the sub field of accounting that analyzes the costs for planning, reporting, control and comparison. University executives should be aware of the cost management in the campus in order to control and plan for the future. The raw financial data must be digested into usable information by providing more time and analysis on cost accounting.

A properly designed cost accounting system should be integrated with the organization's structure and the budget system. During the detailed cost accounting process, the unit-cost information should be a logical and necessary extension of the process. In evaluating the results of the operations for the budget period, the cost accounting system must provide data that will allow comparison of the budget to the actual results of operations [Sweeney, 144].

1.1.3.1. Variable Costing

In this thesis, Variable Costing is used as a cost accounting application which is a type of cost that tends to change with the volume or activity. Variable costing is performed by unit basis calculations, where fixed costs are reported on a period basis. The unit-cost measurements are helpful to recognize the changes and differences between activities in the cost centers of Bilkent University.

1.2. Housing Complex in Bilkent University

One of the support services that university provides is the housing complex in East and Center campus. Housing expenses need variable costing in the light of some unit-cost measurements to be reported to the university executives. Due to the 1992 figures , University is conscious about the cost variances of the cost centers in the housing area. A Cost Variance Analysis may show that a cost center should be modified to show cost-effective performance in terms of variable costing standards.

Providing housing services for its academic personnel, Bilkent University has the highest housing capacity as a private university among other universities in Turkey. Therefore, housing expenses are considered to be an important account in University's Balance Sheet.

The main point is to find out if any cost-effectiveness difference is present between the cost centers of east and center campus of the housing area in the light of some unit-cost measurements.

1.2.1. Objective

Objective of this thesis is to highlight the differences between the cost centers of east and center campuses of university housing by testing the following hypotheses.

- *Hypothesis I_0: Housing Expenditure per Unit Area is Constant*
  Hypothesis I_A: Housing Expenditure per Unit area is not constant

In order to control the cost centers in University Housings, expenditure per unit area is expected to be constant. This hypothesis is tested in Chapter III.

- *Hypothesis II_0: The higher the Housing Area, the lower the Cost per Unit Area (Economies of Scale).*
  Hypothesis II_A :Economies of scale is not present in the cost center.

Economies of scale is tested in each cost center in Chapter III.

- *Hypothesis III_0 : Seasonality Trend is Seen in the Cost Center*
  Hypothesis III_A: Seasonality Trend is not seen in the Cost Center

Expenses vary between certain periods of the year.

Bilkent University has 57,689 square meter closed area of housings in both campuses. Managing Center and East campuses' housing expenses bring an additional burden on university. After examining the expense figures of both campuses' housings, variations between two campuses' expenditure figures took the notice of the executives. In order to achieve cost control in both campuses, some expenditure accounts should be examined.

1.2.2. Thesis Outline

In this thesis, a unit-cost accounting application is done in Bilkent University's housings . All of the relevant data for the housing accounts are searched and compared seasonally, in terms of TL/month, TL/year and TL/m^2.year units. There are also some difficulties in comparing the accounts of both campuses. Here, some reasonable assumptions are made for comparisons. (ex. comparison by square meter and number of people using university housings)

In Chapter II, some important cost accounting terms are defined within the scope of some authors.

Outline of this thesis is structured under the headings of the cost centers in university housing. In Chapter III, all of the cost centers of the housings are separately analyzed. Some hypotheses are tested and test results are summarized for a conclusion. In the light of these results, some general rules appeared in the housing areas. After analyzing the cost centers separately, a total expenditure figure is obtained in section 3.9. Hypotheses are also tested in 3.9 to compare each cost center with the total figures.

Some reasonable assumptions are made for the East Campus figures because of the unclear points of the accounting system of two campuses.

In Chapter IV, a review is done for the analysis part. Findings are summarized by reporting the weight of each cost center within the total expenditure. Results of the tests for the hypotheses are summarized. Some statistical conclusions are achieved to warn executives for the service quality in the housings. Some recommendations are made to achieve a " Cost Control System " for the university housing by assigning a " Responsibility Center ".

Finally, tables and charts for the expense figures are reported in appendices.

The subject of this thesis is important because it helps University to achieve standards in unit-housing expenses so that some targets can be set for the future unit-expenditures. In the light of a budgeting procedure, housing expenses can be controlled by checking whether the target standards are achieved or not. Achieving some service quality standards will help Bilkent University to set goals and control the effectiveness of the cost centers in the university housing.

CHAPTER II

LITERATURE SURVEY

2.1. University as an Organization

Bilkent University Housing Services can be considered as a non-profit organization. When non-profit organizations are compared to profit administrations, some points are highlighted. Non-profit organizations have a tendency to be a service organization where the dominance of professionals are present. There are differences in governance and senior management with respect to business firms. The goal of an university support (auxiliary) service is to render a given amount of resources, or to use as few resources as possible to render a given amount of service [Anthony, 804].

2.2. Accounting for Academic Services

University administration needs proper accounting data to have effective cost management. Cost Centers of the university can be best reported using cost accounting techniques.

2.2.1. Cost Accounting

To understand how cost accounting affects managerial decision making, it is important to make some definitions of some cost accounting terms and their usage in considering the alternatives.

Cost accounting is the subfield of accounting that records, measures and reports the information about costs [Deakin, 3]. "A cost is a sacrifice of resources and it is the amount of expenditure incurred on or attributable to a specific thing or activity" (Institute of Cost and Management Accountants) [Pizzey, 5].

To be successful in any kind of activity, managers must know how much things cost. Costing is an analysis to allocate costs to products or services or time periods to be used inside the organization by managers to evaluate the performance of operations or personnel or as a basis of decision making [Deakin, 3]. Cost information should only be produced if it provides a benefit deemed to be worth more than its cost.

One of the most difficult tasks in calculating costs is to estimate how they will differ among the alternatives. Using cost accounting techniques, differential costs can be estimated to evaluate how they differ for each alternative [Deakin, 4].

Cost accounting analyzes costs by the nature of the components or on the basis of cost accumulation by the cost centers. In contrast to financial accounting, which is designed primarily to meet the needs of groups inside the firm (management), the primary functions of cost accounting are to provide basis for

inventory valuations, budgets, special cost investigations, forecast analysis, cost comparisons, planning and control [Americana, 88].

Although accountants have traditionally supplied management with raw financial data, these data must be converted into usable information in order to promote and direct action by management. Providing usable information requires more time and analysis than simply reporting the raw financial data [ed.Brinker, 18].

Cost accounting systems are designed to ascertain two major types of costs; the total cost of each of the various activities and functions of a business and the cost per unit of each of the concern's product and services. Every division of activity or a function that the cost accountant wishes to cost separately is regarded as a "Cost Center" [Pizzey ,7].

In this thesis, these terms are tried to be highlighted by preparing a cost analysis of East and Center campus housing area of Bilkent University.

2.2.1.1 Variable Costing

Variable costing is an excellent tool for evaluating results of current operations in terms of comparison of actual results to budgets or plans . It also provides valuable information required for other management decisions. Therefore, variable costing is often used for managerial decision making and performance evaluation [Sweeney, 153].

Many companies use variable costing for internal reporting because it is consistent with the cost-behavior assumptions used in managerial decision making [Deakin, 340].

2.2.1.2. Cost Variances and Standard Costs

The actual costs incurred for the time period are compared with the standard costs allowed per unit times. This comparison provides the total variances of the costs.

A Standard is a bench-mark or a norm in accounting. A standard cost is the anticipated unit-cost. It is a pre-determined unit-cost, while a budget is a financial plan. Standard costs are often used to make up the financial plan. While in practice these terms are sometimes used interchangeably, standards usually refer to per-unit amounts, where budgets usually refer to total amounts [Deakin, 743].

A standard cost system is used to describe a situation in which standard costs are part of the formal accounting record keeping system. The use of standard costs in the accounting records means that they can be used for performance evaluation. A possible benefit of formalizing the standard cost system is the monitoring and updating of standards to keep them current [Deakin, 789].

Standard costing and budgetary control have in common the establishment of pre-determined measures of performance so as to disclose the details of variations which are used for the purpose of cost control [Pizzey, 221].

Standards, against which actual effectiveness are to be compared must be carefully developed. They must be derived from and be consistent with the goals or objectives pursued by the organization. Pre-determined standards or budgets are the basis against which actual performance is compared [Anthony, 146].

2.2.2. Cost Control

Cost control has been defined as the regulation by executive action of the costs. It covers the control of material usage and material prices ; of wages cost, separating the effect of efficiency from rates of pay of maintenance and service costs and of all other items of indirect expenditure [Pizzey, 7].

It can also be defined as the skillful handling or directing of costs. As such, cost control involves much more than cost accounting. Cost control requires newer and broader management tools to yield cost advantages.

Managers in all organizations set financial goals for performance indicators. Each responsibility center usually has a budget that is a financial plan of resources needed to carry out the center's tasks and meet financial goals. At regular intervals of time, resources actually used are compared with the amount budgeted to assess the center's and the manager's performance. By comparing actual results with the budget plans, it is possible to identify the probable causes of the variances from planned costs [Deakin, 7].

2.2.3. Budgeting System

" The formal expression of the plans and objectives of management that covers all phases of operations for a specific period of time has been defined as a budget. ". It allows participation from all parts of the organization and enhances the planning of organizational goals and objectives. Budgeting process provides a mechanism to allocate resources rationally and economically [Sweeney, v].

Budgetary Control Systems based on financial measures are widely used in economic organizations. Budget plans provide a basis for directing and evaluating the performance of the segments of the organizations. Through budgets, activities of different parts of the organization can be coordinated and controlled. A control system typically incorporates measures and techniques which conform to the responsibilities delegated to managers under the organization's structure [ed.Bell, 128].

2.2.3.1. Cost Estimation for the Budgeting System

Accounting systems are designed primarily to record and report costs that have been incurred in the past. However, it is important that management should also be able to estimate future cost-behavior. In deciding among alternative actions, management needs to know the costs that are likely to be incurred for each alternative. Data from the accounting records are often used to help make these estimates.

2.2.3.2. Responsibility Centers

Budgets for performance evaluation and cost control are typically organized around responsibility centers [Deakin, 723]. "The organizational implications of adopting an explicit cost-management strategy are so substantial that start-up needs to be viewed as a period of major strategic change for the corporation.". For most organizations, the appointment of a full-time director or coordinator is needed for responsibility centers [Richardson, 219].

2.3. Management Information Systems (MIS)

Information is the base of management control systems. The continuing rise of information technologies is now exploding the information development process and expanding information concept. Information is the transmitted, filtered, reorganized, analyzed and related data useful in achieving organizational goals [Anthony, 133].

In 1990s, local education authorities and individual college managements have been expected to come to grips with a welter of new management information systems. Decisions have required methods of showing their probable and operational effects, and reporting on the outcome of past decision has required some means of retaining and distilling information. Systems have developed for a number of reasons [ed.Locke, 323].

- The cost consciousness that is more apparent at times of financial stringency has meant that closer efforts have been made to establish expected costs and monitor expenditures. "To discourage systematic-over or under-spending a

variety of financial controls have been exerted, and these have encouraged managers to ensure that, when they come to accounting periods, they know whether they will arrive on or near target".

- A variety of techniques has been introduced for comparing the cost of activities or consumables. These techniques are often somewhat crude in their abilities to discriminate between legitimate and illegitimate cost differences.

- The availability of complex computers has enabled major breakthrough in the technical capacity to count and measure performance. Many educational institutions already owned main-frame computers, but these were seldom used for management tasks other than payroll. In part, that was a matter of their relative inconvenience and in part the absence of the right kinds of programs.

2.3.1. Integrated Cost Control and Information System

In the information integration phase, cost accounting is integrated into other business functions within the organization. Strength of the Integrated Cost Control and Information System are [ed.Brinker, 178]:

- Timely entry and editing of data
- Conceptually link operations and accounting
- Can produce useful tools for decision support in budgeting
- Eliminate duplicate data entry
- Data collection is computerized

Weaknesses of the Traditional System are:

- Reporting is too slow to react
- Duplicate inconsistent data
- Slow reaction to operating changes
- Do not recognize the shifts from variable to fixed costs
- Little co-operation between departments

CHAPTER III

ANALYSIS

3.1. Heating And Hot Water Expenses

A framework is prepared for this analysis. (See App. A) According to this framework, the most important accounts for the housing expenses are selected to be the Heating and Hot Water, Water and Personnel Expenses. It is meaningful to start with Heating and Hot Water Expenses where fuel-oil is used in high amounts for closed area Heating and hot-water supply.

