

**A STUDY OF MILITARY FACTORIES
IN TURKEY FROM THE VIEWPOINT OF
PRODUCTIVITY
AND
COST EFFECTIVENESS**

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MASTER OF SCIENCE

By
Kemal Gürol KURTAY
September 2006

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

Prof. Barbaros Tansel (Principal Advisor)

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

Prof. İhsan Sabuncuoğlu

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

Prof. Erdal Erel

Approved for the Institute of Engineering and Sciences

Prof. Mehmet Baray
Director of Institute of Engineering and Sciences

ABSTRACT

A STUDY OF MILITARY FACTORIES IN TURKEY FROM THE VIEWPOINT OF PRODUCTIVITY AND COST EFFECTIVENESS

Kemal Gürol Kurtay

M.S. In Industrial Engineering

Supervisor : Prof. Barbaros TANSEL

September 2006

This study is a field study which investigates military workshops with a investigation methodology for proper determination of concerns that are considered to have adverse effects on productivity and cost-effectiveness at factories and proposes a number of alternatives for their elimination. It also defines issues common for any military factories, that are considered detrimental to cost-effective and productive operation of military factory and puts forth suggestions for their elimination. The Study further makes a comparison of data supplied from military workshops against statistical data retrieved from private owned worksites of similar character and nature, in the conclusions drawn after a compilation of findings obtained through factory investigations.

All this effort currently being carried out is an activity aimed exclusively at improving productivity in military factories. Improving productivity through boosting the amount of output toward shortening production cost and by decreasing operation times are the core of this study.

Keywords : Productivity, Cost-effectiveness, Utilization, Manpower capacity

ÖZET

TÜRKİYEDEKİ ASKERİ FABRİKALARIN VERİMLİLİK VE MALİYET ETKİNLİK AÇISINDAN İNCELENMESİ

Kemal Gürol Kurtay

Endüstri Mühendisliği Bölümü Yüksek Lisans

Tez Yöneticisi : Prof.Dr. Barbaros Tansel

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Bu çalışmada, askeri iş yerlerinde verimliliği ve maliyet-etkinliği olumsuz yönde etkilediği değerlendirilen hususları ortaya koymaya yönelik askeri iş yerlerinde yapılan incelemeler, analizler sonucu elde edilen tespitler ve bunları düzeltmeye yönelik öneriler sunulmuştur. Ayrıca iş yeri bazında ve yerinde yapılan incelemelerden elde edilen verilerden, askeri iş yerlerinin maliyet-etkin ve verimli çalışmasını engellediği değerlendirilen ve tüm iş yerlerinde görülen genel hususlar ortaya konmuş ve bunların ortadan kaldırılmasına yönelik öneriler sunulmuştur. Ayrıca iş yeri incelemelerinden elde edilen tespitlerin bir araya getirilerek yapılan genel değerlendirmede askeri işyerlerine ait veriler, benzer nitelikte faaliyet gösteren özel sektör iş yerlerinin istatistiksel verileri ile karşılaştırılmıştır.

Bu çalışmada askeri iş yerlerindeki verimliliğin artırılması amaçlanmıştır. Bu kapsamda operasyon zamanları ile üretim maliyetlerinin düşürülmesiyle verimliliğin artırılması, bu çalışmanın temelini oluşturmaktadır.

Anahtar Kelimeler : Üretkenlik, Verimlilik, Maliyet Etkinlik, İşgücü Kapasitesi

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TO MY FAMILY

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CHAPTER 1

INTRODUCTION

1.1 Purpose Of The Study

Given the fact that military worksites in Turkey are also factories and organizations engaged in production, productivity becomes a vital phenomenon within military factories. In the recent years, numerous studies have been made aimed at leveraging productivity in military owned factories. In this context, various studies are underway to clarify such as issues reorganization of military factories and how to enhance productivity of the workforce. The single and common purpose of all these studies is to realize the highest quality production, maintenance and repair services, based on most effective use of physical sources of the army.

One of the most important indicators that companies prefer to use in order to cut production costs, become more competitive, sustain an acceptable level of profitability and further expand their market shares is productivity. While the impetus is placed on such concerns as maximization of profits or expanding shares in the market to come at a position to control it for any private sector enterprises (Prokopenko 1987). But the case differs slightly for military workshops. Military workshops are not seek for profit. In their core philosophies, it is considered essential that the basic goal should be “the effective use of inputs” and thus attempting to enhance productivity. Many inputs such as manpower, raw materials etc. are indeed a scarce source for production activities carried out at workshops. Therefore, the most important concern for military workshops is considered as the conduct of vehicle maintenance and repair works and spare part production efforts with the least possible use of already scarce resources. (Sezen and Doğan 2005)

The military workshops in our country are a good example of non-profit large organizations. As a matter of fact, the main objective of military factories is to ensure country's interests and defense by carrying out the maintenance, repairs and manufacturing of firearms and vehicles used in national defense. On the other hand, when approached from the perspective of number of workers or officials, these organizations are big shelters encompassing huge quantities of workforce.

Consequently, improvement of benefits through a slight increase in productivity poses significance for effective and efficient use of the army sources.

This study will analyze data retrieved from on-site inspections carried out at military workshops from 2003, and shall;

- 1) disclose the workforce efficiency and workforce usage rates of workshops,
- 2) provide a deeper insight to such factors (as staff, cost accounting, inventory controls and etc.) that are known to have adverse affects on productivity.
- 3) analyze a number of available solution proposals in order to eliminate such factors that are known to have adverse effects on productivity,
- 4) examine the expense related to the production cost.
- 5) compare the production costs of maintained, repaired and refurbished goods with prices of brand new products available in the market,
- 6) consider workshop staff (whether directly or indirectly or not participating in production process) in respective categories and compare findings with other private sector workshops running similar business,
- 7) provide proposals for preventing duplications between military factories in order to ensure the most economic use of, sources.

There are numerous factors, that adversely affect productivity at military workshops. This study puts forth issues detrimental to productivity and holds a comparison with statistical data of private workshops carrying out business in similar nature and character. Starting from 2003, this study puts the observes and findings obtained from field study of workshops in order to find out what can be done at those sites of concern with regard to assessing capacities of the workforce and for ensuring cost-efficient operation.

1.2 Logistics System And Military Factories

Forming an integral part of the Turkish Army Logistics System, factories pursue operations as public owned enterprises under supervision of the National Defense Ministry. Staying in the core of the system of logistics adopted by the Turkish Army, these factories render maintenance, repair and modernization services for the current weapon systems and vehicles. Also they are manufacturing spare parts for these vehicles. The National Defense Ministry has placed these factories under the direction of the Force Commands based on the functions they are performing.

Maintenance and repair operations at Land Troops Command Headquarters have been classified into 1st, 2nd, 3rd, 4th and 5th levels. The 1st, 2nd and 3rd level maintenance operations are unit-level (i.e are performed within the military unit they belong to) maintenance services. 4th and 5th levels are associated with defects that cannot be repaired through maintenance routines done by military units. There is a similar maintenance system put in place and running for the terrestrial vehicles of Marine Corps and Air Force Command Headquarters. The workshops are also responsible for repairs with respect to such parts or assemblies of any failing vehicles as engines, transmitters or radios. Once a failing part is removed out of the vehicle and replaced with a new one, the unit is returned to workshop for the conduct of further maintenance or repairs, as appropriate.

1.3 Duties And Responsibilities Of Military Factories

Military workshops are factories specialized in maintenance and repair operations. These workshops are responsible for:

- 1) Delivery and handover, storage, maintenance during storage and redistribution of ordnance Class II and IV service items being supplied,
- 2) Setting up 30 days inventory stock for field and maintenance requirements,
- 3) Refurbishment of vehicles and partial replacement of certain engines and thereafter returning them to the originating units,
- 4) Conduct of all necessary maintenance and repair services of ordnance and bulwark materials of all units to which they serve,
- 5) Carrying out the production of materials required for field maintenance,
- 6) Applying factory level maintenance and repair to heavy weapons, turreted vehicles and special-purpose wheeled vehicles at supported units,
- 7) Assigning and seconding portable teams to support units with respect to which they are liable to provide logistics support,
- 8) Carrying out analysis and statistical record keeping operations based on army oil analysis program in addition to providing minimum maintenance- repair standard and modernization operations of vehicles,
- 9) Pursuing R&D, engineering and design, production and integration efforts aimed at developing new systems for the Land Troops Command inventory,
- 10) Performing the mechanical calibrations of measuring tools and instruments of units and organizations supported,

11) Providing on-job training for the staff of units that are mainly responsible for operation of the vehicles. (Kademe Yetkileri Broşürü, 314-5)

Assignments have already been made for military units to which workshops are mainly responsible for providing logistics support.

The military factories subject the main battle weapon systems (that are, tanks, howitzers, ZMA, some wheeled tactical vehicles) of attached units to routine factory level maintenance at regular periods. This activity has commenced in the Turkish Army as of 2001 and the maintenance herein conducted is referred to as FASBAT, a Turkish abbreviation that stands for Factory Level Maintenance and Repair. FASBAT is a set of comprehensive maintenance services aimed at securing the optimized use of the features and abilities of vehicles while reducing normal wear and tear at a minimum (Lawlor 1985). During the conduct of these maintenance routines, vehicles are completely disassembled, their parts being worn and torn replaced and then reassembled. FASBAT intends to detect and shoot any potential troubles inherent with vehicles at a prior time. Given the fact that military vehicles are assigned to battlefield duties and accordingly that any failure that may occur during a battle may result in death of personnel and even in defeat, the core objective with FASBAT is to minimize the probability of failure.

1.4 Conclusion

The maintenance, repair and production activities pursued in the Army has a different status and position from those normally run by other public entities and operations as well as private sector enterprises. Since any system idling connected to a failure in a peaceful environment will eventually lead to lost of working times. Even in the worst case scenario, a job being run may be completed with a certain time delay and substantial loss. On the other hand, the situation is almost entirely different for weapon systems. Any intermittent failures or malfunctions in weapons to occur at territories of conflict and especially at operation areas would have no remedies. In case of such failures, the result is either death or series injury of the soldier.

The very high prices of weapons frequently used by both World and Turkish Armies put forth the requirement for maintenance and repair operations for States. Repair and reuse of a system or weapon rather than being subsided by a new one is unavoidable for countries with developing economies. This also applies to Turkish Army, especially its major weapon systems and vehicles (tanks, helicopters). Some certain vehicles and weapons existing in the inventory of Turkish Army are as old as 30

to 40 years and frequently and actively used on assignments, a fact that makes the requirement for maintenance and repair more stringent. Due to the already high supply costs of these vehicles and weapons, maintenance, repair and modernization functions continue with their assignments in the Turkish Army. Yet, what's important here is the need for creation of a structure that would ensure running of military factories that play the major role in recovery of weapon systems in the most cost-effective and productive way with the use of least physical resource.

This study is a field study which investigates military workshops with a investigation methodology for proper determination of concerns that are considered to have adverse effects on productivity and cost-effectiveness at factories and proposes a number of alternatives for their elimination. It also defines issues common for any military factories, that are considered detrimental to cost-effective and productive operation of military factory and puts forth suggestions for their elimination. The Study further makes a comparison of data supplied from military workshops against statistical data retrieved from private owned worksites of similar character and nature, in the conclusions drawn after a compilation of findings obtained through factory investigations.

All this effort currently being carried out is an activity aimed exclusively at improving productivity in military factories. Improving productivity through boosting the amount of output toward shortening production cost and by decreasing operation times are the core of this study.