As mentioned before, Bilkent University has 57,689 square meter closed area for Heating and hot water supply (See Table 2 in Appendix B).

Center campus has 45,689 square meters where East campus already has 12,000 square meter area (See Figure 1).

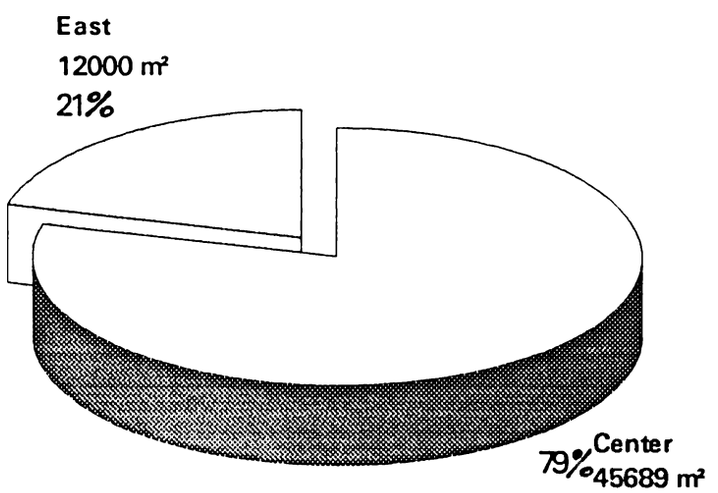

FIGURE 1 COMPARISON OF TWO CAMPUSES HOUSINGS

Center campus has nine Heat Centrals located in various blocks and East campus has ten Heat Centrals located in each block (See Table 3 in App. B). All of the data available for the years 1990, 1991, 1992 and 1993 are examined in Table 4 in App. B and the average of the fuel-oil consumption in four years is calculated (See Table 3 in App. B). Fuel-oil consumption is affected by various conditions each year (changing weather conditions, fuel-oil prices, amount of the housing area etc.). To protect the accuracy of this analysis from deviations, average of the data in 1990-1993 is calculated (especially for the center campus).

In analyzing heating and hot water expenses, three variables are used to compare heating and hot water expenses of both campuses:

3.1.1. Seasonality

Fuel-oil expenses vary in certain periods of the year (maximum expense in winter).

3.1.2. Amount of Fuel-oil Consumed in Heat Centrals (kg/time)

By the help of this unit, fuel-oil consumption of each Heat Central is found out through the years 1990, 1991, 1992 and 1993 (See Table 3 in App. B).

3.1.3. Amount of Fuel-oil consumed per closed area ($kg/m^2.time$)

As mentioned before, some of the Heat Centrals (especially in Center campus) provide heating and hot-water supply for different amounts of closed area. In order to make realistic comparisons between Heat Centrals, the unit consumption of each Central per unit area is calculated.

All these three variables are examined in an Excel 4.0 worksheet, and some realistic conclusions are tried to be achieved in the light of this data (See Table 3 in App. B).

3.2. Findings of Heating and Hot Water Expenses

Fuel-oil expenditure in each Heat Central is searched out between 1990 and 1993 (See Table 4 in App. B).

3.2.1. Seasonality

As can be seen in Figure 2 and Table 5 in App. B, it is obvious that a seasonality trend is present in fuel-oil consumption in various months of the year. Bilkent University Housings' Heat Centrals spend maximum amount of fuel-oil in January and the minimum amount in June. However, there exist some differences as regards the fuel-oil consumption of two campuses.

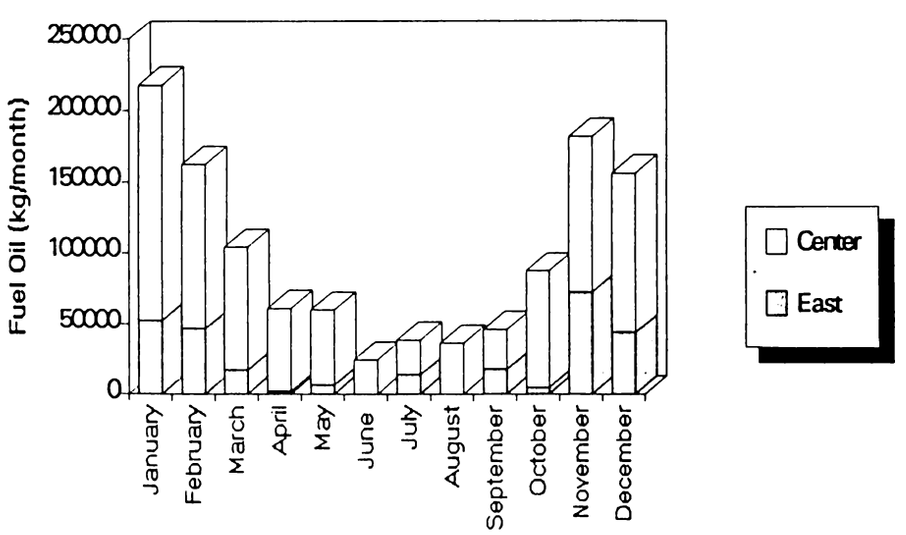

FIGURE 2 AVERAGE FUEL-OIL PURCHASE IN UNIVERSITY HOUSINGS

Although January is the month for maximum fuel-oil consumption for the total housing units, East campus has the maximum expenditure in November. In summer months, fuel-oil is consumed only for hot water supply. So little expenditure is incurred especially in this period.

So, Hypothesis III_0 in Chapter I is not rejected in the light of these findings.

3.2.2. Kg/year

Kg/year Fuel-oil consumption can be interpreted as follows:

3.2.2.1. Heat Centrals

In center campus, fuel oil is mostly consumed by the Central located at block 11 (Central 11 serves to maximum closed area), and Heat Central located at block 40 consumes the least amount. In east campus, each of the Heat Centrals provides heating and hot-water supply for 1200 square meter area. Block C has the maximum consumption with 26,658 kg/year (See Figure 4).

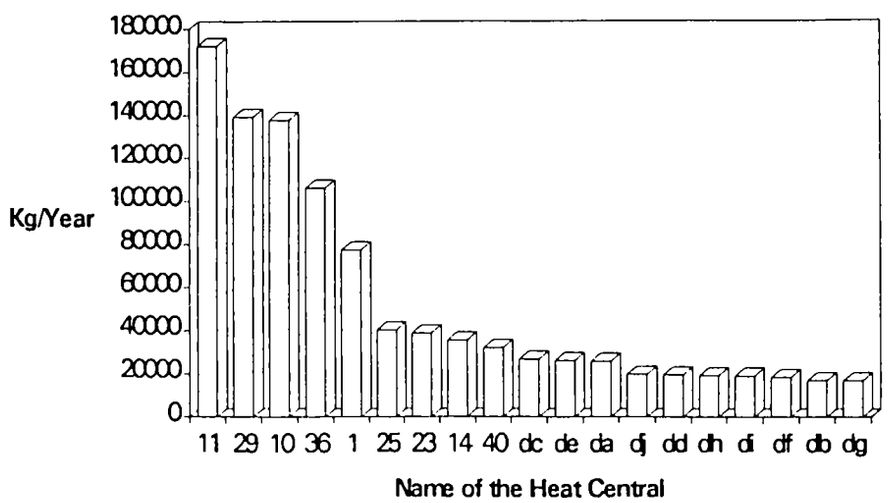

FIGURE 3 FUEL OIL CONSUMPTION IN UNIVERSITY HOUSINGS (KG/YEAR)

It is clear that there exists a difference in cost-effectiveness between blocks C, E, A and those of other blocks in East campus.

3.2.2.2. Total Fuel-Oil Consumption of East and Center Campus

University Housings have a total of 984,085 kg of fuel-oil expenditure per year. 21% of this belongs to East Campus (See Figure 5).

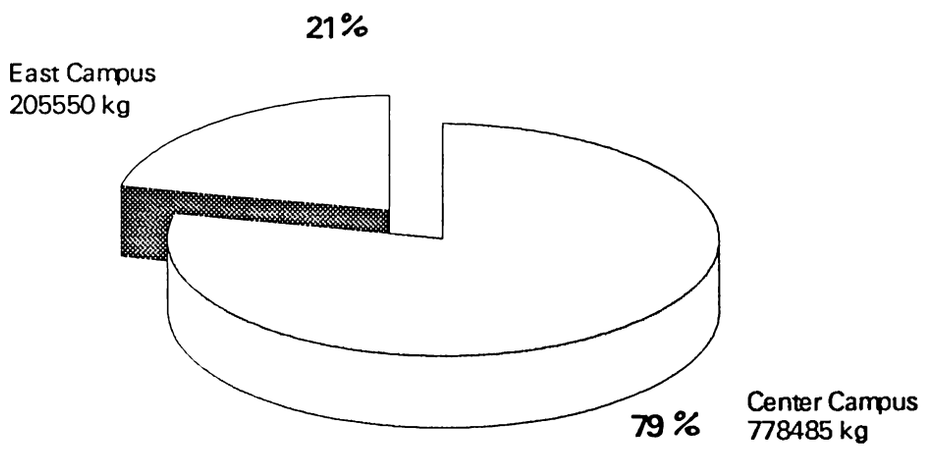

FIGURE 5 FUEL OIL CONSUMPTION IN 1992

In Table 1 in App. B, heating and hot water account has an expenditure amounting to 2,037,103,427 TL (35.39% of the total housing expenses).

3.2.2.3. Kg/m².year

In all of the fuel-oil expenditure calculations, the most effective unit for fuel-oil consumption measurements is the kilogram consumed per square meter per year.

As the Heat Centrals of Center campus provide service for different of square meters of areas, the effectiveness of these Heat Centrals can be calculated by using kg/m2.year as a unit-cost measure. According to Figure 4, East Campus Centrals in blocks C, E, A show a significant difference in consumption per unit area . So Hypothesis I_0 in Chapter I is rejected for kg/m2.year fuel-oil consumption.

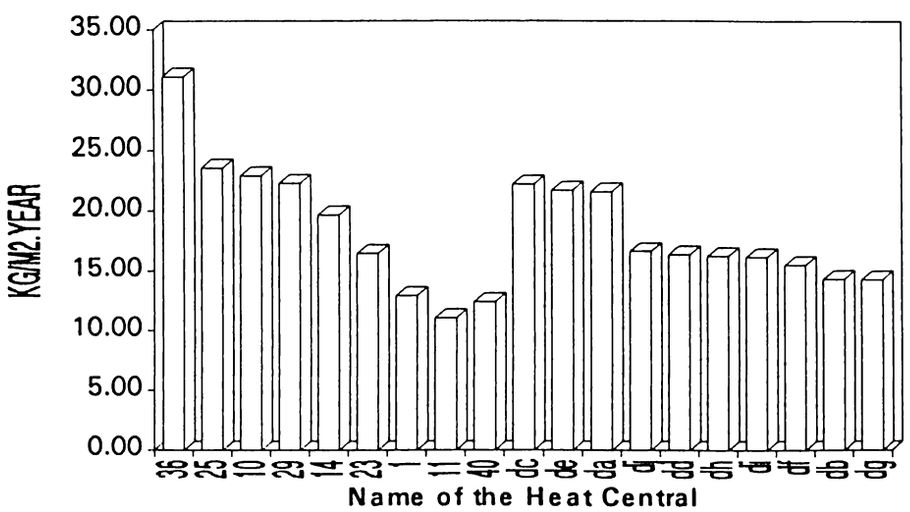

FIGURE 4 FUEL OIL CONSUMPTION IN UNIVERSITY HOUSING (KG/M2.YEAR)

Block 11 of Center campus, which is the Heat Central with maximum fuel-oil consumption has the minimum expenditure in terms of kg/m².year. Also, block 36 has the maximum consumption per unit area (It serves to 3416 m2). Examining

each Heat Central one by one, it is seen that amount of closed area(m^2) has a direct proportion with the cost effectiveness of the fuel-oil consumption. Higher the area of the Heat Central that it serves for, higher the effectiveness of the Heat Central, therefore lower the kg/m^2.year fuel-oil consumed. So Hypothesis II_0 in Chapter I is not rejected.