CHAPTER 2

PRODUCTIVITY

2.1 The Concept Of Productivity

Productivity is, by definition, a concept that associates output with the inputs used to produce it. Rates obtained through division of the amounts or values of outputs obtained at the end of the production process by the amounts or values of inputs used to achieve the production are considered as indicators of the level of productivity (Lawlor 1985). The less the physical expenditures made in respect of a certain production, the more the resultant productivity would be. With an approach of the conception of economics, productivity with the narrowest meaning of the word, is the provision of highest production with some certain inputs fed so as not to leave gaps in the production process. In a wider perspective, it is the production of a given output at minimum cost. Hitting or crossing a previous output level consuming less energy or raw materials purports to a rise in productivity through source savings (Akal 2000).

It is of general assumption that more work is required with reference to past, for achieving an enhancement in productivity. However, the concept of productivity does not incorporate such a definition within its own intimacy. As productivity is defined as delivery of a certain job, within the shortest possible time and using the available resources in the most cost-efficient manner, it certainly does not relate with more work but with more rational work. To be more precise, a productivity increase is not associated with only doing jobs better but also and more importantly related with doing good jobs better (Brinkerhoff and Dressler 1990). Production of a good with no sacrifice from quality is the most important issue to address when attempting to reduce costs (National Center For Productivity and Quality of Working Life 1978).

2.2 Factors Effecting Productivity In Military Factories

In countries where labor markets are regulated with strict labor law arrangements and where interventions to such markets are frequent, private companies are the ones adversely affected from the situation. On the other hand, it becomes harder daily to terminate employment contracts of workers whose contribution to the company is either very low or non-existent, due to need for preserving the social rights of workers. This naturally deteriorates the profitability and productivity structure of companies (Türkiye

İşveren Konfederasyonu 2006). The situation shows itself as a phenomenon especially more in public entities and organizations. Ensnared with the sole and ultimate responsibility of being a social state the governments face extreme hardships in terminating the employment of poor performing, idle workers in their organizations.

The becomingly more stringent rules imposed by the State through intervening the labor markets on working times and modes, staff recruitment and discharges force enterprises to run their operations with higher costs and lower productivity. This is barely evident particularly in all public workshops, for the case of Turkey. The collaterals provided for poor or non-performing workers in the public sectors securing their employment therewith prevents the efficient use of the workforce, causing significant drops in productivity (Chinloy 1981). Military factories face the same problems as being part of this public entities and organizations chain.

Work power productivity is especially regarded as an integral part of the business errands run by small, rather manpower based business enterprises where maintenance and repair by itself represents the core field of operations instead of factories engaged with mass production. Man power has a particularly important place in military workshops. In military factories where line production evidently replaces itself with maintenance and repair routines associated with serviceable vehicles, work productivity gains a peculiar significance, by concept. It is therefore considered essential to address the workforce capacity usage ratios (man x hour) during calculations of productivity, at military workshops. However, this way it shall be possible to demonstrate how effective can the workforce be utilized as a significant input for production carried out in factories. Within the scope of this study, consideration will, by weight, be given to work force productivity.

Training and education is another significant factor that contributes to the sustainable development of productivity on a nationwide scale, by adding on to the recent levels of quality of human capital. However, education has some extremely important effects in both individual and social senses, beyond improvements in quality. Since, today, the world of business desperately demands for workers, who;

- 1) are multi-talented (handy),
- 2) can easily acquire new skills as and when required,
- 3) can learn new things in an effort to meet various demands and requirements arising throughout their career lives.

In this context, the need for training to be required by workers in connection with the tasks they are running at workshops also tends to increase. Nowadays, companies must absolutely have suitably trained and well qualified workforce to maximize their exploitation of contemporary technologies if not, let alone for gaining a sustainable line of success, full of achievements. Only this way, it is appraised that, an improvement can be attained for work productivity at workshops, leading to better work both in quantitative and qualitative terms. An equivalent improvement in the quality of knowledge and experience possessed by workers at military workshops would entail to a steady rising workforce productivity due to shortened troubleshooting and repair times of vehicles.

There is a significant correlation between the organizational structures and productivities of companies. Dense hierarchical structure having a centralized decision-taking mechanism impedes effective management, innovation and transmutation with its static, stringent character that cannot easily adapt to changes. Structures having less hierarchical levels, clearer and more participating entails to faster and more effective flow of information, faster communication and flexibility in business processes and fosters innovative ideas cutting costs shorter. Nevertheless, military workshops are military factories dominated by military hierarchy. Therefore, to speak of a structure busied with less or simplified procedures and a flexible system is yet impossible to speak out, so far. The factories do not have much opportunities to take initiatives of their own due to their pursuance of work under a discrete command line system, attributable to their very military nature.

Flexible organizations is proven to boost work and capital productivity with integration of creative thought taking due account of ever-changing conditions to each and every phase of the production process and minimization of resource expenditure. They eliminate many layers of mid level management which are dysfunctional from the aspect of informational flows and prevents overspecialization and segmentation practices by defining multidimensional work responsibilities and exploiting professional alteration (Prokopenko 1987). It is especially believed that this concern alone is a phenomenon that required more recognition and adoption by public sector workshops. The very existence of a plenitude of intermediate levels and the requirement for obtaining many approvals from the bottom to the top of the organization slows the normal running of procedures and also causes workers get crushed under the heavy

bureaucratic bulks. Therefore, it is considered extremely beneficial, for military factories, to pursue efforts toward setting flexible organizations in place and running. However, it is also acknowledged that the implementation of such organizational structuring within the current structuring of military poses some tough challenges.

2.3 Conclusion

The concept of productivity has a significant meaning for both private and public sector entities and organizations, in the pace of the high competitive environment of the day. The saving measures enforced within the scope of arrangements concluded with International Monetary Foundation (IMF), in combination with policies destined to cut public expenditures to a sustainable minimum caused the concept of productivity gain more importance than before, in the recent years. At this extent, efforts aimed at improving the productivity which are implemented with full scope at private sector premises which have gained a corporate identity has gradually evolved to the core of concern also for public entities and organizations in the course of accession to the European Community. Within the process of integration with the EU, more public entities and organizations took major steps toward rectification of their readily humble and unproductive structuring in the recent years. The military factories are the examples of such government owned huge organizations.

CHAPTER 3

PURPOSE, SCOPE AND METHODOLOGY OF STUDY

3.1 Purpose

This study, designed and executed as a field study at military factories starting the year 2003 is mainly investigates and assesses military workshops in terms of for manpower productivity and proposes thence determine measures for improving productivity while reducing costs.

3.2 Scope

This study cover site investigations performed at one to two weeks intervals at a total of 22 workshops owned and operated by the Turkish Army, selected based on such criteria as the size of premises and assignments already carried out. Within the context of investigations made, conclusions are drawn, covering such issues as:

- 1) Improving productivity of the workforce,
- 2) Cutting short of the running costs,
- 3) Setting out standard operation times,
- 4) Staff recruitment policies,
- 5) Cost accounting practices,
- 6) Cheaper supply of products normally produced at workshops with high costs

from the market.

3.3 Definitions

For the purpose of this study, the following terms used in the context hereof shall have the meanings assigned to them nearby:

Workshop : A functional unit in which workers are organized with material and immaterial aspects to produce goods or services.

Employer's Representative : Any person or body duly authorized to manage the entire workshop on behalf of the employer.

Worker : Any real person employed in a job position against charge basing on the terms and conditions of a service contract.

Civil Servant : Any personnel employed for tasks falling outside of those dedicated to production, subject to the provisions of the Law No 657 for Civil Servants,

Officer/Junior officer : Any military staff employed at military workshops as subject to the Internal Services Act generally at supervisor positions. It is also possible that a certain part of junior officers can be employed at workshops as manpower depending on their areas of specialization. This varies from one worksite to another.

Direct labor : The labor power represented by staff employed at a workshop for carrying out the production of goods or services forming the main engagement of the site. The term also purports the labor of staff members assuming active duties and perform physical work at or in relation to any maintenance, repair, refurbishment and/or production activities carried out at the workshop as part of main engagement. Professional categories or classifications written on relevant service arrangements concluded with staff has no relevance with determination of direct labor. The important thing is the job done by worker.

Indirect labor directly participating production: The labor employed for performance of the main engagement not within the status of a “direct worker” in performance of such activities but, instead, required for performance of maintenance, repair, refurbishment and production activities in due course of business.

Indirect labor not directly participating production: Any labor assigned for tasks having indirect relevance with the main engagement as may be required for such positions as water, cook, dish handler, driver, cleaner or office worker depending on assignment.

Labor capacity : The exact time of work within which a staff employed for the production of a good or service within the main activities of a workshop is allowed to perform work and render efforts pursuant to applicable laws, statutes, collective bargaining agreements and regulations.

Standard time : Standard time, is the time in which a worker with normal capacity can complete a certain work under certain conditions and which is established in accordance with the rules of work study (Barnes 1980).

Process time : Time that is determined statistically based on laboring times used commonly for maintenance and repair activities and used in the past for similar processes.

3.4 Study Subjects And Method Of Investigation

3.4.1 Study Subjects

During the investigations made at military workshops to assess man power productivity,

1) standard laboring times used for production of goods and services are checked for compliance with the time requirements for performance of the work,

2) man power capacity usage ratios are worked out on a per workshop basis, for worksites,

3) the costs of goods and services of civilian character (which can easily be supplied from private sector enterprises) to the workshop are compared to the market rates of their new and unused equivalents (prices determined for products of same character through market research),

4) cost-effectiveness analyses are performed for staff employed at worker status in connection with works to be rendered by mostly civil servants in indirect activities and the savings to derive from the alternative employment of officials are put forth,

5) production costs of all such products and services that has non-specific nature and can easily be produced within the existing means and capacities of the private sector are compared with its market prices,

6) reviews are made on production plannes adopted by the worksites to allow for subsequent comparisons of existing manpower with the anticipated workload,

7) detailed research is performed on completion status of jobs already taken by the worksite on production schedule at the end of the year and on the causes of the failure ,

8) workers and officials at the workshops and staff actively employed for these positions are examined to accurately assess;

a. whether workers are employed at positions for civil servants,

b. whether workers which should originally be employed for production basing on their professional occupation and qualifications are assigned to office errands and other indirect activities,

c. The assignment of a worker administrator, compliance with the effective use of manpower based on the current Collective Bargaining agreements and implications on workmanship costs.

9) the cost accounting practices adopted and rotating capital based charge payment accounting procedures of worksites are examined to assess whether all related expense items are properly and completely reflected under relevant accounts.

10) the number of staff directly or indirectly or not participating production at workshops are determined in percentage and duties.

3.4.2 Methodology Followed For Workshop Investigations

Workshop investigations took place in two separate stages, namely the theoretical stage based on documentation available at the workshop headquarters and the practical stage based on actual conditions at the factories.

3.4.2.1 Annual Production Plans Of The Worksite

The ultimate objective of production planning and control is to ensure that job constraints are effectively avoided, the worksites are run with maximum capacities and that personnel, material, machinery and equipment as well as all other available means are fully and most efficiently exploited.

Production planning is precisely a study aimed at identification of what to perform, where, how and using how much of the available sources (i.e. in terms of labor, raw materials etc.), in which quantities and time. In this regard, the following factors are investigated in this study;

1) The jobs that were included in the annual production plans and anticipated for production by the worksite and their completion status at the end of year and if not the causes of this delay,

2) The degree and extent of compliance of the production plan made with the labor capacity of the worksite,

3) The total working times spent for maintenance, repair or production efforts by the worksite outside the production plan and the ratio of these times to overall labor capacity,

4) The standard times taken as basis for setting up of annual production plans and procedures run for determining procedure delivery times and the effects of developments in the machine inventories or workflows of the worksite on process times.

5) Reappointment of workers employed at workshops or units where there are idle capacities, at workshops in need of manpower,

6) Measures taken for the prevention of problems that may arise due to both inadequate workforce and delays in supply of materials.

3.4.2.2 Study Of Standard Times And Process Times

1) Methods adopted and used in the industry for measurement of work are led by time study. Ideally, worksites should perform especially their production activities in predetermined standard timeframes. In order for calculating the standard time, the following requirements should be met. Only this way it shall become possible to argue about a healthy and reproducible measurement.

a. fitting of worker to the work and work to the worker,

b. employment of a qualified worker having acquired all knowledge and education with respect to work,

c. work according to a certain methodology,

d. performance of work by the worker performing standard

work deviating from a properly calculated standard time and job orders prepared basing thereon is a symbol of unproductive (inefficient) work.

2) There is the actual need for determination of process times in a realistic manner for such tasks as maintenance and repairs, refurbishment and modification of all sorts of weapons, vehicles and instruments of war and for close monitoring of such times as used by the workshops. Accordingly the labor times required for activities of the kind, depending on the specific character of the operation being carried out should be determined basing on studies involving statistical data and time study rules applicable to the maintenance, repair and refurbishment activities conducted during the previous terms and permanently recorded thereafter.

3) Both the standard times calculated for production activities and process times designated for maintenance and repair operations should;

- a. control the work performance of the personnel at the workshop,
- b. provide a guidance for workers on how to pursue work with full capacity and without causing any work casualties,
- c. be at an appropriate level required for the performance of work,
- d. in such a way as not to cause hidden idled workforce.

4) No change should be expected or allowed in standard times set for goods under production unless a change is made to the raw materials, machinery or equipment used to produce the good or qualifications of the workers assigned to carry out the production tasks or in the process workflows. A comprehensive review has been made related to the points mentioned above during the investigations held at worksites. In the investigation the following factors are considered;

- a. the standard or process times allocated for production, maintenance, repair and refurbishment activities included in the production schedules of the worksite for the most recent biannual period and their completion statuses,
- b. efforts rendered for development of the standard times for production activities or process times for maintenance, repair and refurbishment activities and whether or not such developments have properly been reflected on job orders given to workshops.

The data is based on detailed reviews of the worksite records and studies carried out according to time study rules at workshops for compliance of the standard/process times with times required for the fulfillment of the job at workshops, which was followed by a comparison of results.

3.4.2.3 Determining The Labor Capacity And Usage Ratio

1) The labor (man power) capacity at military workshops is the sum of working times permissible under statutes, laws, collective bargaining agreements and regulations for the production of goods or services. In order to be able to calculate the labor capacities of workshops, the lost working times have been recorded as specified in Table 3.1 and total labor loss has been subtracted from the total labor capacity to obtain the net labor capacity. Table 3.2 shows the total times allocated to educational activities carried out at the worksite. The following tables are drawn up for use in worksite investigations

to determine the main causes of loss in labor and the amount of labor lost at worksites. Data have been used to calculate the net amount of labor of the worksite under inspection.

AT THE WORKSITE OF COMMAND/ADMINISTRATION

TOTAL LOSS OF LABOR DURING THE TERM

MANPOWER LOSSES	AMOUNT OF LOSS (Man x hour)		
	DIRECT PARTICIPATION IN PRODUCTION		INDIRECT WORKERS NOT DIRECTLY PARTICIPATING PRODUCTION
	DIRECT WORKERS	INDIRECT WORKERS	
TOTAL OFF TIMES			
TOTAL OF PAID EXCUSED LEAVES			
TOTAL OF EXCUSED LEAVES			
TIME LOST TO PERIODIC EXAMINATIONS			
.....			
T O T A L			

Table 3.1 : Distribution and amount of labor losses

EDUCATIONAL ACTIVITIES DURING THE TERM

PERSONNEL UNDERGOING EDUCATION					
DIRECT PARTICIPATION TO PRODUCTION				INDIRECT WORKERS NOT DIRECTLY PARTICIPATING PRODUCTION	
DIRECT WORKERS		INDIRECT WORKERS			
NO.	TIME	NO.	TIME	NO.	TIME
	(Man x Hour)		(Man x Hour)		(Man x Hour)

Table 3.2 : Amount of educational activities performed at the worksite per man x hour

2) The labor capacity usage ratio has then been established per workshop through proportioning of, the aggregate total of working times spent to job orders completed as well as not completed due to numerous any reasons during the annual period (starting January 1st and ending December 31st) within the framework of maintenance, repair, refurbishment or production activities carried out at the workshops to the net labor capacity of the workshop. In order to be able to assess the labor capacities of workshops;

a. On a per workshop basis and for staff employed as direct labor the following have been taken into account to establish the annual labor capacities;

(1) General attendance per diem,
(2) Work extras plus off-time work throughout the year,
(3) All kinds of leaves and permissions granted during the year and other working times lost to such reasons as doctor visits, periodical checkups and etc. (a detailed description of which is given in Tables 3.1 and 3.2);

b. Working times spent to job orders released during the last two years, between Jan 1st and Dec 31st (including such working times spent in the particular years of concern for job orders left incomplete transferred to the then coming financial term for whatsoever reasons).

3) Labor calculations of the worksite has duly taken into account the daily net working times. Within the context, 30-minute breaks granted to workers during working hours have been subtracted from a daily total of 8.5 hours. Comparisons have been made between work carried out per each workshop with the net labor capacity to obtain labor capacity usage rates. All efforts have been based on the presumption that the process and standard times determined and implemented by workshops had been calculated correctly. The net workshop labor capacity calculation included staff used directly for production depending on business errands run by workers at workshops. Where workers are accompanied by junior officers or professional sergeants in production tasks, the workshop labor capacity calculations also took due account of these personnel members.

Table 3.3 shows times of jobs carried out by workshops on an annual basis and per workshop labor capacities obtained after the detailed investigation performed during the study.

AT THE WORKSITE OF COMMAND/ADMINISTRATION MAN POWER CAPACITY USAGE

WORKSHOP / UNIT	TERM				TERM			
	No. of Direct Workers	Labor Capacity	Capacity Used	Capacity Usage Ratio	No. of Direct Workers	Labor Capacity	Capacity Used	Capacity Usage Ratio
		(A x S)	(A x S)	(%)		(A x S)	(A x S)	(%)
<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
TOTAL								

- A* : This means the other servicing functions employing staff in worker status and workshops carrying out maintenance, repair and/ or production activities within the core scope of business of the workshop forming subject of productivity investigation.
- B* : Shows the total number of staff employed in direct worker status at the workshop or unit specified in the foregoing column.
- C* : Found through multiplying the total number of working days within the year of concern (I) by number of workers (II) and daily working times (III) ((I x II x III). In case of overwork during the year of concern, the extra times caused thereby are added on to the labor capacity calculation. Workers assumed to perform work over a working time of 7.5 hours are also taken to this calculation.
- D* : The total of working times spent to activities rendered at the workshop during the year of concern for maintenance, repair, refurbishment and / or production jobs. (Determined from the table shown in ANNEX- A).
- E* : The labor capacity usage ratio of the workshop ($[D \div C] \times 100$).

Table 3.3. Man Power Capacity Usage

3.4.2.4 Analysis Of Costs For Maintenance, Repair And Production Activities

1) The accounting procedures adopted for recognition of expenses and the fact whether or not the accounting procedures adopted sufficiently cover all expenses made during the year of concern by workshops for each of;

- a. direct labor, indirect labor
- b. production overheads (managerial),
- c. depreciation,
- d. supplies,

have been examined, in addition to the current cost accounting practices.

2) Costs of goods maintained, repaired or produced to the workshop have been established during the investigations held on workshops.

3) The avoidance of production of goods or services readily available at the market has been adopted basic logistic system approach and to ensure cost-efficient running of the workshops, comparisons have been held between;

- a. the workshop costs of goods for which maintenance, repair and refurbishment procedures are run with the new buy values of the same,
- b. the workshop costs of produced goods of civilian character with applicable market sales rates by which, we have tried to demonstrate the importance in terms of cost-effectiveness of the option of reassigning workers employed in public sector for high worker wages to works such as weapon maintenance and production, which could not be outsourced easily from the market place.

Table 3.4 shows the formulations used for calculation of revolving fund activities hourly rates and workshop hourly work used as basis for calculation of hourly labor costs and cost of production. The table is also intended to form a listing of all expenses (without material) made during the year by the factory showing their whereabouts. Formulation has been based on a method of calculation which takes all costs made by the worksite, which was used throughout this study.

A-Time of work during..... = ... Man x Hour
 B- Direct labor hours during = ... Man x Hour
 C- Indirect labor hours during = ... Man x Hour

EXPENSES REALIZED BETWEEN JAN 1 ST AND DEC 31 ST OF TERM.....	
Net wage	= YTL..
Overwork charge	= YTL..
Weekend and Holiday work charge	= YTL..
Annual paid leave charge	= YTL..
Severance Liability payments	= YTL..
Pay in lieu of notice	= YTL..
Bonus payments (acc. to laws and contracts)	= YTL..
Sea Trial	= YTL..
Employer's insurance liability contribution (% ...)	= YTL..
Employer's unemployment coverage liability premium (%...)	= YTL..
Overnight work extra	= YTL..
Health expenses (periodic and porter checks)	= YTL..
Food allowance (both in kind and specie)	= YTL..
Maternity-Death-Marriage allowances	= YTL..
Social allowances	= YTL..
Shoe grants	= YTL..
Health-Hazardous Work compensation	= YTL..
Productivity Encouraging Premium (% ...)	= YTL..
Shift premium (% ...)	= YTL..
Clothing and towel allowance	= YTL..
Executive premiums	= YTL..
Tip ups to engineer (BS) and master engineer (MBS) wages (%...-%...)	= YTL..
Service vehicles	= YTL..
Total of other payments made for permanent staff	= YTL..
D- TOTAL LABOR EXPENSES	= YTL..
Payments for officers, junior officers and civil servants *(Z)	= YTL..
Operating expenses (power, water, heating fuel, fuel oil, stationeries and etc.)	= YTL..
Basic facility expenses	= YTL..
Command HQ expenses	= YTL..
E- GENERAL EXPENSES	= YTL..
F- DEPRECIATION COSTS	= YTL..
G- GRAND TOTAL	= YTL..

* Z = Denotes the cost of civil servants, officers and junior offices indirectly participating the production process. Derived from the total costs of officers, junior officers and civil servants.

Table 3.4 : Total costs of the Workshop excluding raw material and semi-finished product costs and their distribution

Formulation:

- I** = (No. of Workers subject to a daily total working time of 7,5) x (6.75)*
- II** = (No. of Workers subject to a daily total working time of 8,5) x (7.75)*
- III** = The total number of working days during..... (calculation includes inoperable times due to such reasons as permitted leaves, doctor visits and etc. applied for by the workers during workdays.)
- A** = [(I + II) x III]+(Total time of overwork)
(Yearly total working times of direct and indirect workers participating production and indirect workers not participating in production and civil servants, officers and junior offices indirectly engaged with production)
- B** = Product of number of working days within the year (III) multiplied by the daily working times (distinguishing between 7,5 and 8,5 hours of work). It includes overwork, if any, performed by direct workers within the year.
- C** = A – B
(Yearly total working times of indirect staff)
- Z** = Cost of civil servants, officers & j. officers indirectly engaged with production.
- P** = Number of indirect workers not participating production at the workshop
- R** = Number of indirect personnel participating production at the workshop
- X** = P / R (Ratio of Number of indirect, non-producing workers to number of indirect workers)
- [1]** = (B ÷ A) x 100
(Ratio of indirect working times to total working time)
- [2]** = (C ÷ A) x 100
(Ratio of indirect working time to total working time)
- [3]** = C x X
(Indirect non-production working time)
- DHLC** = (D ÷ A) x [1]
(DHLC : Direct Hourly Labor Cost of the workshop)
- IHLC** = ((D+Z) ÷ A) x [2]
(BSEİM : Indirect Hourly Labor Cost of the workshop)
- INPLC1** = DHLC1 x X
(INPLC1 :Indirect Non-Production Labor Cost of the workshop)
- HOC** = (E-Z)+INPLC1 ÷ B
(BSGİM: Hourly Overhead Cost of the workshop)
- HDC** = F ÷ B
(HDC: Hourly depreciation cost of the workshop)

IWC (Individual Workshop Cost) = DHLC+IHLC+HOC+HDC

* Direct labor time has been calculated basing on the actual posts run rather than professional categories written on service arrangements.