It appears that , Heat Centrals of each campus work with the same cost-effectiveness when total fuel-oil consumption is divided by the total area of housings in each campus (See Figure 6).

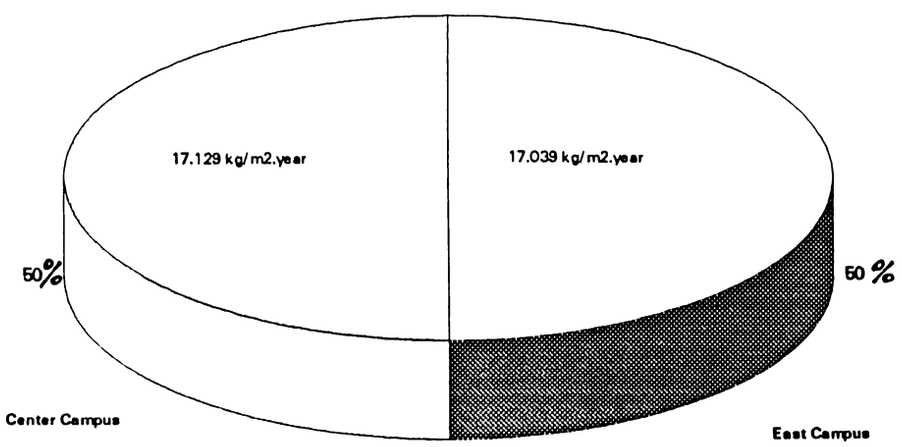

FIGURE 6 COMPARISON OF TWO CAMPUSES FUEL OIL CONSUMPTION (KG/M2.YEAR)

Considering Table 6 in App. B, University had spent 38,084.53 TL/m2.year in 1992 for heating and hot-water expenses.

As a statistical tool, a control chart is used to summarize the changes in the cost effectiveness of all Heat Centrals (See Figure 7). According to the control

chart plotted, there is no block that appears to be out of the control limits. However, this tool is not sufficient to conclude that Hypothesis I_0 in Chapter I should not be rejected.

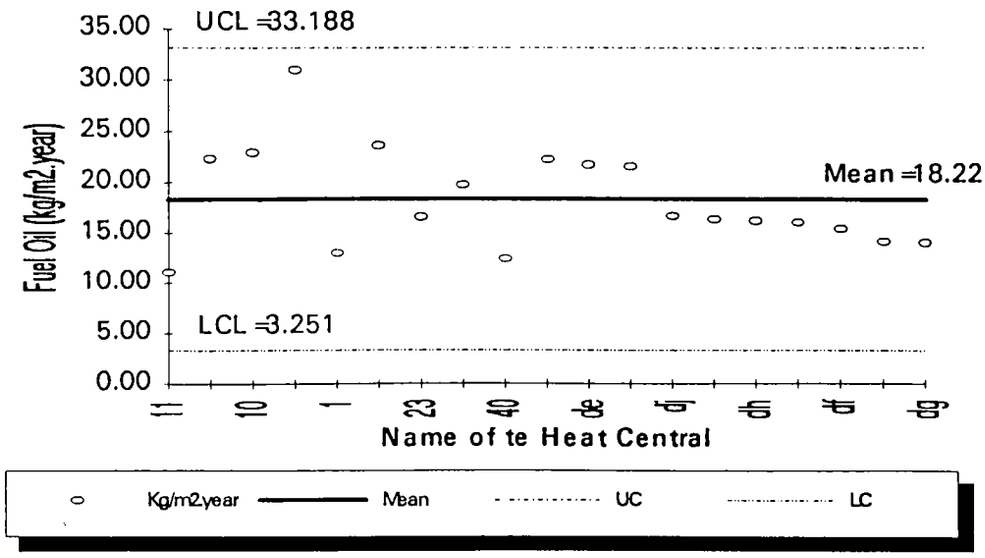

FIGURE 7 CONTROL CHART FOR FUEL OIL CONSUMPTION

3.3. Electricity Expenses in the University Housing

Academic personnel living in the University Housing are charged for their electricity consumption in Kwh. However, Bilkent University is supposed to pay its electricity consumption in terms of the industrial prices where academic residents are charged with the household prices. The difference between these prices creates an expense account for the university (See Table 7 in App. B).

In Table 8 of App. B, all of the electricity expenses are tabulated in terms of Kwh/Month and Kwh/m².month between January 1990 and March 1993. In the light of these figures, both campuses can be compared in five unit-cost measures:

3.3.1. Kwh/Month

Center campus housings have an average consumption of 50,598 Kwh per month, whereas east campus is faced with a figure of 32,923 Kwh/Month (See Figure 8).

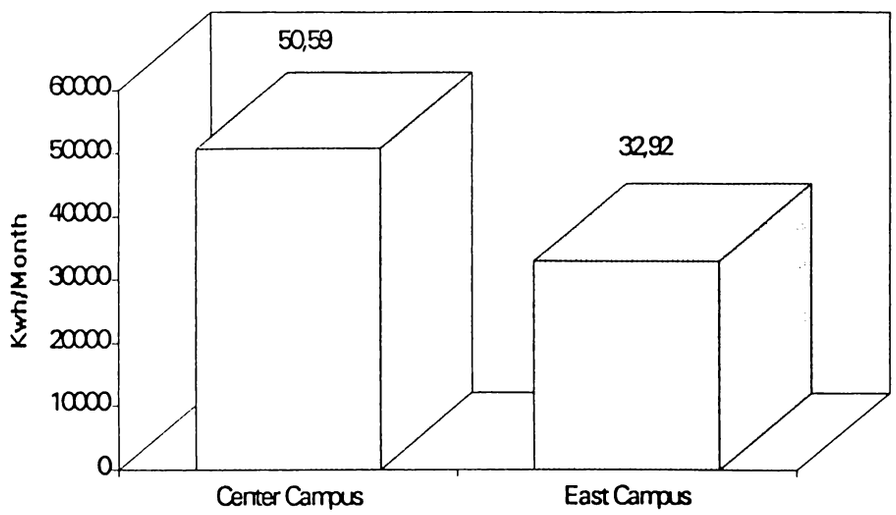

FIGURE 8 ELECTRICITY CONSUMPTION (KWH/MONTH)

3.3.2. Kwh/m².month

Kwh/Month electricity consumption figures are useful but not enough to make a comparison as regards the housings of two campuses. Hypothesis I_0 in Chapter I is not rejected when Kwh/m².month is selected as unit-cost measurement. The higher the area for electricity consumption, the lower the Kwh electricity consumed per m².month (See Figure 9).

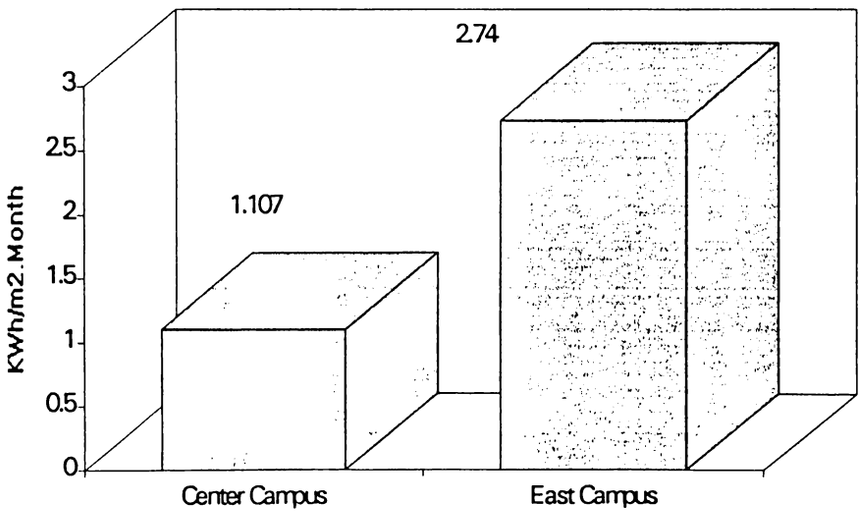

FIGURE 9 ELECTRICTY CONSUMPTION (KWH/M2.MONTH)

3.3.3. TL/year

It is observed that a total of 927,551,835 TL is spent on electricity after the payments of the residents is substracted (See Table 1 in App.B). Electricity expenses constitute 16.12% of the total housing expense in 1992 figures.

3.3.4 TL/M².Year

Bilkent University spent 17,340.98 TL/m2 for electricity in 1992 (See Table 6 in App. B).

3.3.5. Seasonality

A seasonality trend is also seen in electricity expenses (See Figure 10). Most of the Kwh of electricity is consumed in academic months (fall and spring semesters). Sunlight exposure has a lower period in winter and higher in summer

months. So, some differences are detected between certain months of the year. Environment lighting, which is an important factor in total electricity consumption is affected by this seasonality trend.

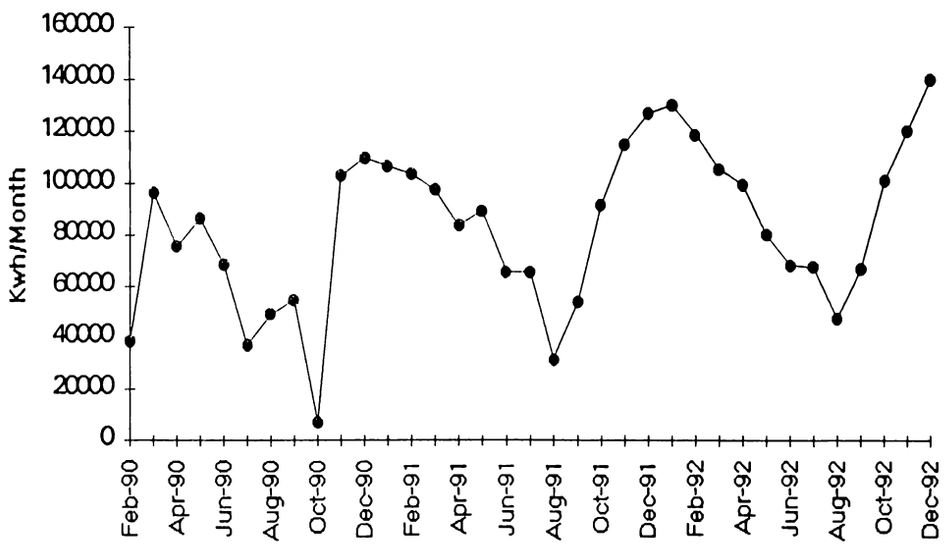

FIGURE 10 SEASONALITY IN ELECTRICITY CONSUMPTION

As a result, Hypothesis III_0 in Chapter I is not rejected in electricity expenses.

3.4. Water Consumption Expenses in University Housing

Water is consumed in two ways. As stated before, some amount is used as hot-water and the rest is consumed as cold-water. Academic residents are not charged for their water consumption. Bilkent University pays for the water expenses that is incurred in the housings of boyh campuses.

Available figures for water consumption in both campuses are reported in Table 9 of App. B.

Bilkent University pays 9520 TL/m^3 (March 1993) per unit water consumption. Total water expense is 761,412,960 TL, where it constitutes 13.23% of the total housing expenses (See Table 1 in App. B). According to this figure, 33.7% (257,054,560 TL) of total water expenses is consumed by east campus. East campus housings constituting 21% of the total housing area, have spent 33.7% of the total. This indicates that, east campus housing has a higher water consumption than it is expected. This conclusion can also be proved by using other unit-cost measures:

3.4.1. M^3/Month

Center campus has 7762.6 m^3/month water consumption, where east campus has 5389.9 m^3/month (See Figure 11).