** The working time has been calculated less the 30 minutes total break (15 min before and after the noon) facilitated to workers and the 15 minutes cleaning break.

*** Determinations as to which functioning civil servants, military officers and junior officers to be treated in the category of indirect production staff have been made for each workshop.

Separate calculations have been made for each of the direct, indirect labor, depreciation and overhead costs relevant to the workshops. The hourly labor costs of the workshops have then been found using the formulation above.

3.4.2.5 Labor Effectiveness

1) Focus has been drawn on assessing;

a. whether activities already performed at the workshops with respect to maintenance, repair and production tasks can be supplied from the market place,

b. how much of the available labor capacity is used for works that can be ordered from the market and for works that cannot be ordered from the market.

Furthermore, investigations have been made for the content and costs of such activities, that are still being fulfilled by workshops through outsourcing of services from the market place. The cost of goods or services supplied from the market through service procurements was then compared to the workshop costs of the same goods or services.

2) Staff employed in worker status have been divided into three categories as direct production workers, indirect production workers and indirect non-production workers for evaluation purposes of this study. (For investigations to take place at workshops attended by technician class junior officers and professional NCOs and civil servants assigned / appointed to maintenance, repair or production tasks carried out within the core operations of the workshop, such staff members have been treated as direct workers.) During the aforesaid examinations, the following determinations have been made, which were then used for comparisons with the private sector. These are

a. ratio of the number of workers employed at the workshop to total number of staff,

b. ratio of number of workers used for the main business operations (in production) of the workshop (that is to include both direct and indirect labor employed for production purposes) to total number of staff,

c. ratio of the number of direct workers used for the core business operations of the workshop to total number of staff,

d. ratio of number of staff used for production in worker status to the total number of workers,

e. ratio of direct production staff to total number of workers,

f. ratio of the number of direct workers used for the production operations of the workshop to the number of workers.

Private sector mean values required for distribution of number of workers have been taken from statistical data published annually by the Metal Industry Employers' Trade Union, which incorporate all workers employed in the field of metal industry, where work, similar both in scope and nature to those performed by the workshops in concern, are carried on.

3) Pursuant to the employment policies set by Force Commands;

a. those performing identical work at the same workshop should bear identical status,

b. appointment of workers to such office services as document recording, typing etc. that are originally presumed to be handled by civil servants should be avoided.

c. no new recruitment or reappointment of workers should be allowed to fill positions becoming vacant on resignation of workers while holding office works,

d. of the workers employed with indirect labor status, those available for employment in direct worker status based on their business and occupation branches as well as academic qualifications should be assigned exclusively to production tasks. In this context, investigations have been made with respect to the organizational positions fulfilled by and positional compliances based on professional qualities possessed of workers employed at the factories.

4) During the productivity audits of the workshops, such matters as;

a. opportunities of cooperation for maintenance, repair, refurbishment and production activities performed at military workshops and whether measures have been taken to prevent duplications,

b. the chance of gathering supplies of exported materials used for maintenance, repair, refurbishment and production activities from domestic markets,

c.compliance of working hours for staff employed in worker status with effective law provisions, have been assessed for the aspects of productivity. (Askeri İş Yerleri İş Gücü Verimliliği İnceleme Kılavuzu, 380-1)

3.5 Conclusion

This study performed at military factories with the sole aim to reveal the current status in respect of labor productivity and cost-effectiveness of workers at workshops has been carried out to cover all of the aforementioned points and according to the specified calculation procedures. Thereby, points considered to be eliminated and to be implemented within its scope have been presented for each individual factory investigated. It is of common belief that a combined evaluation of the suggestions drawn herein for individual workshops should make the military factories, more cost-effective and productive in their day-to-day operations. Chapter four draws the core attention on a variety of important points, retrieved from the findings of investigations held on each individual factory subjected to this study. All other points covered by this study may be furnished to interested authorities on demand with all relevant data and information. Chapters five, six, seven and eight go into concerns that appear to have adverse effects on productivity in a majority of workshops, analyzed in chapter four. Based on the findings on chapter four, this study provide a number of proposals as to their solution of the same, in a comparative approach with private sector workshops.

CHAPTER 4

ANALYSIS OF WORKSITES AND MAJOR FINDINGS

4.1 3rd Main Maintenance Command Worksite (Ankara)

Operations of the workshop include;

- 1) Engine, appliance and weapon refurbishments,
- 2) Maintenance and repair of and production of spares for weapons falling within authority frames, and
- 3) Battery, dye, rubber coating, rubber and plastic spares, oxygen, acetylene and nitrogen gas production.

Investigations covering this workshop took place during November 12 - December 10, 2003.

4.1.1 Findings About The Worksite

1) The labor capacity usage ratio of the workshop being investigated for the term 2003 has been established to be 63.7%, due to delays in the supply of raw materials and a variety of ongoing modernization efforts. Assessments made with consideration of annual labor capacity of the workshop and jobs carried out by workshops, as described in Chapter 3 hereof. The 36.3% capacity is idle. The existing labor capacity of the workshop could not been used effectively, particularly due to concurrent delays in the supply of materials. For improving its labor capacity usage ratio, the factory should increase its current levels of spares inventory. Although it is undesirable to operate with stocks for contemporary systems of production, this should preferably provide a simple approach to resolution of the humble and entangled course of bureaucratic procedures common for any public entity. While cash invested on raw materials and semi-products can be used for production purposes sooner or later, there is not any remedy for the laboring times lost to idling.

2) Reviews held at the battery production unit of the workshop revealed that this premise was regularly attended by 82 workers as of the date and time of inspection, to deliver around 65.000 battery units per annum. Currently, 83% (i.e. 68 workers) of the crew were found to be temporarily assigned from other departments. The very reason that underlies the preference of employing workers with qualifications relating to

a variety of business and occupational categories is that workers assuming active duty in the functional unit can further be appointed to positions at other functional units due to clinical reports somehow they receive and submit for occupational diseases quarterly. The positions vacated by these personnel are filled by workers reassigned from other workshops.

Despite an anticipated total production of 58.100 batteries of various types on schedule drawn up for the term 2003, findings revealed that only a 85.6% of this target could have been achieved, due to the times lost in periodic health checkups of workers and the time needed for orientation of new workers are assigned to positions vacated by resident workers on receiving an excuse due to occupational diseases. Meanwhile, the labor capacity usage of the workshop was calculated to be at 63.2 percent. This eventually caused a drawback in labor capacity usage below the anticipated levels in the annual schedule due to workers' orientation needs and delays in supply of materials.

3) As the findings of periodical checks clearly showed, of the 97 workers named on reports of the Occupational Diseases Hospital as people that cannot be employed in their main professions, only 39% (38 workers) were assigned to workshops where they can be employed as direct or indirect labor in their areas of specialization. The remaining 59 on the other hand were assigned to non-production and office tasks normally should be attended by civil servants.

Reassignment of workers causes;

- a. escalations in overhead costs of the workshop,
- b. increase in idling of labor,
- c. the tendency to seek for and obtain "occupationally diseased" reports through a number of illegal and improper ways of personnel assigned particularly to battery production.

4) The calculations made at the workshop drew the conclusion that the sales price of batteries currently produced are close to the market rates appraised for private sector productions of similar kind and nature. The workshop costs and applicable market rates are as shown in Table 4.1. The battery production costs indicated herein are exclusive of costs of workers seconded to other functional departments (especially as non - production workforce) due to an occupational disease and the indemnities

charged by court impositions made with respect to claims filed against the employer by workers and Social Security Administration Prosecutors.

Product Name		Raw Material Costs (per unit) (TL.)	Cost of Direct Labor (TL.)	Overhead costs (TL.)	Production Cost (TL.)	Market price (TL.)
BATTERY	12 V 45 AH	32.280.516	9.038.484	16.670.907	57.989.907	59.050.000
	12 V 60 AH	37.089.459	9.505.696	19.404.461	65.999.616	72.100.000
	12 V 95 AH	50.796.343	19.224.576	42.518.276	112.539.195	121.150.000
	12 V 100 AH	50.618.705	16.505.643	36.317.402	103.441.750	121.150.000
	12 V 105 AH	47.522.887	10.095.872	42.382.385	100.001.144	121.150.000
	12 V 200 AH	55.914.296	28.325.284	58.858.252	143.097.832	231.150.000

Table 4.1 : Workshop costs versus market sales rates of batteries produced at the workshop

Despite a battery production cost aligned to market sales rates, it is considered essential for cost-effectiveness to discontinue production of batteries at the workshop and outsource the supply from the market because of;

- a. favorable discounts can be settled in market rates on mass purchasing orders,
- b. workers enter into idled worker status due to occupational diseases,
- c. indemnities forcibly paid due to Social Security Administration's having recourse to the employer for costs incurred on its part for due treatment of these persons,
- d. indemnities ruled subsequent to court action for claims brought by workers of occupational diseases caught,
- e. hardships encountered in the supply of labor to employ at workshop, due to growing bulks of occupational disease reports,
- f. diversified range of battery products available in the market place.

4.2 1st Maintenance Facility Command Worksite (Ankara)

This workshop is assigned for completion of such tasks as;

- 1) Provision of assistance to various units and troops on maintenance, repair, servicing.
- 2) Carrying out factory level maintenance and repairs (FASBAT) for main combat weapons and vehicles of ordnance Class,

3) Performing the filtering and removal of vehicles and weapons desired to be put off the record, and

4) Refurbishing engine and appliance parts reporting failure.

The inspections held at the workshop were conducted during December 22-31, 2003.

4.2.1 Findings About The Worksite

1) Fulfilling maintenance and refurbishment tasks of light arms, the workshop has means and capabilities to fix barrel failures referred to it, despite which fact, it prefers to redirect failed barrel deliveries coming to it to the 3rd Central Maintenance Facility Workshop (which purchases barrels as ready-to-use from MKEK and thus replaces the old barrels with new ones). In this case, two factories work for a single – pass job, which in turn causes unnecessary use of extra labor for inspection, acceptance and disassembly of weapons. It is therefore considered essential for the sake of improving labor productivity, to pledge assignments involving barrel exchange for firearms to the factory, in order to help minimize loss of labor.

4.3 Naval Sewing House Command Facility (Ankara)

The workshop is currently engaged with;

1) The production of clothes required via orders by the force command,

2) Maintenance and repairs of textiles equipment installed and operated in the force command.

The inspections covering this worksite took place during November 3-11, 2003.

4.3.1 Findings About The Worksite

1) Inspections carried out at the worksite revealed that the clothing demand of the Naval Forces Command Headquarters for the term 2003 have been broken down on schedule taking due account of calculated standard times and that productions were underway according to the timetables drawn for production. A review of the in-term production efforts by the workshop through its annual net labor capacity that only 78% of the total available laboring capacity could have been utilized. The remaining labor were idled. Findings also revealed that a certain part of the labor capacity used by the worksite have been dedicated to production of cloths to meet the requirements of the Land Forces Command according to a letter agreement signed in time of delivery and handover of the Sewing House facility to the Naval Forces Command. Given the fact that the protocol mentioned above deed would expire as at the end of 2003, an 18%

increase have been presumed in the total idled labor at the said facility. Therefore, it is considered to be the most appropriate action for an effective utilization of existing labor to;

a. extend the validity of the letter agreement signed with the Land Forces Command Headquarters,

b. commence studies on optimized use of the existing labor at other commands.

2) Calculations have been made to determine the workshop production costs of the cloth made at the Sewing house. Due to high labor and production overhead costs, the final prices of goods throughput by the facility remain higher than similar productions carried out by private sector industries. For instance, computations yielded a production cost of TL 93 million for a trench coat, based on prices effective as of January, 2003. With consideration of the rises in raw materials and worker wages, the cost of production of a trench coat at a workshop reveals to be some 70 to 35% higher, at the current. In light of these findings, it is appraised to be wiser to supply products that require no specialization and are currently available at the market place for affordable prices from the market place. (i.e. the trench coat can be supplied from the local market for around 50% cheaper)

4.4 1st Sewing House Command Worksite (İstanbul)

The workshop is currently engaged with;

- 1) The production of clothes for the Land Forces Command,
- 2) Preparation of proposed cloth production lists,
- 3) Maintenance and repairs on textile machinery installed and operated at the command.

The inspections covering this workshop took place during Jan 18-31, 2004.

4.4.1 Findings About The Worksite

1) Inspections carried out at the worksite revealed that the operation managed to realize its production schedule by 61% for the term 2003 with a production related labor capacity usage of 87%. Moreover, it has been found that workers were encouraged to decelerate performance and the standart times set for specific products are not used due to delays frequent with supply of raw and semi-produced materials. Due to the inability to timely deliver the quantities of fabric required for fulfillment of the production schedule, workers who were idle were assigned tasks in the production of

such products that can be obtained cheaper from the market such as waiter garments, table cloths, napkins etc. The main purpose of this is to avoid idling. This practice prevented the idling of workers due to lack of raw materials to go on with main production efforts, to some extent. Due to the decelerated performance of workers, the capacity usage of the worksite seemed to be above the real capacity usage. Furthermore, off-schedule jobs were performed due to the delays in supply of raw materials, which truly resulted in a compliance with the production schedule at 61%. Capacity usage data of the worksite in consideration are shown in Table 4.2 and graphically presented in graph 4.1

WORKSHOP	NUMBER OF EMPLOYEES	PRODUCTION CAPACITY (Man*Hour)	FOR TERM 2003		
			TIME SPENT TO PRODUCTION (Man*Hour)	IDLED PRODUCTION TIME (Man*Hour)	CAPACITY USAGE RATE
CLOTH PROD. WORKSHOP	410	728.365	685.892	42.473	%94,2
SERVANT UNIFORM PR. WS	618	1.097.877	887.911	209.966	%80,9
CAP PRODUCTION WORKSHOP	29	51.519	51.015	504	%99,0
EMBROIDERY WORKSHOP	15	26.648	26.052	596	%97,8
T O T A L	1.072	1.904.408	1.650.870	253.538	%87

Table 4.2 : Labor capacity usage status at the worksite

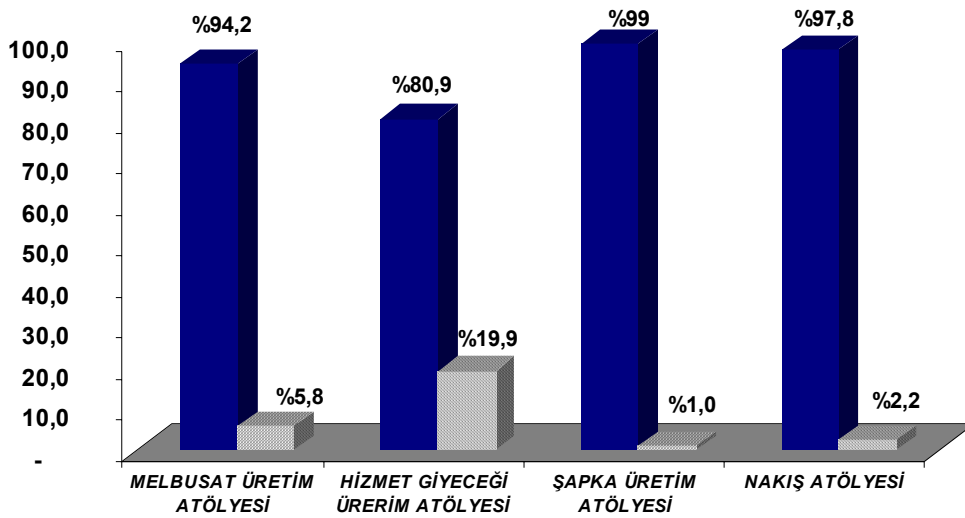


Figure 4.1 : Labor capacity usage rate of the worksite on a per workshop basis

2) At the current, tubular and standard fabric cutting operations are made both automatically using pc-controlled workbenches and manually in the workshop. The site has three pc-controlled fabric cutting equipment items in place and running. Calculations made revealed that a saving of 37 workers from the labor force normally

assigned to perform tubular and standard cutting operations is possible by the preferred use of these pc-controlled auto-cutter benches to meet the overall fabric cutting requirements of the site. This finding alone represents a potential saving of 81.400 YTL. per month, a sum assessed otherwise to be payable to 37 workers, building on the assumption that a worker would roughly cost a 2.200 YTL. per month to the government. According to examinations done in factories, with an average operation time of 5 hours a day (which means 209 days for term 2003), the machinery would be well capable of carrying out the fabric cutting procedures required by the site for all kinds of goods to be delivered. Finally speaking, a more efficient use of the pc-controlled fabric cutting equipment employed at the site combined with redirection of the labor already employed at manual cutting section to other segments of the production line would essentially provide significant yields, in terms of savings from labor.

4.5 Air Force Command 1st Air Servicing & Maintenance Facility (Eskişehir)

The workshop is mainly engaged with,

- 1) Carrying out the factory level maintenance, repair, refurbishment, testing and calibration services,
- 2) Producing all necessary parts and components,
- 3) Assigning portable teams to handle the maintenance, repair, refurbishment and calibration procedures which cannot be performed by Troops,
- 4) Rendering development, modification and modernization activities.

The inspections covering this workshop took place during Feb 23rd – March 5th, 2004.

4.5.1 Findings About The Worksite

1) 55 workers are present at the workshop whom are assigned to tasks far outside the categories of profession for which they are hired particularly. Consequently, misplacement of this workforce at organizational functions outside or irrelevant to their job and professional skills causes not only a substantial drop in laboring capacity but also a relative boost in the operational overheads of the worksite. Table 4.3 below shows workers employed for tasks irrelevant to the competencies and professional skills for which they are hired.

Function of Employment	No. of Workers	Profession
Catering	1 (x)	Aircraft power systems Mechanic
	1	PC Operator
	1 (x)	Hydraulics fitter and repairer
Supervisory	2 (x)	Cutter Operator
	1	Aircraft cabin pressurizing specialist
	1	Technical Graphics Designer
Performance and Coordination	1	Upholsterer
Staffing Department	1 (x)	Cutter Operator
Logistics Operations and Training Department	1	Aircraft Frame Maintainer – Repairer
Servicing Group Command	1 (x)	Heating Systems Mechanic
	1	Measuring Equip. Repairer
	1	Aircraft accessories, installations and sundries handler
Planning and Schedules Dept. Training Service	1	Aircraft Assembler
	1 (x)	Aircraft accessories, installations and sundries handler
Planning and Schedules Dept. Operational Division	1	Metal Worker (Blacksmith)
Planning and Schedules Dept. Report Analyses and Coordination Division	1 (x)	Aviation electronics mechanic
Technical Management Department Operational Division	1 (x)	Leveler
Production Workshops Department Operational Division	1	Aircraft fire control and surveillance systems mechanic
	1	Aircraft seat and ejector systems mechanic
	1	Electrician
	1 (x)	Leveler
Aircraft Maintenance - FASBAT Dept. Operational Division	1	Aircraft frame maintainer and repairer
	1	Aircraft Chemicals Handler and Mechanical Parts Cleaner
	1	Parts Cleaner

	2	Aircraft frame maintainer and repairer
Aircraft Maintenance - FASBAT Dept Supply Planning Service	1 (x)	Aircraft Boarding Systems Repairer
Aircraft Maintenance - FASBAT Dept Supply Planning Service	1 (x)	Flight control systems mechanic
Aircraft Maintenance - FASBAT Dept Supply Control Service	1 (x)	Aircraft power systems mechanic
	1	Aircraft Frame maintainer and repairer
	1	Aircraft Frame maintainer and repairer
	1	Aircraft engines and systems handler
Jet Revisions Dept. Operational Division	1	Aircraft engines and system handler
Electronic Systems Dept. Operational Division	1 (x)	Aircraft power systems mechanic
	1 (x)	Aircraft accessories and installations repairer
	1	Aircraft flight control systems mechanic
Electronic Systems Dept. Production Planning & Control Division	1 (x)	Aircraft Boarding Systems Mechanic
Production Dept. Supply Control Service	3 (x)	Leveler
Accessory Revisions Dept. Production Planning & Control Division	1 (x)	Aircraft accessories and installations maintainer
Accessory Revisions Dept. Supply Planning Service	3 (x)	Aircraft accessories and installations maintainer
Accessory Revisions Dept. Supply Control Service	2 (x)	Aircraft accessories and installations maintainer
Ground Systems Department	1	Engine mechanic
	1	Brake systems handler – mechanic
	1	Aircraft chemicals handler and mechanical parts cleaner
Ground Systems Department Production Planning & Control Division	3	Engine mechanic
	1 (x)	Aircraft power systems mechanic
	1	Brake systems handler - mechanic

Table 4.3 : Staff employed at offices instead of production positions suiting their job competencies and professional skills ((x) : denotes the professional categories and job competencies declared as requirement by the factory.)

Posing availability for employment directly in production as per their academic backgrounds and qualifications, this workforce should be gained to relevant positions in

production line, in order to increase the existing labor capacity of the workshop and causing a rational decline to the number of indirect labor.

2) CNC (Computer and Numeric Controlled) bench equipment were found to exist in the production department of the worksite. Yet, these benches installed at the worksite are operated for 8 hours a day, becoming idle for the remaining 16 hours. A benchmark with the private sector practices involving benches of similar type and nature suggests that these equipment items are operated 24 hours a day, with a view to maximize benefits taken out of them. Another observation made during the inspections has been that there were lots of parts left unattended on the rows of the benches for production at site. In order to ensure timely production of parts queued on the row and better exploitation of the CNC benches available at the workshop, it appears essential, to the extent of improving productivity by migrate to shifted work design for using CNC 24 hours.

3) A review of the quarterly plans drawn up by the worksite within the framework of its production schedule for the term 2003 leads to the conclusion that a requirement evidently exists for replacement of the existing plans taking into account the labor capacity. For instance, the amount of workload envisaged for the Electronic System Repairs Department is given in tables 4.4 with workshop labor capacities and command base requirements.

Working Quarter		Planned (Man-hours)	Requirement (Man-Hours)	Department Capacity (Man-Hours)
Electronic System Repairs Department	1 st Quarter	29.891	31.786	42.429
	2 nd Quarter	27.430	48.258	42.546
	3 rd Quarter	21.860	56.941	28.300
	4 th Quarter	31.980	72.791	41.318

Table 4.4 : Quarterly workload projections of Electronic System Repairs Department

As a review of data supplied above would also reveal, it appears that the process and standard times and timing averages for times lost during the previous years were not properly taken into account during preparation of the production plans.