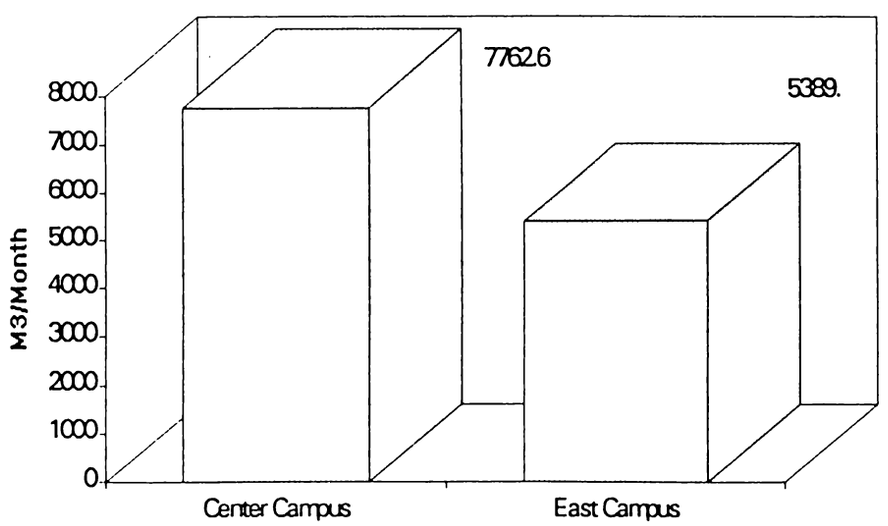

FIGURE 11 WATER CONSUMPTION (M3/MONTH)

However, M^3/Month figures are not enough to conclude about the cost effectiveness of water consumption in both campuses.

3.4.2. M^3/M^2.Month

East campus housings have a water consumption of 0.2438 m^3/m^2.month (See Figure 12).

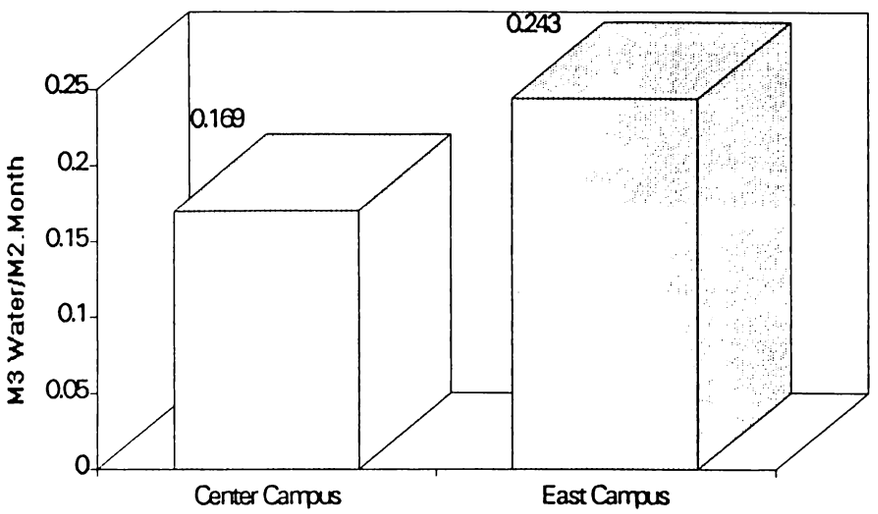

FIGURE 12 WATER CONSUMPTION (M3/M2.MONTH)

Using the same unit, center campus housings have only 0.1699 m^3/m^2.month of water consumption. So Hypothesis II_0 in Chapter I is not rejected.

3.4.3. TL/m^2.year

Bilkent University spent 14,235 TL for water per square meter in 1992 (See Table 6 in App. B).

3.4.4. Seasonality

M^3/month figures is plotted to search whether any seasonality trend is present (See Figure 13).

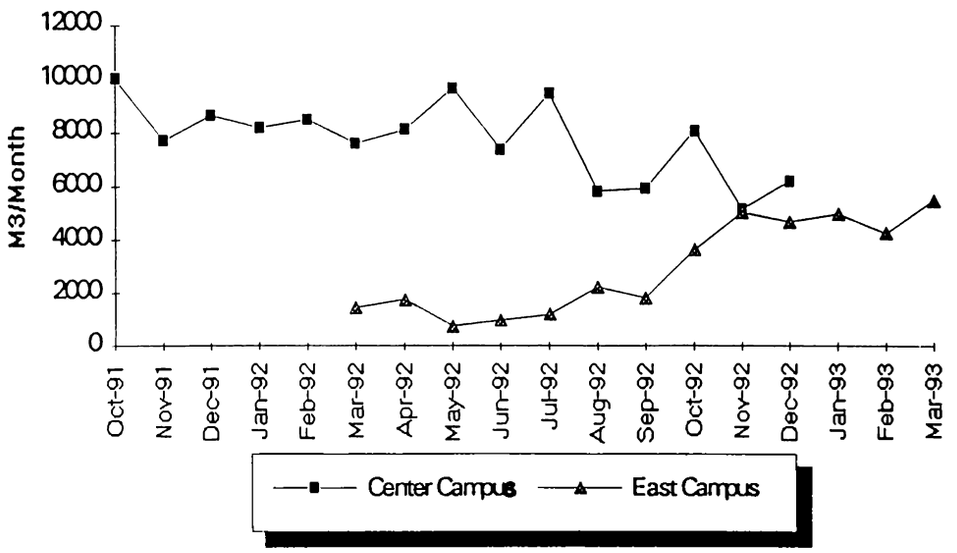

FIGURE 13 SEASONALITY TREND IN WATER CONSUMPTION

It can be concluded that there is no seasonality trend. So Hypothesis III_0 in Chapter I is rejected.

3.5. Overhead Expenses in the University Housing

Overhead expenses occupy an important part of the total housing expenses (20.34%) in 1992 (See Table 1 in App. B). Overhead expenses consist of purchasing of main fixtures, consumer durables and furniture in the university housing. Overhead expenses is not considered as a fixed cost because all these materials require replacement and maintenance after some period. So, overhead

expense figures change periodically. Therefore, it is included in the total operating expenses of the University housing.

Brief classification of the overhead expenses is indicated in Table 10 in App. B. As can be seen from the figure, building equipment occupies an important portion of the total overhead expenses (88.06%). This is the figure that needs concentration to control the cost-effectiveness in the University housings.

Unfortunately, most of the overhead purchasing figures of East Campus are included in the Center Campus figures. There is not a clear cost accounting system between two campuses to differentiate the costs that occur in the overhead expense account. The present figures do not seem to be clear and reasonable (East Campus occupies 2.2% of the total overhead expenses). From 1992 figures, Bilkent University spent 1,170,886,631 TL for the overhead (See Table 1 in App. B).

Bilkent University spent 21,890.23 TL/m^2 for the overhead expenses in1992 (See Table 6 in App. B).

3.6. Maintenance Expenses in the University Housing

Maintenance in the university housing consists of the repair of the overhead, plumbing, motor breakdowns and wall paintings (See Table 11 of App. B).

Bilkent University spent 167,793,873 TL for the maintenance of housings in both campuses in 1992. This constitutes 2.92% of the total housing expenditures (See Table 1 of App. B).

Bilkent University spent 3,136.98 TL per square meter for maintenance of housings in 1992 (See Table 6 of App. B). Using this measure, it is more reasonable to make a comparison of the cost-effectiveness of two campuses. According to this table , east campus maintenance expenditure is 25.44% of the total maintenance expenses. Having 21% of the total housing area, this figure seems to be reasonable.

3.7. Other Utility Expenses in the University Housing

These are the minor expenses that are obligatory to manage the housing services. Other Utility expenses include; transportation of residents, food and beverage of housing personnel, cleaning expenses, personnel clothing and some other service expenditures (See Table 12 of App. B).

Bilkent University spent 257,169,608 TL for Other Utilities in 1992. It constitutes 4.47% of the total housing expenses (See Table 1 of App. B).

When Other Utility Expenses are reported in terms of TL/m^2.year, it is observed that University spent 4,807.90 TL per square meter in 1992 (Table 6 of App. B).

3.8. Personnel Expenses in the University Housing

In order to achieve a high standard in housing services, Bilkent University employs some administrative personnel in the housing area. Salaries and other payments of these personnel are summarized under the account of personnel expenses. Bilkent University spent 433,545,404 TL for personnel in 1992 (See Table 1 of App. B). This figure is 8.15% of the total housing expenses.

Unfortunately, it is very hard to make a comparison between east and center campus. According to the general expense report (prepared by finance department), all of the personnel expense figures are included in center campus accounts.

Therefore, a realistic assumption seems to be necessary to differentiate the personnel expenses of two campuses. Excluding personnel expenses, Bilkent University spent 4,888,372,930 TL for University Housing. East campus had an expenditure of 963,253,923 TL (See Table 1 of App. B). This constitutes 19.71% of the total housing expenses. 19.71% of personnel expense figures is assumed to belong to east campus which is 85,451,799 TL.

Bilkent University spent 7,813.18 TL/m^2 for personnel expenses in 1992 (See Table 6 of App :B).

3.9. Total Expenditure of the University Housing

A total expense figure is obtained after covering all the expenses that take place in the University housing, (See Table 1 of App. B). This table reports the expenditure that takes place in each campus and also summarizes the expense figures of both campuses.

Bilkent University spent 5,755,463,738 TL for housing in 1992. East campus had an expense of 1,048,705,723 TL constituting 18% of the total expenditures. Also, center campus had an expenditure of 4,706,758,015 TL by being 82% of the total (See Figure 14).

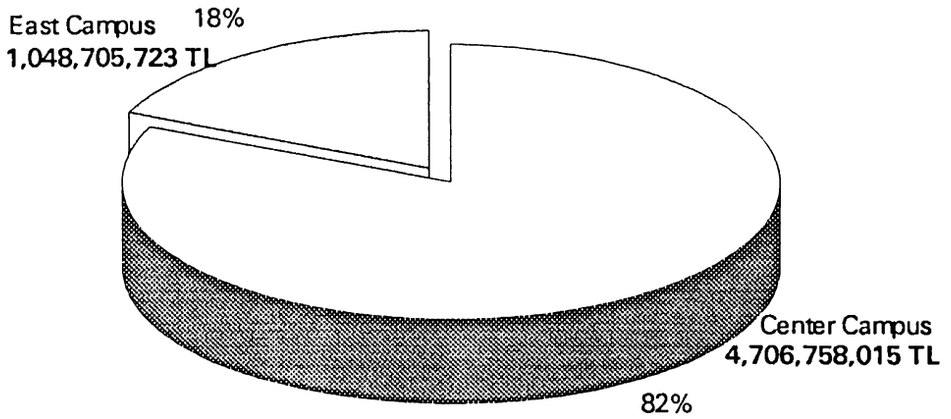

FIGURE 14 TOTAL HOUSING EXPENDITURE IN 1992

The percentage distribution of all the expenses within the total figures are also reported in Figure C.1 in App. C. As can be seen from the figure, Heating and Hot-water expenses have the highest amount by constituting 35.39% of the total expenditure. Following the heating and hot-water expenses, electricity and Water expenses constitute 20.34% and 16.12% of the total expenditure respectively.

Total expenditure in University Housing should also be reported in terms of TL per square meter. Two campuses having different areas of housing services are also compared to take effective results (See Table 6 in App. B). East campus housing area is currently 12,000 m^2. However, it was 7800 m^2 in 1992 when a weighted average of them is calculated according to the months when they were available for the academic residents. So, total figure of housing expenditure is divided by 7800 and 45689 m^2 respectively to compare TL/m^2 expenses of both campuses. In the light of these figures, East and Center campuses have

130,615.08 and 99,016.45 TL/m² expenditure respectively. Adding up the expenses of both campusand dividing them to the total housing area, 107,308.74 TL/m² of expense is reported (See Figure 16).