The capacity of the workload planned for all the quarters of concern by the Electronic System Repairs Department (with exclusion of annual leaves, paid leaves and refreshment leaves) has been calculated at a level of 70%. This can only be possible when critical workflows exist to drive the operation toward the edge of a bottleneck due

to any concurrent deferred delays in supply of spare parts or wrong planning. Therefore it seems essential that these concerns should properly be addressed in planning efforts, especially for assuring timely deliveries of spares and supplies and avoidance of idling in the workforce. Moving further on these facts, it is considered as the most appropriate action to;

a. update the standard and process times that formed the basis for planning and production in line with capabilities gained, due to timely completion of activities despite the work planning made on the existing labor,

b. set up plans that allow for full exploitation by departments of their labor capacities when drafting the annual plans.

4.6 4th Maintenance Facility Command Worksite (Ankara)

This workshop is currently assigned to and engaged with:

- 1) Maintenance and repairs of Communication and Electronic Information Systems owned by the Land Forces,
- 2) Production of spare parts.

The inspections covering this workshop took place during March 11 – 19, 2004.

4.6.1 Findings About The Worksite

1) The factory was found to have used its labor capacity of 306.629 man-hours at 75% during term 2003. This low labor capacity usage rate is attributable to small quantities of equipment reporting failure throughout the year.

On the other hand, the production schedule set for the term 2003 has been realized at 104% for its aspects covering maintenance and repair activities, at 156% for its part dealing with instrument and spare part production efforts. These results eminently put forth the requirement for updating of the process and standart times taken as basis in planning efforts for maintenance and repair activities and renewal of plans accordingly. Planning is of vital importance for any worksite to see into the predictable future and precisely arrange for timely deliveries of supplies needed for operational purposes. An erroneous planning will cause the existing workforce become idle. Therefore, it is considered to the best benefit of any operation of the sort dealt herein to regularly update its process times to manage the best realistic planning attainable in practice and base all its further planning efforts on the resultant timetables. Despite an actual performance of over 100% compared to the plan, a usage rate of 75% of the total

labor capacity, gives clues of something wrong with the planning. The need thus appears to exist for more comprehensive and detailed conduct of planning related efforts on the worksite.

2) The calibration workshop already established on the factory operates with a labor capacity usage rate of 43%, although it is seen as exemplary with the technological riches it incorporates. Use of the diverse means and capabilities of the calibration workshop existing on site, restricted exclusively to the calibrations on equipment used at 4th Central Maintenance Facility was responsible for the resultant low level of labor capacity usage. Accordingly, the resultant situation not only entails to full and proper exploitation of the workshop's labor capacity but also causes idling of benches and equipment imported to the facility at extremely high rates. There seems the need for utilization of the workshop to properly serve other parts of the worksite as well as for other command headquarters.

4.7 Air Force Command 2th Air Servicing And Maintenance Facility

This worksite is mainly responsible for:-

- 1) Factory level maintenance, repair, modification, testing and calibration,
- 2) Manufacturing of parts and assemblies of requirement
- 3) Assignment portable teams to handle maintenance, repair, modification and calibration procedures, which cannot be performed at Troop level.

The inspections covering this workshop took place during March 28 – April 10, 2004.

4.7.1 Findings About The Worksite

1) The firearms workshop of the worksite renders maintenance and repair services of about 18,000 units of G-3 type rifles and handguns with varying calibers and ballistic specifications, used by the Air Force Command. These weapons are delivered by troops deployed anywhere throughout the country to the worksite. On the other hand, roughly around 600,000 rifles are maintained and repaired at 11 other worksites acting under the Land Forces Command, having specialized on infantry class weapons. In presence of these specialized workshops, running and maintaining a separate workshop just because that the lines of command differs seems to be the main cause that underlies inefficient use of the existing sources. Given the current volume of 600,000 firearms properly and timely maintained and repaired, an extra load of 18,000 should not lay an intolerable burden upon the 11 currently running operations. Therefore, arrangements may be made for the performance of refurbishment, maintenance and repair operations

with regard to firearms proprietary to the Air Force Command at other sites available within latter's authority frames is considered to pose importance, particularly for:

- a. achieving personnel savings,
- b. strengthening cooperation between separate lines of command,
- c. managing savings in terms of forwarding costs,
- d. efficient use of the resources.

2) A review of the revision costs of rubber wheeled terrestrial vehicles and construction machinery revealed refurbishments performed at a cost, in average, of:

- a. US \$ 13.997 for aircraft trailers,
- b. US \$ 26.186 for fuel-oil tanker trucks,
- c. US \$ 5.439 for vehicular engines,
- d. US \$ 26.236 for construction machinery.

That a majority of the aforesaid vehicles have expired their economic lives was found to be the core reason for high costs incurred for their revisions.

Due to economic lives being expired due to aging of vehicles maintained, repaired and revised at the Ground Systems Department after 30 to 35 years of operation and as such, their undergoing refurbishments more than once until today,

- a. including newer vehicles in inventories within available means,
- b. Replacement of vehicles at shorter time intervals based upon determinations of their economic lives, rather than retaining them in use with growingly more investments and costly repairs for long years, should lift off the load imposed by the maintenance and repair activities on budget.

4.8 8th Maintenance Facility Command Worksite (Afyon)

This worksite has been assigned to;

- 1) Factory level maintenance (FASBAT), repairs and refurbishments of bulwark class major construction machines and equipment,
- 2) Production of major supplies, spares and products containing composite materials,
- 3) Handle the delivery and supply, storage and redistribution of bulwark materials required by Land Troops.

The inspections covering this workshop took place during April 26 – May 7, 2004.

4.8.1 Findings About The Worksite

1) Repair and refurbishment costs of small generators and compressors maintained and repaired as well as fire extinguishers put into refurbishment processes at the worksite tend to exceed the market sales rates established for similar new items. For example, while it is possible to refurbish a 2 kg weighing fire extinguisher device for US\$ 52 at the worksite, the sales price set by the market for a new device of the same sort and nature is US\$ 19. Table 4.5 shows the worksite costs versus market based renewal rates of some bulwark class materials for which maintenance, repair and refurbishment work is performed at the worksite.

TYPE OF MATERIAL	SPECIFICATION	FULL RENEWAL COST (\$)	FILLING COST (\$)	MARKET RATES (\$)	FULL RENEWAL COST TO MARKET RATE RATIO (%)	FILLING COST TO MARKET RATE RATIO (%)
FIRE EXT.	K.K.T 2 KG.	52	36	19	273	189
	K.K.T 6 KG.	80	56	30	266	186
	K.K.T 12 KG.	115	79	40	287	197
	K.K.T 25 KG.	198	136	129	154	105
	CO ₂ 2 KG.	52	36	37	142	99
	CO ₂ 6 KG.	84	60	65	129	92
	CO ₂ 10 KG.	117	85	100	117	85
	CO ₂ 30 KG.	231	159	250	93	64
GENERATOR	1,5 KVA.	1.000 - 2.300		1.165	85 - 197	
	3 KVA.	1.000 - 2.300		2.000	50 - 115	
	110 KVA.	15.800		13.000	122	

Table 4.5 : Worksite costs versus market “new” sales rates of bulwark class materials

Given worksite refurbishment costs of fire extinguishers and especially small generators higher than the market sales rates applicable to their new and unused correspondents. The procurement of new devices instead of having the old ones refurbished seems to be economically more viable.

2) The production work covering the fabric jerkins incorporating bulletproof plates and mine-proof garments (protective suits) is carried out by 15 workers from a variety of professions at the worksite. Similar garments are also produced in sewing houses owned by the Turkish Army. Therefore it is considered essential for worksites to

specialize in certain areas and for prevention of duplications, to produce garments in the sewing houses.

4.9 7th Maintenance Facility Command Worksite (İstanbul)

The worksite is mainly assigned to;

- 1) Production of 4x4 and 4x2 vehicles,
- 2) Production of spare parts for these kind of vehicles.

The inspections covering this workshop took place during May 20 – May 28, 2004.

4.9.1 Findings About The Worksite

1) The worksite was found to realize a labor capacity usage rate of 66.01% during the term 2003. The remaining part of the capacity equaling to 33,99% on the other hand was left idle. While calculating the labor capacity usage, the 124 indirect workers are not taken into account. The idled work times would rise even further, if these in direct workers take account. Table 4.6 depicts the capacity usage ratios.

ACTIVITIES	AVERAGE DIRECT WORKER NUMBER IN 2003	ANNUAL LABOR CAPACITY	USED LABOR QTY	LABOR CAP. USAGE RATE
		(Man-Hours)	(Man-Hours)	(%)
SCHEDULED TASKS	212	349.650	153.118,7	66,01
LT FIELD MAIN. CENTER PRODUCTION TASKS			5.470,0	
TASKS CARRIED FORWARD FROM 2002			22.511,5	
UNSCHEDULED TASKS			17.530,3	
MISC. SURVEYS			32.186,0	

Table 4.6 : Capacity usage status of the worksite

The aforesaid surplus labor has been used for the maintenance and repairs of the factory and tidying up of the servicing department depots of the factory.

2) The ratio of intermediate leaves (<30 min. per day) to the direct labor capacity is 5.1% during term. Findings showed that times spent to cleaning which form a 22% of the idle labor capacity represent a 6,1% of the total worksite capacity. According to these figures, workers utilized as direct labor spend 36 minutes of their working times in daily average to cleaning purposes, at the worksite. The daily loss of labor capacity at the worksite in which 212 workers are working as of the date of inspections is shown in Table 4.7.

No. of Workers	Cleaning Times Used (min.)	Max & Min Required Cleaning Times (min.)	Difference (min.)	Loss of Labor (Hr/Day)
212	36 min.	5 min.	31	110
		10 min.	26	92

Table 4.7 :Labor loss due to prolonged cleaning times at the worksite

With a prolonged time of 36 minutes in daily average spent to cleaning, a labor time of 92 to 110 hours is lost per diem. Considering that per capita hourly worker cost to worksite is about 25-30 YTL., the financial outcomes of this labor loss would better be perceived. It is essential for the effective use of labor to carry out the required set of studies at each worksite for cutting the cleaning times shorter.

3) It has also been observed that the worksite having specialized knowledge on gear and cutting edge production was producing toggle sets for the Naval and Air Force Commands, within the framework of cooperation among different forces. Pursuance with improvements of cooperation between different force commands is considered beneficial, to make savings from the costs already incurred by the site with respect to these products.

4) The worksite has been found to employ staff in worker status at such positions and for such services and duties which normally require attendance by non-commissioned officers, civil sergeants, and specialists. At such posts and positions 57 workers in total are employed, precisely consisting of:

- a. 25 assigned to services normally rendered by civil servants,
- b. 9 assigned to non-commissioned officer posts,
- c. 7 assigned to enlisted specialist positions, and
- d. 16 assigned to enlisted men and private posts.

Furthermore, 14 other workers were found as assigned to functional duties which normally can be run by civil servants.

The Government would have considerable savings in terms of labor, calculated to be around. 110 billion 600 million YTL. monthly, through replacement of 71 workers currently filling official posts or duties on an irregular basis with civil servants. It therefore becomes a vital requirement to fill such office positions that fall outside the main reference frames and engagement of the worksite with civil servants and enlisted specialists and shift technically qualified workers already employed as indirect labor to production posts, insofar as an improvement is sought for the labor capacity of the worksite.

4.10 7th Army Corp Maintenance Facility (Diyarbakır)

This worksite is mainly responsible for;

- 1) Ensuring the receipt and delivery, storage, in-storage maintenance and redistribution of Ordnance Class II and IV servicing materials supplied,
- 2) Carrying out maintenance and repairs of all Ordnance, Bulwark and Supply materials of all the Troops it actively supports, and
- 3) Carrying out the factory level maintenance and repairs (FASBAT) for heavy weapons and caterpillar type vehicles owned by supported Troops, And
- 4) Conducting the maintenance of tanks deployed at Regional Gendarmerie in the region. The inspections covering this workshop took place July 26–30, 2004.