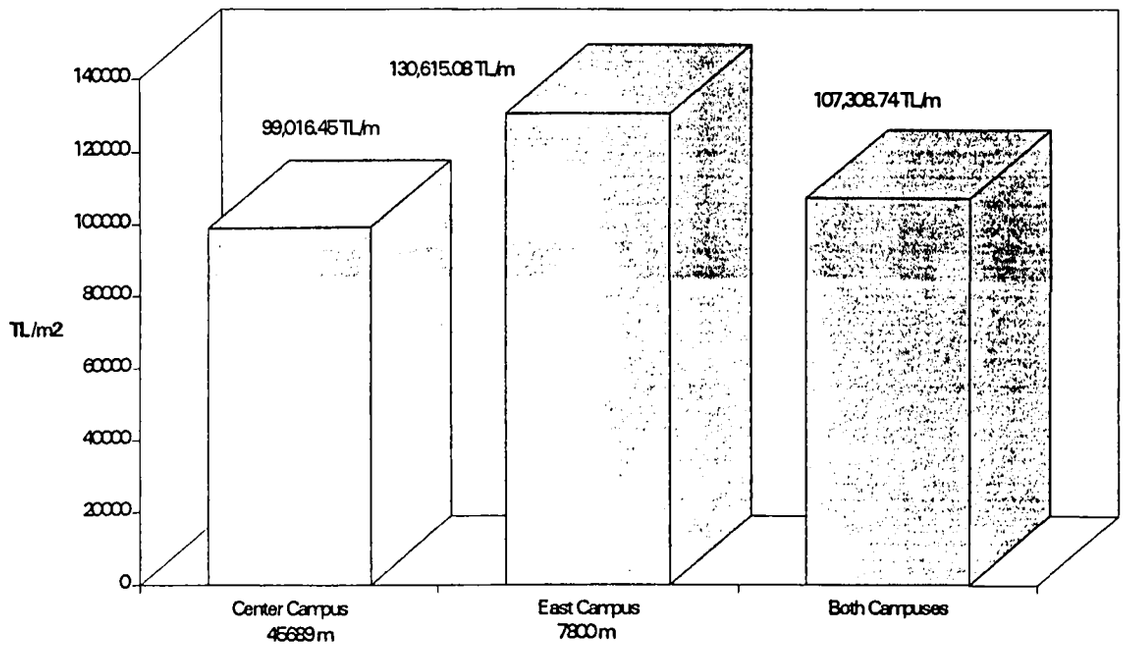

FIGURE 16 TOTAL HOUSING EXPENDITURE IN 1992 (TL/M2)

So, Hypothesis II_0 in Chapter I is not rejected fur the total figures.

CHAPTER IV

SUMMARY, CONCLUSION AND RECOMMENDATIONS

4.1. Summary

It is crucial to make a review in order to compare the cost-effectiveness of east and center campus housings. In this analysis, all of the cost centers of housing area are searched out in detail to achieve a total expenditure figure for 1992. Data is separated for east and center campus and compared in different terms of unit-cost measurements. Comparisons are reported by pareto, pie and control charts that are the tools for service quality measurement. Hypotheses stated in Chapter I are tested to see whether they are rejected or not in each of the cost centers (See Table 13).

Some differences appeared between east and center campus when analyzing the cost centers of the housing service. These differences are highlighted in the analysis section.

After examining all of the cost centers, a total figure for the housing expenses is achieved (See App.B, Table 1). The weight of each cost center is reported in percentage distributions.

4.2 Conclusion

In all of the cost centers, an hypothesis appeared; higher the housing area, higher the cost-effectiveness, lower the expense incurred per unit area.

Achieving statistical conclusions will provide Bilkent University to achieve standards on housing services and to set goals in the light of these findings.

Service quality management is an important issue to consider in Housing services. By achieving standards, control will be sustained on expense figures.

The results of the hypotheses are reported in Table 13.

4.3. Recommendations

In addition, there are some points to be recommended to achieve cost-effectiveness in both campuses' cost centers in the future. These points can be summarized as follows;

4.3.1. Cost Control System

A "Cost Control System" should be introduced. Budgeting should be made for each period so that costs will be planned before they occur in the following period. Having controlled planned costs at the beginning of each period will support executives to control service quality. Also, some future projections can be done -including inflation rate- to budget the housing expenses by the help of

computer supported database applications. For further improvement in service quality, some indexes can be added for a more technical analysis.

Cost control is the guidance and regulation of the costs by executive action. It involves not only the ascertainment of current costs, but also a comparison of these with some reliable standard of measurements. It is a process whereby management ensures the organization's desired ends. It can be defined as a set of organized actions directed towards achieving a specified goal. To bring out particular future events, it is necessary to influence the factors that lie behind those events. Control is the ability to bring out a desired future outcome [Richardson, 47].

The existence of a control process enables management to know from time to time where the organization stands in relation to a pre-determined future position. This requires observation, measurements and re-direction, if there are variations between the actual and desired positions .

4.3.1.1. Cost Control Strategy for Bilkent University

In order to accomplish an effective cost control strategy, management should originate the goals of a cost reduction program. Executives should consolidate the cost-reduction activities into a single organizational function. They should assign a "Cost Reduction Specialist" for the responsibility of achievement of the program's goals.

The responsibilities of the Cost Reduction Specialist should be:

- To help to develop, organize and guide the cost control action
- To serve as a communication link in receiving and disseminating ideas and information pertinent to the cost reduction program among Vice-presidency and other executives [Henry, 5]
- To maintain records and measures the results of cost reduction activities and projects
- To make inspections, ensure the overall success of the cost reduction program

The objective of cost control efforts in Bilkent University Housing Complex is to minimize the cost variances in unit-cost measurements by providing information needed by the executives for making decision on planning, directing and controlling.

4.3.2. Budget System

A cost control system and a budgetary system are complementary. In order to achieve an effective cost control system, budgets should be planned for the previous and the following periods, so that the expenses in the cost centers are planned and controlled.

Budget is a plan quantified in monetary terms prepared and approved prior to a defined period usually showing planned income to be generated and expenditure to be incurred during that period, and the capital to be employed to attain that objective [Pizzey, 214].

Bilkent University needs a budget system that calculates future cost estimates for the variable expenses, so that actual results can be compared with the budgeted ones in case of any variances in the cost centers. The comparison of actual results with the budgeted ones should be monitored for each cost center. For Bilkent University Housing Complex, a budget control sheet can be recommended to provide timely feedback on how successfully the plan is being carried out (See Table 14). Where any variances occur, the need for remedial action can be identified, and such action can be organized before it is too late.

4.3.2.1. Cost Estimation for the Budget System

Accurate cost estimation helps management to make informed decisions concerning the incurrence of future costs and how future costs may vary if conditions change.

4.3.2.1.1. Recommended Techniques for Housing Complex Cost Estimation

Some graphical techniques can be used for future projections for the cost estimation in Housing Complex. Scattergraphs and High-low cost estimates use past cost behaviors and their relation to some activity measure to estimate future costs. A scattergraph is a plotting of past-costs along the vertical axis and of some activity measure along the along the horizontal axis. If the points fall into a roughly linear pattern, a line can be estimated to fit these points into a model of simple regression.

Another method that can be used for cost estimation is ordinary least squares regression. Like the scatter graph approach, post data are used in least squares regression. All of the data points can be used to estimate future variable costs [Deakin, 386].

4.3.2.2. Standard Cost System

Standards are estimates. As such, they may not reflect the conditions that actually occur. If prices and operating methods are frequently changing, standards may be constantly out of date. Standards should be revised periodically, thus variances will occur because conditions change during the year, but standards do not [Deakin, 766].

A standard cost system can be recommended to Bilkent University Housing Complex which is a technique whereby standard costs are pre-determined and subsequently compared with the actual costs as recorded.

Pre-determined standard costs provide [Pizzey, 277]:

- Economy of calculation
- Early availability of cost information
- The ability to anticipate the changing conditions
- Standard costs adjusted in line with the current conditions provide an excellent basis for the preparation of estimates

4.3.2.2.1. Recommended Ratios for Standard Costs

Bilkent University Housing complex can use, Volume or Activity Ratio which is, Actual expenses over budgeted expenses. Also standard deviations of the difference between actual and budgeted results can be used a comparison tool for the cost variances. Actual fuel-oil expenses can be compared to the budgeted estimates to see if this cost center is in control.

4.3.3. Responsibility Center

A responsibility center exists to accomplish one or more purposes. the objective of an individual responsibility center is intended to help to achieve the overall goals of the whole organization [Anthony, 186].

A "Responsibility Center" which is directly responsible for reporting to executives should be established. It should be a specific unit of the university assigned to prepare expenditure data for the housing complex. Responsibility Center is needed for effective cost management .Budgets for performance evaluation and cost control are typically organized around the responsibility centers.

Establishment of a responsibility center for the Housing Complex will enhance the implications of the points discussed above.

4.3.4. Management Information Systems (MIS)

Information systems essentially transform information into a form usable for coordinating the flow of work in a firm, helping managers to make decisions and solving other kinds of problems.

"The system that monitors and retrieves data from the environment, captures data from transaction and operations within the firm, filters, organizes and selects data and presents them information to managers, and provides the means for managers to generate information as desired is called the Management Information System." [Murdick, 123]. MIS is the combination of human and computer based resources that results in collection, storage, retrieval, communication and use of data for the purpose of efficient management of operations and for business planning [Lucey, 1].

Information systems accomplish this through a cycle of three basic activities; input, processing and output. Input, entails capturing or collecting raw data sources from within the business or from its external environment. Processing covers converting this raw input into a more appropriate and useful form. Output entails transferring the processed information to the people or business activities that will use it.

Within the useful functions of Management Information Systems, Bilkent University needs a network application not only for the housing complex but for all of the cost centers in the university. Management Information Systems will help executives to be aware of the expense figures whenever they want. Any cost

variances between the cost centers of each campus will be realized and instantaneous remedies will be set for the future. This will save Bilkent University from any delay in decision making in housing services. Executives will not be supposed to wait for the end of the accounting period for decision making.

4.3.4.1. What can be Recommended as a MIS for Bilkent University

Management Information Systems, as a concept has a lot of applications. It is important to select a computer-based network system to accomplish MIS's features.

Local Area Network (LAN) is a transmission network encompassing a limited area such as a single building or several buildings in close distance, widely used to link personal computers so that they can share information. Local Area Network can be established in Bilkent University by providing a file-server that is a computer with a large capacity memory (hard disk) and a network software (Novell 3.11) can be used to be placed in the file-server to connect personal computers used in the university. Local Area Network for the cost management can have access to a maximum forty users by installing ethernet cards into the computers. Costs that appear in network installation are ; Cable costs (5000TL/m), Cost of the file-server ($3000) , each personal computer is to be modified ($300/each), and the software package cost ($2500).

The users of the Local Area Network system will be the executives of the university and the employee who are responsible of inputting accounting data. By

this method , positive feedback will be taken in a short time to prevent periodic variations in the cost centers.

As a result, the intentions of the Management Information Systems to Bilkent University can be summarized as follows:

- To ensure that consistent and reliable information is instantly available to managers
- To identify deviations and to indicate possible causes of cost variations
- To provide a basis for planning and budgeting
- To help users get the maximum value out of the business of collecting, recording and using the data

In the light of these circumstances, Management Information Systems should be assigned to a coordinator in the use of the system and its purposes, and latter calling a meeting off staff in each department to explain the importance of using accurate data. Staff should be involved by receiving data on themselves which they would then check for accuracy. Decisions had to be made on where the computer should be housed and who should have access to it.

4.3.5. Responsibility Accounting

As a final issue to summarize all of these recommendations, a term, "Responsibility Accounting" can be used to fulfill the requirements discussed above.

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APPENDIX A

OPERATING EXPENSES IN UNIVERSITY HOUSING COMPLEX

1. **Personnel Costs** (TL/month)- Salaries, Wages, Meal, Clothing Transportation
   a. Permanent Personnel
   b. Temporary Personnel
   c. Labor
   d. Security Guards

2. **Water Consumption Expenses**- Cold Water (m3/month, m3/m2.month))

3. **Heating and Hot Water**- Fuel (kg/month, kg/m2.month)

4. **Maintenance Costs** (TL/month, TL/m2.month)- Data available from Construction Unit
   a. Electric Breakdowns
   b. Plumbing Breakdowns
   c. Construction
   d. Carpentry

5. **Electricity Expenses** (kwh/month, kwh/m2.month)
   a. Electricity Expenses that University is supposed to pay (excluding the payment of the academic residents).
   b. Electricity Expense in the Environment (Bulbs of basement and stairs etc.)

6. **Overhead Costs** (TL/month, TL/m2.month)- Main fixtures, consumer durables and furniture in the housings
   - Data available from Purchasing Department

7. **Other Utility Expenses** (TL/month, TL/m2.month) - Data available from Purchasing Department

APPENDIX B

TABLE 1

Total Expenditure in University Housing 1.1.1992-31.12.1992

	Center Campus	*East Campus*	*Total*	TOTAL	%
Heating and Hot Water Expense(*)	1,605,237,606 TL	431,865,821 TL	2,037,103,427 TL	**2,037,103,427 TL**	**35.39%**
Overhead Expenses					
Building Equipments	1,016,244,072 TL	14,943,040 TL	1,031,187,112 TL		
Construction Equipment	23,876,181 TL	4,598,739 TL	28,474,920 TL		
Other Overhead Purchases	105,064,599 TL	6,160,000 TL	111,224,599 TL		
				1,170,886,631 TL	**20.34%**
Electricity Expense (University)	703,094,375 TL	224,457,459 TL	927,551,835 TL	**927,551,835 TL**	**16.12%**
Water Expense	504,358,400 TL	257,054,560 TL	761,412,960 TL	**761,412,960 TL**	**13.23%**
Maintenance Expense					
Machine Repair and Maintenance	83,734,809 TL	3,076,640 TL	86,811,449 TL		
Other Overhead Maintenance	12,636,232 TL	1,456,000 TL	14,092,232 TL		
Other Small Repairs	65,187,035 TL	1,703,157 TL	66,890,192 TL		
				167,793,873 TL	**2.92%**
Other Utility Expenses					
Transportation	63,459,394 TL	4,317,381 TL	67,776,775 TL		
Food & Beverage	51,733,852 TL	3,519,648 TL	55,253,500 TL		
Other Consumption Equipment	48,702,611 TL	3,477,600 TL	52,180,211 TL		
Cleaning Expense	42,006,604 TL	4,439,320 TL	46,445,924 TL		
Cleaning Equipment	9,989,441 TL	679,619 TL	10,669,060 TL		
Telephone & Telex	8,567,314 TL	582,867 TL	9,150,181 TL		
Environment Ordering	5,106,955 TL	347,445 TL	5,454,400 TL		
Stationary & Writing Materials	3,970,766 TL	270,146 TL	4,240,912 TL		
Personnel Clothing	2,853,917 TL	194,163 TL	3,048,080 TL		
Other Service Expenditure	1,571,500 TL	24,000 TL	1,595,500 TL		
Security & Fire	1,177,458 TL	80,107 TL	1,257,565 TL		
Demonstration	91,289 TL	6,211 TL	97,500 TL		
			257,169,608 TL	**257,169,608 TL**	**4.47%**
Personnel Expense	348,093,605 TL	85,451,799 TL	433,545,404 TL		
				433,545,404 TL	**8.15%**
TOTAL	**4,706,758,015 TL**	**1,048,705,723 TL**		**5,755,463,738 TL**	**100.00%**

(*) M^3 Hot Water Consumption is not included

TABLE 2

Area(m^2) of University Housing

Center Campus		East Campus	
Central No.	M^2	Central No.	M^2
1	6000	da	1200
10	6000	db	1200
11	15600	dc	1200
14	1800	dd	1200
23	2340	de	1200
25	1705	df	1200
29	6240	dg	1200
36	3416	dh	1200
40	2588	di	1200
		dj	1200
Total	45689	Total	12000

(*) da indicates: Block A of East Campus

TABLE 3

FUEL OIL PURCHASE IN TERMS OF KG / MONTH & KG / M2.MONTH

Central No.	Area(m	January		February		March		April		May		June		July		August		September		October		November		December	
	Avg	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont	vg.Kg/mont	Kg/m2.mont
1	6000	27786	4.631	14478	2.413	14076	2.346	8817	1.47	0	0	0	0	0	0	0	0	0	0	7859	1.31	14741	2.457	17328	2.888
10	6000	25584	4.264	23352	3.892	13963	2.327	11590	1.932	13670	2.278	0	0	0	0	0	0	8351	1.392	17093	2.849	18230	3.038	26509	4.418
11	15600	25519	1.636	19872	1.274	16075	1.03	13470	0.863	13561	0.869	9677	0.62	10928	0.701	11940	0.765	7443	0.477	16665	1.068	22710	1.456	15868	1.017
14	1800	6942	3.857	6306	3.503	7961	4.423	2942	1.634	1154	0.641	0	0	0	0	0	0	0	0	3879	2.155	3655	2.031	6137	3.409
23	2340	8002	3.42	8354	3.57	3911	1.671	3832	1.638	1523	0.651	0	0	0	0	0	0	0	0	4875	2.083	4954	2.117	5425	2.318
25	1705	6026	3.534	5630	3.302	3976	2.332	2062	1.209	0	0	0	0	10800	6.334	0	0	0	0	3606	2.115	3961	2.323	4995	2.93
29	6240	29221	4.683	13976	2.24	14170	2.271	10806	1.732	11800	1.891	8042	1.289	3140	0.503	15160	2.429	0	0	14975	2.4	16650	2.668	15299	2.452
36	3416	15815	4.63	13895	4.068	12500	3.659	5069	1.484	11380	3.331	6488	1.899	0	0	9170	2.684	12350	3.615	13275	3.886	10447	3.058	10961	3.209
40	2588	20010	7.732	9600	3.709	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13220	5.108	9160	3.539
da	1200	4923	4.103	6000	5	4086	3.405	0	0	0	0	0	0	5400	4.5	0	0	0	0	0	0	4400	3.667	5900	4.917
db	1200	7377	6.148	0	0	0	0	0	0	4946	4.122	0	0	0	0	0	0	7660	6.383	0	0	10987	9.156	1000	0.833
dc	1200	6439	5.366	5770	4.808	4768	3.973	0	0	0	0	0	0	3070	2.558	0	0	0	0	0	0	8050	6.708	5000	4.167
dd	1200	4885	4.071	1586	1.322	4067	3.389	2169	1.808	0	0	0	0	1798	1.498	0	0	4680	3.9	0	0	5900	4.917	4000	3.333
de	1200	5178	4.315	6359	5.299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5012	4.177	10160	8.467	4440	3.7
df	1200	6530	5.442	3000	2.5	4163	3.469	0	0	1607	1.339	0	0	3402	2.835	0	0	5430	4.525	0	0	3530	2.942	2700	2.25
dg	1200	4430	3.692	3770	3.142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7700	6.417	5400	4.5
dh	1200	4230	3.525	6400	5.333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8800	7.333	4150	3.458
di	1200	4600	3.833	7100	5.917	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6380	5.317	5710	4.758
dj	1200	4170	3.475	6700	5.583	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6970	5.808	6200	5.167

TABLE 4

Fuel Oil Expenditure of University Housing

Place(block)	Month	Year	Fuel (kg)	Cost(TL)
29	1	90	9242	6,609,878 TL
1	1	90	6503	4,650,945 TL
10	1	90	13130	9,390,576 TL
1	1	90	12810	9,161,712 TL
29	1	90	14040	10,041,408 TL
36	1	90	7573	5,416,209 TL
10	1	90	6366	4,552,963 TL
10	1	90	13720	9,812,544 TL
1	1	90	13840	9,898,368 TL
36	2	90	4338	3,102,537 TL
29	2	90	8170	5,843,184 TL
36	2	90	5610	4,012,272 TL
10	2	90	13990	10,005,648 TL
1	2	90	13780	9,855,456 TL
29	2	90	4700	3,361,440 TL
36	2	90	8419	6,021,268 TL
10	2	90	13880	9,926,976 TL
29	2	90	3630	2,596,176 TL
1	3	90	12470	8,918,544 TL
29	3	90	13120	9,383,424 TL
36	3	90	5800	4,148,160 TL
10	3	90	13130	9,390,576 TL
29	4	90	13760	9,841,152 TL
1	4	90	13930	10,094,931 TL
10	4	90	13510	9,790,561 TL
36	4	90	5590	4,051,017 TL
36	5	90	13880	10,058,697 TL
29	5	90	13340	9,667,364 TL
10	5	90	13840	10,029,709 TL
29	7	90	10800	7,826,652 TL
36	7	90	3140	2,275,526 TL
29	10	90	14550	16,146,426 TL
10	10	90	11740	13,028,112 TL
10	10	90	1500	1,664,580 TL
36	10	90	12770	14,171,124 TL
29	10	90	500	554,860 TL
1	11	90	3980	4,416,685 TL
10	11	90	14400	15,979,968 TL
29	11	90	14530	16,124,231 TL
1	11	90	13450	14,925,734 TL
36	11	90	4370	4,849,476 TL
29	12	90	4700	4,849,476 TL
36	12	90	12000	13,440,000 TL
1	12	90	13620	15,254,400 TL
29	12	90	6500	7,280,000 TL
10	12	90	8930	10,001,600 TL
10	12	90	13500	15,120,405 TL
29	1	91	6760	7,571,200 TL
36	1	91	6500	7,280,195 TL
29	1	91	10170	11,390,705 TL
1	1	91	14370	16,094,831 TL
10	1	91	4000	4,480,000 TL
10	1	91	12820	14,358,400 TL
29	1	91	12870	14,414,400 TL
36	1	91	9500	10,640,000 TL
36	2	91	2520	2,822,400 TL
10	2	91	12580	14,089,600 TL
1	2	91	14490	16,228,800 TL
29	2	91	12770	14,302,400 TL
10	2	91	13690	15,332,800 TL
36	2	91	9500	10,640,000 TL
1	3	91	14030	15,713,600 TL
29	3	91	12800	14,336,000 TL
36	3	91	2470	2,766,400 TL
36	3	91	10000	11,200,000 TL
10	3	91	14270	15,982,400 TL
1	4	91	8400	9,621,948 TL
29	4	91	13730	15,727,303 TL
29	5	91	14310	17,119,625 TL
36	5	91	13530	16,186,480 TL
10	5	91	13500	16,150,590 TL
da	9	91	6900	9,073,500 TL
db	9	91	7660	10,072,900 TL
36	9	91	12350	16,240,250 TL
10	10	91	13900	18,278,500 TL
29	10	91	14900	19,593,500 TL
10	10	91	10840	14,254,600 TL

TABLE 4

1	10	91	9330	12,268,950 TL
10	11	91	13000	17,095,000 TL
db	11	91	4130	5,430,950 TL
29	11	91	14570	19,159,550 TL
36	11	91	13750	18,081,250 TL
da	11	91	9730	14,886,900 TL
db	11	91	4880	7,466,400 TL
da	11	91	7034	10,762,020 TL
db	11	91	3524	5,391,720 TL
1	11	91	2832	4,332,960 TL
1	12	91	13500	20,655,000 TL
10	12	91	13740	21,022,200 TL
1	12	91	2753	4,212,090 TL
29	12	91	11037	16,886,610 TL
36	12	91	11410	17,457,300 TL
1	12	91	11320	17,319,600 TL
29	12	91	1859	2,844,270 TL
10	12	91	13550	22,140,700 TL
da	12	91	1588	2,594,792 TL
dc	12	91	3999	6,534,366 TL
dd	12	91	6913	11,295,842 TL
10	12	91	3086	5,042,524 TL
29	12	91	8830	14,428,220 TL
36	12	91	4273	6,982,082 TL
1	1	92	9720	15,882,480 TL
10	1	92	12610	20,604,740 TL
29	1	92	4715	7,704,310 TL
36	1	92	8555	13,978,870 TL
29	1	92	13460	21,993,640 TL
1	1	92	9150	14,951,100 TL
da	1	92	5646	9,225,564 TL
db	1	92	7144	11,673,296 TL
dc	1	92	2575	4,207,550 TL
dd	1	92	4880	7,973,920 TL
da	1	92	6055	9,893,870 TL
10	1	92	11148	18,215,832 TL
29	1	92	5168	8,444,512 TL
36	1	92	8432	13,777,888 TL
1	1	92	14370	23,480,580 TL
dc	1	92	5083	8,305,622 TL
29	2	92	5175	8,455,950 TL
36	2	92	9275	15,155,350 TL
10	2	92	10708	17,496,872 TL
da	2	92	2679	4,377,486 TL
29	2	92	13510	22,075,340 TL
1	2	92	6943	11,344,862 TL
36	2	92	6447	10,534,398 TL
dd	2	92	1152	1,882,368 TL
da	2	92	3792	6,196,128 TL
10	2	92	13960	22,810,640 TL
1	3	92	10810	17,663,540 TL
dc	3	92	4768	7,790,912 TL
29	3	92	9590	15,670,060 TL
36	3	92	4900	8,006,600 TL
da	3	92	4086	6,676,524 TL
dd	3	92	4067	6,645,478 TL
10	3	92	14490	23,676,600 TL
29	3	92	5587	9,129,158 TL
36	3	92	8743	14,286,062 TL
df	3	92	4163	6,802,342 TL
29	3	92	7000	11,438,000 TL
1	3	92	4918	8,036,012 TL
29	4	92	4927	8,050,718 TL
36	4	92	4587	7,495,158 TL
10	4	92	9669	16,630,680 TL
1	4	92	4120	7,086,400 TL
dd	4	92	2169	3,730,680 TL
1	4	92	3462	5,954,640 TL
29	5	92	7749	13,328,280 TL
36	5	92	6731	11,577,320 TL
db	5	92	4946	8,507,120 TL
df	5	92	1607	2,890,993 TL
10	6	92	7993	14,379,407 TL
29	6	92	8042	14,467,558 TL
36	6	92	6488	11,671,912 TL
da	7	92	5400	10,335,600 TL
dc	7	92	3070	5,875,980 TL
dd	7	92	1798	3,441,372 TL
df	7	92	3402	6,511,428 TL
36	8	92	9170	18,450,040 TL
29	8	92	15160	32,002,760 TL
df	9	92	5430	11,462,730 TL