4.10.1 Findings About The Worksite

1) The labor capacity usage ratio calculated for the site, with consideration of the net working times of NCOs, enlisted specialists and workers already set to production tasks revealed to be 104,7% for term 2003. This finding testifies that not only any idle manpower is arguable about but also a superb operation took place during the year, above the annual labor capacity. A closer look to the overwork shifts run throughout the year, which were also included in the calculations draws up the conclusion that workers performed 9 hours of work on a daily average. Table 4.8 below demonstrates the labor capacity per each workshop running within the site.

WORKSHOPS	AVERAGE NO. OF WORKERS	ANNUAL LABOR CAPACITY	AMOUNT OF LABOR USED FOR CORE ACTIVITIES	LABOR CAPACITY USAGE RATE
		(Man-Hours)	(Man-Hours)	(%)
Arms	35	50.769	47.078,0	92,7
Dye house	9	15.893	19.432,0	122,3
Gear house	22	38.056	46.148,0	121,3
Blacksmith	16	29.084	35.415,0	121,8
Welding & Frames	34	45.890	55.254,0	120,4
Carpentry	16	28.847	35.666,0	123,6
Bench Repairs	9	15.573	18.913,0	121,4
Wheeled Vehicles	40	70.132	66.403,0	94,7
Cat. Type Vehicles	24	42.090	39.088,0	92,9
Refurbishment	38	65.898	61.250,0	92,9
Const. Mach.	11	21.187	20.252,0	95,6
Segregation	3	5.616	5.508,0	98,1
3rd level	10	16.416	16.357,0	99,6
T O T A L S	277	492.516	515.827,0	104,7

Table 4.8 : Labor capacity usage ratio at the worksite distributed over workshops

Conduct of work in excess of the existing capacity as shown on records automatically leads one to the conclusion that the process and standart times used in time of issuance of orders to workshops and setting up annual production schedules for the worksite are more than needed for the conduct of job. Therefore, updating of the process times determined basing on the factory statistics covering the last five years and standard times applicable to production tasks according to the business survey methods should be the most appropriate action to take.

2) A review of the job orders released during term 2003 revealed that some certain operational times were maintained at high levels that are far from reflecting the truth. An example to this is a Renault Toros brand passenger car, for the cleaning, oil replacement and lock interchange of which work took 6, 3 and 16 hours respectively. Table 4.9 below shows the maintenance and repair times applicable at the worksite for passenger type cars, in comparison with private sector practices.

OPERATION	STANDART TIME (Hour)	
	FACTORY	PRIVATE SECTOR
Lock Changing	16	0,58 – 1,45
Dragling Balance Check	4	0,58 - 0,75
Car Wash	4 - 6	0,30 – 0,70
Brake Test	2	0,50 – 0,75

Table 4.9 : A comparison of process times at the worksite and private sector industries (Private sector data retrieved from authorized dealers of Renault Mais and Tofas brands)

A standard lock interchange operation held on a passenger type car at the work site for 16 hours, takes around 1,45 hours at maximum, in private sector practices. Car cleaning which originally took some 4 to 6 hours, is finished in about 0.3 hours. These times should be reassessed by the worksite. Similar findings were also revealed for arms and bulwark functions.

3) A number of significant differences were found between factories, in the modes adopted for running Factory Level Maintenance (FASBAT) operations pursued by Central Maintenance Facility Commands. For example, the FASBAT procedure runtimes for M-48 A5-T2 tanks vary in a range of 278 to 650 hours from one worksite to another. It is therefore considered essential that a standard time assessment should be made for each type of vehicles being FASBAT by all worksites according to business survey rules, for procedures followed by the same, successfully determining whether the

labor at each individual worksite is used effectively, to standardize procedures run for the cars and shortening the already excessive maintenance times at worksites.

4.11 5th Army Corp Maintenance Facility Worksite (Çorlu)

This worksite is mainly assigned to;

- 1) Refurbishment of complete parts and auxiliary complete parts,
- 2) Conduct of maintenance and repairs of Ordnance, supply and bulwark materials of supported Troops,
- 3) Delivering factory level (FASBAT) maintenance and repairs for heavy weapons and caterpillar type wheeled vehicles sent by supported Troops.

The inspections covering this workshop took place during July 23 – May 28, 2004.

4.11.1 Findings About The Worksite

1) There is plenty of workers employed for jobs and at positions completely irrelevant with their professional skills and qualifications. These workers can be used as labor in production, by their academic qualifications and professional skills and competencies. The workers employed at the worksite irrelevant to their professional skills and qualifications could be seen in Table 4.10.

PROFESSIONAL / CATEGORY OF WORKERS	FUNCTIONS TO WHICH WORKERS ARE CURRENTLY ASSIGNED
Engine Mechanic	Servicing Department Commodity Manager
Caterpillar type vehicle	Servicing Dept. Warehouse No.1 Commodity Manager
Frame maker	Mixed Services Department No.1 Commodity Manager
Leveler	Mixed Services Department Warehouse No. 1 commodity
Electrician	Servicing Department commodity manager
Cooling and washing	Servicing Department. Documentary archives manager
Wheelwright	Servicing Department Inspector
Car Electrician	Servicing Department Warehouse No. 1 commodity
Harness maker	Servicing Department Commodity manager
Frame maker	Servicing Department
Electrician	Staffing Division (scorer)
Oilman	Operational Division (Military Zone entrance point)

Table 4.10 : Workers employed at functions irrelevant to their professional titles and qualifications

It appears essential for meeting up any potential future labor requirements and utilizing qualified staff in production that technically qualified staff defined above as being assigned to posts of NCOs, enlisted specialists, and civil servants need to be reassigned to production posts.

2) A review of held on the yearend repairs report submitted by the worksite to the Logistics Command at the end of term 2003 reveals that 7.64 hours were spent to refurbishment work of a fire extinguisher (FE). Accordingly the overall cost of labor basing on the hourly rates applicable to workmanship by the worksite (which was TL 22.746.332 for Direct + overhead costs for 2003) has been calculated at TL 173.781.976 for refurbishment work of fire extinguishers. Given the fact that it was common industrial practice of the worksite for term 2003 to produce fire extinguishers up to 12 kg capacities, it becomes apparent that a fire extinguisher refill operation costs 3 to 15 folds of the market prices. (The market rates for fire extinguishers have been established through the listing of prices supplied from three large industries operating in domestic market place, based on minimum rate quotations) In 2004, the worksite assigned 2 hours of work for refurbishment operations of fire extinguishers.

During the time survey made at the worksite as part of inspections, it was found that the times applied as 2 hours should have been much shorter. Table 4.11 illustrates the times obtained through studies performed.

Order no.	Type of FE	Refurbishment Time
1.	1 Kg CO ₂	0.85 hrs
2.	1.5 Kg CO ₂	0.85 hrs
3.	2 Kg CO ₂	0.9 hrs
4.	2.5 Kg CO ₂	0.9 hrs
5.	3 Kg CO ₂	0.95 hrs
6.	4 Kg CO ₂	1 hr
7.	5 Kg CO ₂	1.1 hrs
8.	6 Kg CO ₂	1.15 hrs
9.	10 Kg CO ₂	1.4 hrs

Table 4.11 : Refurbishment times of FE's processed at the worksite.

The FE refill times applied as 7.4 hours during term 2003 caused a virtual increase in the labor capacity usage rate. Consequently, workers appear as if had always worked without break, since they performed a 1 hour work in 7.4 hours. This in turn is applicable also to frame making and arms workshops. Therefore, it is considered vital for this worksite for eliminating the hidden idle labor to perform a standard time study and new operating timetables for workshops to follow.

4.12 9th Maintenance Facility Command Worksite (Bor)

The worksite is currently responsible for;

1) Handling the main warehouse services for clothing, dressing and dormitory materials and field units,

2) Production, factory level maintenance and modernization of such filed units and equipment as cooking, heating, cooling, washing machinery and bathing appliances, and

3) Production of ceremonial swords for use by the Turkish Army.

The inspections covering this workshop took place during May 9– 13, 2005.

4.12.1 Findings About The Worksite

1) Within the refectory operating on the worksite, a pay of YTL. 2.84 is allocated per capita worker, for gathering of foodstuff and nutrients, pursuant to the arrangements of Collective Bargaining Agreement (CBA). Such items of cost as power, water and gas services and cleaning materials that are necessitated in time of cooking, preparation and servicing of meals (standard fix menu) are met by the Employer as per the CBA. The costs incurred by the refectory service of the worksite during term 2004 are shown in Table 4.12 below.

	Power	Water	LPG	Detergents
Approx. Cost per repast (in YTL.)	0,01	0,01	0,13	0,04

Table 4.12 : Per repast costs of power, water and etc. at the worksite.

There are already six people employed at the worksite for handling the refectory services. When the costs of these staff members to the employer is evaluated together with other costs made for the same by the Refectory service, the cost of each repast per capita worker is calculated to be YTL. 7.65. Table 4.13 breaks down the calculated cost per repast.

	Power, Water, LPG and Detergent Costs	Staffing costs	Source allocation to Refectory as	TOTAL
Approx. Cost per repast (in YTL.)	0,19	5,12	2,34	7,65
PS: (1) Calculations based on the presumption that refectory at the 9 th Central Maintenance Facility Command Worksite serves for 160 persons on daily average throughout the term 2004. (2) Calculations of staffing costs take due account of the average organizational levels of workers employed at Refectory and include costs to the government based on existing wages. (3) It is presumed that food services are made to workers for 217 days in a year. Workers are not entitled to refectory services and thereby the food allowance when set away from office due to permission leaves, annual leaves, and etc. pursuant to CBA. Therefore calculations are made less relevant days..				

Table 4.13 : Cost of one noon repast per capita worker to the worksite.

It is considered that outsourcing of refectory services to a professional private catering firm would be economically beneficial for the worksite, with reference to the realized cost of 7.65 YTL. per repast per capita worker. As a matter of fact, it is also learnt that privates and enlisted men assuming regular duty at various troops of Commands are paid within a range of 4.00 to 5.00 YTL. 3 course meal per capita soldier, for standard meals supplied by private sector caterers.

4.13 4th Sewing House Command Worksite (Sivas)

This worksite is currently responsible for;

- 1) Producing all kinds of training uniforms, tents and equipment required by the Land Forces Central Command,
- 2) Carrying out the repairs for sewing ad harness making machinery and equipment used at supported troops,

The inspections covering this workshop took place during May 24 – 28, 2005.

4.13.1 Findings About Worksite

1) Labor capacity usage rate of the worksite is found to be realized at a level of 84% in 2003, 107% in 2004 and 111% within the first quarter of 2005. The labor capacity rate exceeding over 100% is considered as mainly attributable to the worksite assessed per workshop laboring times' being higher than the times required for production and to subsequent recordings made as such. Table 4.14 below shows the worksite labor capacity usage ratios distributed over years.

Explanations	2003	2004	2005
Average Direct Labor	211	193	171
Man Power (Man x Hour)	360.196	333.301	113.252
Used Man Power (Manx Hour)	304.179	357.586	126.210
Man Power Capacity Usage	84,45%	107,29%	111,44%

Table 4.14 : Worksite capacity usage ratios over years

2) The time study held on the worksite revealed that the 11 workers performing 8 hours of work filling the entire day at the tent workshop, tubular and normal fabric cutting section, in relation to production bed protective covering cloths would finish up the daily task in about four hours. The bed covering sheet production;

- a. Is divided in to two subcategories as one being currently performed by hourly paid labor and the other by lump sum workers on per piece basis. The part of work carried out by hourly paid labor consists of tubular and normal cutting of the

fabric and fibers followed by insertion of such cuts in between two folds of the fabric, while the part carried out by lump summers includes straight and striped sewing, installation of rubber parts, sewing of fine strips around collars, arms and skirts of the resultant cloth and folding and wrapping procedures, rendered in sequence. (Hourly paid labor is attending the worksite over 8.5 hours a day.) (Lump sum workers are intended to imply workforce entitling to payment of wages by producing a fix amount of good which is measured by standart time study)

b. Expects, according to predetermined timetables, delivery of 11,16 units of bed protective covering per each machine operator for the part of work performed by lump sum workers. Table 4.15 below compares the total number of workers currently assigned to the position of Machine Operator with the bed protective covering sheets remanded for production at the worksite.