TABLE 4

dc	2	93	5770	12,965,190 TL
df	2	93	3000	6,741,000 TL
dd	2	93	2020	4,538,940 TL
de	2	93	6250	14,043,750 TL
dj	2	93	6700	15,054,900 TL
23	1	90	5015	3,587,014 TL
11	1	90	10855	7,763,496 TL
25	1	90	2555	1,827,580 TL
14	1	90	3711	2,654,107 TL
23	1	90	2347	1,678,310 TL
11	1	90	1222	873,974 TL
14	1	90	3488	2,494,475 TL
25	1	90	2503	1,789,858 TL
23	1	90	1057	755,895 TL
25	1	90	3322	2,376,180 TL
11	2	90	11359	8,123,778 TL
23	2	90	4246	3,036,689 TL
14	2	90	4317	3,087,518 TL
11	2	90	10530	7,531,056 TL
25	2	90	3833	2,741,518 TL
11	2	90	10879	7,780,929 TL
23	2	90	5218	3,732,057 TL
14	2	90	3906	2,793,571 TL
25	2	90	1819	1,301,256 TL
14	3	90	3891	2,782,843 TL
23	3	90	1494	1,068,294 TL
25	3	90	3655	2,613,799 TL
11	3	90	11334	8,106,345 TL
14	4	90	4182	2,990,966 TL
23	4	90	5269	3,768,317 TL
11	4	90	9588	6,947,965 TL
11	5	90	11375	8,243,349 TL
11	5	90	10961	7,943,055 TL
11	7	90	10684	7,742,859 TL
11	10	90	11408	12,545,055 TL
11	10	90	10108	11,216,494 TL
23	10	90	5714	6,340,385 TL
14	10	90	3390	3,761,951 TL
25	10	90	5195	5,765,443 TL
11	11	90	10343	11,477,972 TL
14	11	90	3801	4,218,046 TL
23	11	90	3939	4,371,187 TL
25	12	90	2409	2,697,789 TL
25	12	90	3252	3,642,015 TL
11	12	90	11700	13,104,000 TL
14	12	90	4119	4,613,403 TL
23	1	91	2477	2,773,680 TL
25	1	91	3194	3,576,991 TL
11	1	91	11448	12,821,900 TL
23	1	91	5265	5,896,800 TL
25	1	91	2513	2,814,148 TL
14	1	91	4257	4,767,840 TL
11	1	91	11854	13,276,900 TL
11	1	91	11659	13,058,500 TL
23	2	91	5764	6,455,904 TL
25	2	91	3563	3,990,867 TL
14	2	91	4251	4,761,120 TL
23	2	91	3537	3,961,776 TL
11	2	91	11806	13,222,300 TL
25	2	91	789	883,758 TL
14	3	91	2646	2,963,520 TL
11	3	91	11050	12,376,000 TL
11	3	91	496	555,100 TL
23	3	91	2987	3,345,888 TL
25	3	91	2949	3,302,466 TL
25	3	91	1101	1,232,610 TL
11	3	91	1950	2,184,000 TL
14	3	91	4293	4,808,160 TL
23	3	91	546	611,520 TL
23	4	91	2925	3,350,500 TL
11	4	91	8206	9,400,013 TL
11	4	91	5363	6,142,583 TL
14	4	91	2220	2,542,943 TL
23	4	91	1385	1,585,903 TL
11	4	91	5484	6,282,187 TL
25	4	91	2259	2,587,882 TL
11	5	91	10733	12,840,466 TL
11	6	91	11213	13,413,962 TL
11	8	91	11798	15,525,274 TL
11	10	91	11814	15,535,081 TL
14	10	91	3780	4,970,700 TL
23	10	91	5667	7,451,711 TL

TABLE 4

11	10	91	2104	2,767,253 TL
25	10	91	1802	2,370,159 TL
11	11	91	11846	15,577,819 TL
11	11	91	12009	15,791,506 TL
14	11	91	3176	4,858,515 TL
23	11	91	5550	8,491,041 TL
25	11	91	5047	7,722,126 TL
11	12	91	11123	17,018,381 TL
14	12	91	4374	6,692,220 TL
11	12	91	821	1,255,556 TL
23	12	91	3560	5,446,678 TL
11	12	91	11887	18,186,919 TL
25	12	91	4000	6,119,624 TL
14	12	91	4440	6,793,200 TL
23	12	91	5710	9,329,486 TL
25	1	92	1978	3,232,173 TL
11	1	92	11018	18,002,595 TL
14	1	92	4362	7,127,508 TL
25	1	92	1769	2,890,837 TL
11	1	92	11497	18,785,894 TL
23	1	92	3768	6,156,569 TL
23	1	92	2550	4,166,406 TL
25	1	92	2531	4,136,068 TL
11	1	92	10774	17,604,308 TL
14	1	92	4023	6,573,582 TL
23	2	92	5253	8,583,892 TL
25	2	92	3919	6,403,950 TL
14	2	92	4083	6,671,622 TL
23	2	92	2692	4,398,369 TL
25	2	92	1792	2,928,160 TL
11	2	92	10766	17,591,031 TL
14	2	92	4491	7,338,294 TL
23	3	92	2037	3,328,409 TL
23	3	92	2298	3,755,373 TL
25	3	92	3172	5,182,470 TL
11	3	92	11083	18,108,805 TL
11	3	92	7570	12,369,482 TL
23	3	92	1608	2,627,423 TL
14	3	92	1619	2,644,629 TL
23	3	92	762	1,245,843 TL
25	3	92	1052	1,718,216 TL
14	4	92	2425	3,962,777 TL
11	4	92	3933	6,765,298 TL
23	4	92	1916	3,294,970 TL
25	4	92	1864	3,205,850 TL
11	4	92	7837	13,480,285 TL
11	5	92	7615	13,698,935 TL
14	5	92	1154	2,075,686 TL
23	5	92	1523	2,739,085 TL
11	6	92	3584	6,447,504 TL
11	6	92	4556	8,195,682 TL
11	7	92	11172	21,382,969 TL
11	8	92	12082	24,308,733 TL
11	9	92	7443	17,296,370 TL
23	10	92	1365	3,172,260 TL
11	10	92	11196	26,020,085 TL
14	10	92	4467	10,381,308 TL
23	10	92	1880	4,368,655 TL
25	10	92	3821	8,879,446 TL
11	11	92	11286	25,449,084 TL
11	11	92	10701	24,129,909 TL
11	11	92	11944	27,936,431 TL
23	11	92	5374	12,570,254 TL
25	11	92	2874	6,721,996 TL
14	11	92	3987	9,325,593 TL
14	12	92	3987	9,325,593 TL
25	12	92	1080	2,525,605 TL
23	12	92	3299	7,717,297 TL
11	12	92	12074	28,240,501 TL
25	12	92	3738	8,742,480 TL
14	12	92	1491	3,487,449 TL
23	12	92	3705	8,665,995 TL
25	12	92	507	1,138,479 TL
25	1	93	872	1,959,676 TL
11	1	93	10554	23,715,681 TL
14	1	93	3966	8,911,602 TL
23	1	93	5417	12,172,224 TL
14	1	93	3960	8,898,120 TL
23	1	93	2551	5,731,198 TL
25	1	93	2866	6,438,936 TL
14	1	93	450	1,011,150 TL
23	1	93	1560	3,505,320 TL

TABLE 4

11	1	93	11196	25,157,974 TL
23	2	93	5437	12,216,040 TL
25	2	93	3650	8,202,644 TL
11	2	93	12147	27,294,028 TL
23	2	93	1268	2,848,073 TL
14	2	93	4176	9,383,472 TL
11	2	93	12001	26,965,404 TL
14	2	93	1920	4,314,240 TL
25	2	93	3156	7,092,161 TL

TABLE 5
Monthly Fuel-oil Consumption in University Housings

	Fuel(kg)		
Time	**East**	**Center**	**Total**
January	52762	164904	217666
February	46685	115463	162148
March	17084	86632	103716
April	2169	58606	60775
May	6553	53088	59641
June	0	24207	24207
July	13670	24868	38538
August	0	36270	36270
September	17770	28144	45914
October	5012	82228	87240
November	72877	108567	181444
December	44500	111681	156181

TABLE 6

Total Expenditure in University Housing 1.1.1992-31.12.1992 (TL/M2.year)

	Center Campus	*East Campus*	*Total*	TOTAL	%
Heating and Hot Water Expense(*)	33,660.54 TL	55,367.41 TL	38,084.53 TL	**38,084.53 TL**	35.49%
Overhead Expenses					
Building Equipments	21,309.82 TL	1,915.77 TL	19,278.49 TL		
Construction Equipment	500.66 TL	589.58 TL	532.35 TL		
Other Overhead Purchases	2,203.12 TL	789.74 TL	2,079.39 TL		
				21,890.23 TL	20.40%
Electricity Expense (University)	14,743.32 TL	28,776.60 TL	17,340.98 TL	**17,340.98 TL**	16.16%
Water Expense	10,575.99 TL	32,955.71 TL	14,234.94 TL	**14,234.94 TL**	13.27%
Maintenance Expense					
Machine Repair and Maintenance	1,755.85 TL	394.44 TL	1,622.98 TL		
Other Overhead Maintenance	264.97 TL	186.67 TL	263.46 TL		
Other Small Repairs	1,366.92 TL	218.35 TL	1,250.54 TL		
				3,136.98 TL	2.92%
Other Utility Expenses					
Transportation	1,330.69 TL	553.51 TL	1,267.12 TL		
Food & Beverage	1,084.82 TL	451.24 TL	1,032.99 TL		
Other Consumption Equipment	1,021.25 TL	445.85 TL	975.53 TL		
Cleaning Expense	880.84 TL	569.14 TL	868.33 TL		
Cleaning Equipment	209.47 TL	87.13 TL	199.46 TL		
Telephone & Telex	179.66 TL	74.73 TL	171.07 TL		
Environment Ordering	107.09 TL	44.54 TL	101.97 TL		
Stationary & Writing Materials	83.26 TL	34.63 TL	79.29 TL		
Personnel Clothing	59.84 TL	24.89 TL	56.99 TL		
Other Service Expenditure	32.95 TL	3.08 TL	29.83 TL		
Security & Fire	24.69 TL	10.27 TL	23.51 TL		
Demonstration	1.91 TL	0.80 TL	1.82 TL		
				4,807.90 TL	4.48%
Personnel Expense	7,618.76 TL	7,120.98 TL	7,813.18 TL		
				7,813.18 TL	7.28%
TOTAL	**99,016.45 TL**	**130,615.08 TL**		**107,308.74 TL**	**100.00%**

(*) M^3 Hot Water Consumption is not included

TABLE 7

Distribution of Electricity Expense between Academic personnel and University

A: Kwh/Month of electricity that academic personnel is supposed to pay

B: Kwh/Month of electricity that University is charged

C: Total Kwh/Month of electricity that T.E.K. sends to Bilkent University

Time	A	*B*	C
Jan-90			
Feb-90	14353	*20,705*	35,058
Mar-90	15846	*74,222*	90,068
Apr-90	14245	*57,004*	71,249
May-90	15477	*65,469*	80,946
Jun-90	33259	*31,092*	64,351
Jul-90	40184	*-6,340*	33,844
Aug-90	29351	*16,879*	46,230
Sep-90	17837	*33,875*	51,712
Oct-90	26975	*-24,028*	2,947
Nov-90	36379	*57,000*	93,379
Dec-90	29689	*72,595*	102,284
Jan-91	33621	*68,521*	102,142
Feb-91	22308	*77,049*	99,357
Mar-91	31773	*59,765*	91,538
Apr-91	35160	*42,193*	77,353
May-91	27978	*52,264*	80,242
Jun-91	26795	*31,971*	58,766
Jul-91	25884	*35,013*	60,897
Aug-91	20092	*9,725*	29,817
Sep-91	21292	*29,633*	50,925
Oct-91	35622	*47,657*	83,279
Nov-91	37063	*70,177*	107,240
Dec-91	35963	*83,875*	119,838
Jan-92	38668	*85,204*	123,872
Feb-92	33965	*79,310*	113,275
Mar-92	33463	*65,500*	98,963
Apr-92	35265	*57,197*	92,462
May-92	29755	*43,650*	73,405
Jun-92	29307	*32,628*	61,935
Jul-92	23976	*39,317*	63,293
Aug-92		*44,209*	44,209
Sep-92		*63,516*	63,516
Oct-92		*93,606*	93,606
Nov-92		*109,879*	109,879
Dec-92			

(-) sign indicates a transfer between different period's accounts

(-) amount of TL is paid in excess for the previous period expenditure

TABLE 8

Electricity Expense of University Housing

	Electricity (KWH)	Electricity(KWH)	Elec.price(TL/KWH)	Electricity Expenditure(TL)		KWH/M2	
Date	University(CENTER)	University(EAST)		Center	East	Center	East
Jan-90							
Feb-90	20,705		220.54	4,566,280.70		0.453	
Mar-90	74,222		234.78	17,426,841.16		1.625	
Apr-90	57,004		240.47	13,707,751.88		1.248	
May-90	65,469		247.35	16,193,757.15		1.433	
Jun-90	31,092		253.02	7,866,897.84		0.681	
Jul-90	-6,340		260.73	-1,653,028.20		-0.139	
Aug-90	16,879		267.50	4,515,132.50		0.369	
Sep-90	33,875		276.92	9,380,665.00		0.741	
Oct-90	-24,028		283.98	-6,823,471.44		-0.526	
Nov-90	57,000		294.19	16,768,830.00		1.248	
Dec-90	72,595		303.92	22,063,072.40		1.589	
Jan-91	68,521		313.44	21,477,222.24		1.500	
Feb-91	77,049		322.63	24,858,318.87		1.686	
Mar-91	59,765		332.24	19,856,323.60		1.308	
Apr-91	42,193		362.62	15,300,025.66		0.923	
May-91	52,264		393.97	20,590,448.08		1.144	
Jun-91	31,971		413.99	13,235,674.29		0.700	
Jul-91	35,013		469.03	16,422,147.39		0.766	
Aug-91	9,725		489.16	4,757,081.00		0.213	
Sep-91	29,633		500.85	14,841,688.05		0.649	
Oct-91	47,657		516.93	24,635,333.01		1.043	
Nov-91	70,177		520.98	36,560,813.46		1.536	
Dec-91	83,875		595.85	49,976,918.75		1.836	
Jan-92	85,204		652.17	55,567,492.68		1.865	
Feb-92	79,310		675.78	53,596,111.80		1.736	
Mar-92	65,500		698.36	45,742,580.00		1.434	
Apr-92	57,197		731.51	41,840,177.47		1.252	
May-92	43,650		765.23	33,402,289.50		0.955	
Jun-92	32,628		803.95	26,231,280.60		0.714	
Jul-92	39,317		854.46	33,594,803.82		0.861	
Aug-92	44,209	15,456	893.85	39,516,214.65	13,815,345.60	0.968	1.288
Sep-92	63,516	18,008	933.82	59,312,511.12	14,948,590.56	1.390	1.334
Oct-92	93,606	22,494	966.47	90,467,390.82	21,739,776.18	2.049	1.8745
Nov-92	109,879	26,082	1,001.50	110,043,818.50	26,121,123.00	2.405	2.1735
Dec-92		48,162	1,035.50	0.00	49,871,751.00		4.0135
Jan-93		55,476	1,069.00	0.00	59,303,844.00		4.623
Feb-93		46,782	1,098.00	0.00	51,366,636.00		3.8985
Mar-93							
Average	50,598	32,923				1.107	2.743571429

TABLE 9

Water Expense in the University Housing

	Water(M3)		Water Price(TL/M3)	Water Expense (TL)		M3/M2.Month	
Data	Center(45689m2)	East(12000m2)		Center	East	Center	East
Jan-90			4356				
Feb-90			4,356.00				
Mar-90			4,356.00				
Apr-90			4,356.00				
May-90			4,356.00				
Jun-90			4,356.00				
Jul-90			4,356.00				
Aug-90			4,356.00				
Sep-90			4,356.00				
Oct-90			4,356.00				
Nov-90			7,616.00				
Dec-90			7,616.00				
Jan-91			7,616.00				
Feb-91			7,616.00				
Mar-91			4,435.00				
Apr-91			4,435.00				
May-91			4,435.00				
Jun-91			4,435.00				
Jul-91			4,435.00				
Aug-91			4,435.00				
Sep-91			4,435.00				
Oct-91	10,001.00		4,435.00	44354435		0.218893	
Nov-91	7,707.00		4,435.00	34180545		0.168684	
Dec-91	8,667.00		4,435.00	38438145		0.189696	
Jan-92	8,177.00		5,600.00	45791200		0.178971	
Feb-92	8,500.00		5,600.00	47600000		0.18604	
Mar-92	7,600.00	2630	5,600.00	42560000	14728000	0.166342	0.118983
Apr-92	8,124.00	3223	5,600.00	45494400	18048800	0.177811	0.145811
May-92	9,679.00	1383	5,600.00	54202400	7744800	0.211845	0.062568
Jun-92	7,383.00	1777	5,600.00	41344800	9951200	0.161593	0.080393
Jul-92	9,475.00	2178	5,600.00	53060000	12196800	0.20738	0.098534
Aug-92	5,800.00	4028	5,600.00	32480000	22556800	0.126945	0.182229
Sep-92	5,913.00	3307	5,600.00	33112800	18519200	0.129418	0.149611
Oct-92	8,090.00	6606	5,600.00	45304000	36993600	0.177067	0.29886
Nov-92	5,119.00	9241	5,600.00	28666400	51749600	0.11204	0.418069
Dec-92	6,204.00	8604	5,600.00	34742400	48182400	0.135788	0.389251
Jan-93		9137	9,520.00		86984240		0.413364
Feb-93		7806	9,520.00		74313120		0.353149
Mar-93		10149	9,520.00		96618480		0.459148
Average	**7,762.60**	**5389.923077**				**0.169901**	**0.243844**

(Blank figures are the ones which are not available)

TABLE 10

Overhead Expenses (1.1.1992-31.12.1992)

Building Equipments		
Refrigerator	292,236,000 TL	
Washing Machine	291,276,000 TL	
Oven	134,029,999 TL	
Electricity Broom	61,155,000 TL	
Curtain	94,473,120 TL	
Other Inhouse Utilities	158,016,993 TL	
		1,031,187,112 TL
Construction Equipment		
Building Maintenance Material	28,474,920 TL	
		28,474,920 TL
Other Overhead Purchases		
Kitchen Equipment	56,034,343 TL	
Electric Radiator	6,160,000 TL	
Bed	8,097,600 TL	
Iron	1,330,560 TL	
Iron Table (ütü masasi)	14,868,000 TL	
Lampshade(abajur)	1,254 TL	
Others	24,732,842 TL	
		111,224,599 TL
Total		**1,170,886,631 TL**

	Total Expenditure	
East Campus Housings	**25,701,779 TL**	2.20%
Center Campus Housings	**1,145,184,852 TL**	97.80%

TABLE 11

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Maintenance Expenses (1.1.1992-31.12.1992)

Machine Repair and Maintenance		
Washing Machine Maintenance(AEG)	29,440,880 TL	
Other Machine Maintenance (AEG)	7,986,780 TL	
Other Machine Maintenance(Arçelik)	9,324,000 TL	
Other Machine Maintenance(Demirdöküm)	13,171,200 TL	
Others	26,888,589 TL	
		86,811,449 TL
Other Overhead Maintenance		
Motor Maintenance	5,544,000 TL	
Platform Maintenance	3,360,000 TL	
Pump Maintenance	2,352,000 TL	
Armchair (koltuk) Maintenance	2,740,640 TL	
Others	95,592 TL	
		14,092,232 TL
Other Small Repairs		
Exterior and Interior Painting	57,805,035 TL	
Door Maintenance	862,400 TL	
Window Maintenance	1,680,000 TL	
Kitchen Maintenance	1,680,000 TL	
Others	4,862,757 TL	
		66,890,192 TL
Total		**167,793,873 TL**

	Total
East Campus Housings	6,235,797 TL
Center Campus Housings	161,558,076 TL

TABLE 12

Other Utility Expenses in University Housing in 1992

Transportation	67,776,775 TL
Food & Beverage	55,253,500 TL
Other Consumption Equipment	52,180,211 TL
Cleaning Expense	46,445,924 TL
Cleaning Equipment	10,669,060 TL
Telephone & Telex	9,150,181 TL
Environment Ordering	5,454,400 TL
Stationary & Writing Materials	4,240,912 TL
Personnel Clothing	3,048,080 TL
Other Service Expenditure	1,595,500 TL
Security & Fire	1,257,565 TL
Demonstration	97,500 TL
Total	**257,169,608 TL**

TABLE 13

Hypotheses Tested in the Cost Centers of University Housing

	$H\ 1_0$	$H\ 2_0$	$H\ 3_0$
Fuel-Oil Expenses	REJECTED	NOT REJECTED	NOT REJECTED
Electricity Expenses		NOT REJECTED	NOT REJECTED
Water Expenses		NOT REJECTED	REJECTED
Total Expenditure		NOT REJECTED	

$H\ 1_0$: Housing Expenditure per unit area should be constant

$H\ 2_0$: Higher the Housing area, Lower the cost per unit area

$H\ 3_0$: Seasonality Trend is present in the cost centers

APPENDIX C

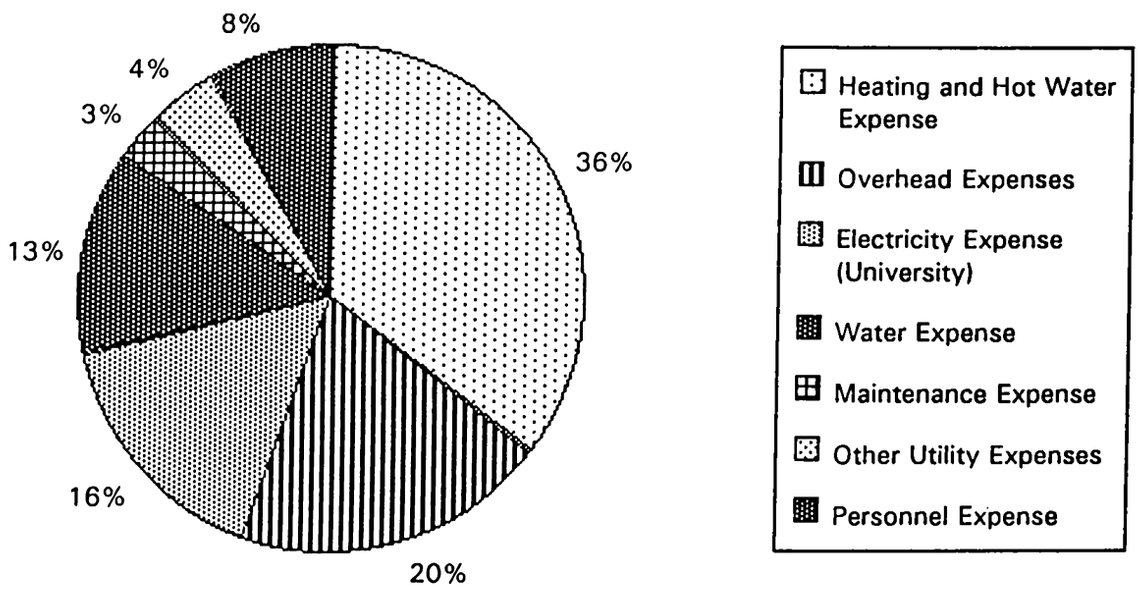

FIGURE C.1 Percent Distribution of the Cost Centers