No. of Machine Operators assigned to the workshop for bed protective covering sheet production	Bed protective that each Machine Operator is expected to produce (Qty acc. to Schedule)	Amount of production at the Workshop (Qty acc. to Schedule)
34	11,16	379,44

Table 4.15 : Number of machine operators working and amount of production required to be met at the worksite.

Accordingly, totally 34 machine operators employed for bed protective sheet covering production purpose should deliver 379,44 production units per workday, while, the raw materials required for such production being supplied by the tubular - standard fabric cutting section.

c.Reviews made in respect of the production in concern revealed:

1. That the tubular –standard fabric cutting section of the “Harness Making and Tent Workshop” employs 11 workers in total. Table 4.16 below shows the workflows in the workshop, number of workers employed in each workflow, amount of production and times determined basing on measurements for completion of each workflow obtained as a result of a standard time study performed for tubular – standard fabric cutting section. The 11 workers assigned to the workshop perform multiple works at a time. For instance, it is the same labor who spreads the fabric along the bench and also spreads sheep skins onto the same. The number of workers cited next to the process description is to show the expected number of workers needed to complete the job.

Process Description	No. of Workers employed	Quantity Produced (Units)	Time of production (sec.)
Spreading of fabric to be cut over the bench (Fabric required for quantity of production: 960 Folds)	3	480	21.360
Marking of the fabric to be cut	1		840
Cutting of fabric	1		1.125
Spreading of sheep skin over the bench	3		4.140
Marking of the sheep skin to be cut	1		540
Cutting of sheep skin	3		1.680
Spreading of sheep skin between fabric folds	2		99.952
Fitting of the sheep skin to the fabric by stapling	2		12.858
Bench Cleaning and Material Handling times	% 2		
Break time	% 10		
TOTAL	11	480	159.594

Table 4.16 : Results of Standard time survey held at tubular cutting workshop

Accordingly, an interpretation of the above table shows that the fabric and sheep skin required for making 480 units of bed protective covering sheets ready can be prepared in totally 159.594 seconds (inclusive of break times).

11. Table 4.17 below shows the labor capacity usage rate for 11 workers employed at the worksite for tubular fabric production and cutting purposes after an evaluation of the total number of workers attending the tubular fabric cutting section together with the production capacity of the workshop.

No. of Workers employed for Tubular Fabric Production	Daily output of the workshop (Man x Seconds)	Time required for production of 480 units based on measurements (Man x Seconds)	Labor Capacity Usage Rate (%)
11	316.800	159.594	50,3
<i>PS : Labor capacity assessments for the workshop were based on a daily working time of 8 hours (28.800 sec.) out of a 8,5 hours officially disclosed total time less 30 minutes allowed break time.</i>			

Table 4.17 : Labor capacity usage rate of tubular fabric production and cutting workshop

At this juncture, a further examination would reveal that only a 51% of the labor capacity of the worksite assessed to be 88 Man-Hours (316.800 man x seconds) with 11 workers actually worked.

iii. Table 4.18 contains data on hidden idle times of workers assigned to tubular fabric production and cutting workshop for delivering bed protective covering sheets during terms 2003 and 2004 and the first quarter of 2005.

Term	Amount of Sheets Produced	Time required for preparing fabrics based on measurements made	No. of Days worked in the Workshop for Production of Sheets (For 380 fabric sheet productions as per the existing schedule)	Labor as of days worked in the workshop for sheet production	Times passed in idle
	(Units)	(Man-Hours)		(Man-Hours)	(Man-Hours)
2003	38.800	3.583	102.1	8.984,8	5.401,8
2004	39.300	3.629	103.4	9.099,2	5.470,2
2005	2.000	185	5.3	466,4	281,4

Table 4.18 : Times during which workers at the worksite remained idle over years

The three terms total idling time of the workers corresponds to 11.153,4 man*hours, as shown on the above table. Therefore, it is considered of best practice to apply the time derived out of standard time study held on the tubular fabric production and cutting section and have excessive workforce reappointed to other workshops, for elimination of these idle times in future. (480 units of bed protective covering sheets are produced within the time obtained through standard time survey. When the daily production capacities of 380 units of the machine operators are considered, the idled labor shall increase by approximately 20%.)

iv. Semi-products prepared by the tubular fabric production and cutting section are transformed into finished products by machine operators. Given the fact that each machine operator is required to produce 11,16 production units daily, this capacity may well be improved to 20,25 units per machine operator daily, basing on the results of measurements conducted (time study). There appears the urgent need for updating of the standard times in application. Calculation of standard times took the breaks and cleaning times at 12% similar to the case for cutting section.

v. The bed protective covering sheet productions carried out at the worksite according to the current schedule utilize approximately 55% of the daily

production capacities of the Machine Operators. The personnel members work productive for 4,4 hours over a daily total operating time of eight hours and become hidden idle for the rest of the time (3,6 hours). The throughput values set by the current schedule for machine operators tend to be lower than the required, which affects the cost of production in an adverse manner. Table 4.19 below illustrates the unit bed protective covering sheet production costs for both the actual daily production quantity of 11,16 and calculated daily production quantity of 20,25.

Product Name / Description	Machine Op.	Cost of Raw materials	Direct Labor Cost	Indirect Labor Cost	Total Cost
	<i>Units</i>	<i>(YTL..)</i>	<i>(YTL..)</i>	<i>(YTL..)</i>	<i>(YTL..)</i>
Bed Protective Covering Sheet	11,16	4,01	4,35	14,76	23,22
	20,25	4,01	2,40	8,13	14,54

Table 4.19 : Worksite costs of bed protective covering sheets depending on production quantities (Cost calculation is made 2004 over hourly wages.)

The total time spent for production according to the current schedule is greater than the normal by 81,4%, which fact causes an eventual rise in the overall production costs of finished goods and prevents cost-effective operation of worksites.

vii. Table 4.20 shows production quantities of wind jackets, another item of production included in the production schedules of the worksite, throughout the time elapsing between term 2003 and Month April of term 2005.

Product Description	Production Qty in 2003	Production Qty in 2004	Production Qty in 2005	Total
Wind Jacket	138.400	232.700	70.175	441.275

Table 4.20 : Wind jacket production quantities distributed over years

The machine operator daily throughput is 5,94 according to the approved schedule of wind jackets. However, with the standard time study, it has already been revealed that the daily production quantities can be improved to 10 units daily per machine operator, (also given tolerances to the workers.)

Viii. With consideration of the fact that a total of 441.275 wind jackets had been produced at the worksite since 2003 until today and with a machine operator daily throughput of 10 units, the total quantity of production throughout the same time period would have increased by 48.1%. The lost quantities of production would better be

realized with particular reference to the already produced quantity of 441.275. It is therefore considered of vital importance for the worksite to update its current schedules for wind jacket production.

3) Although tent and canopy productions are the core specialization of the worksite. A review of the annual work schedules adopted and implemented during the last two years and of their implementation statuses reveals that:

- a. No tent production took place during term 2005,
- b. 17% of the labor capacity was used for tent production during 2004,
- c. The labor force costing around YTL. 2.400 to the government monthly was rather used for the production of such goods as bed protective covering sheets, wind jackets, private backpacks etc. which can easily be supplied from the market.

It is understandable and even considered beneficial to have the workforce engage with productions of civil character, in such circumstances where no military requirements exist, with the ultimate goal of utilizing the idle workforce. However, reverting to the market place for the supply of demands of the kind dealt herein, if and when the workers already attending shifts resign from office would be a wiser and more appropriate action to take. Consequently it would ensure more effective usage of the general budget in terms of resource allocations for defense.

4.14 Gölcük Naval Shipyard Command Worksite

This worksite is mainly responsible for;

- 1) Pursuing ship building and repair operations,
- 2) Producing batteries for submarines,
- 3) Repairing the weapon and navigation systems of battleships.

The inspections covering this workshop took place during Jan 25th – Feb 4th, 2005.

4.14.1 Findings About The Worksite:

1) The battery workshop operating under directions of the worksite produces submarine batteries. Basing on the standard timetable implemented at the worksite, one battery set (consisting of 480 batteries) is produced against a labor of 6.382 man-hours in case recyclable materials are used or of 5.899 man-hours, if new materials are used.

A standard time survey was held in the battery installation unit, the results of which are compiled in Table 4.21

of Workers at Installation Unit : 20
Daily operating time (actual) : 20 x 6 = 120 Man-Hours

Activity	# of workers	Process Time	Average Time of production
Cart loading	2 persons	9 min.	1 bat., 18 men/hour
Cart Readyng	2 persons	60 min.	1 bat., 120 men/hour
Sorting on chassis	1 person	60 min.	1 bat., 60 men/hour
Bat. Source	1 person	50 min.	1 bat., 50 men/hour
Bat. Cleaning	2 persons	20 min.	1 bat., 40 men/hour
Vulcanizing	1 person	90 min.	3 bat., 30 men/hour 2 bat., 45 men/hour
Pressure test	2 persons	60 min.	3 bat., 20 men/hour 2 bat., 30 men/hour
TOTAL			338 – 363 men/hour
Daily production output			19-21 batteries (20 x 6 x 60 = 7200 man x min.)

Table 4.21 : Results of standard time survey held at battery assembly unit

Daily 10 units of batteries are installed at the worksite. However, as the measurements resulted to testify, there can be 19 to 21 batteries assembled daily.

The amount of vapor used by the vulcanizer equipment employed for assembly of batteries are frequently retain lower levels than the requirements of the unit, which fact gave rise to a bench design to vulcanize three batteries at a time. However, after the three batteries produced in a single-run, the vapor remaining in the system proves to be sufficient for the production of only two more. In case the amount of vapor produced in the worksite is upgraded to retain the level required for operation of the vulcanization unit, 15 battery units can be installed daily. Apart from this, if the vapor production required for vulcanization process is considered alone, the viable production output appears to be 13 batteries installed per diem. It is therefore considered that the daily battery installation capacity of the worksite can be improved to 13 units, according to the sample worksheet displayed in Table 4.22 below.

Vulcanization Operation		No. of Batteries
Start time	Ending Time	
08.10	09.10	3
09.30	10.30	2
10.55	11.55	3
13.10	14.10	2
14.25	15.25	3
<i>PS : Above figures take due account of cooling and process finalization times of the vulcanization bench. It solely relies upon the assumption that batteries will be readied up for vulcanization process to take place a day before.</i>		

Table 4. 22 : Timetable for vulcanization of batteries

The labor capacity of totally 20 workers, employed at the installation unit which can realize the installations of 21 battery basing on the existing labor capacity or 15 battery basing on the installed bench capacity or 13 battery given the vapor inadequacy, is used at a rate of 50%.

Therefore, it is considered essential, for the efficient use of existing labor, that;

- a. New benches capable of vulcanizing higher quantities of batteries at a time should be procured or alternatively, the vapor leakages should be prevented,
- b. Vulcanization procedures should be initialized according to the above tables, as of the starting hour of operations, for successful installation of 13 battery per day, given the existing worksite capacity (vapor capacity),
- c. If non of the above can be achieved, then the workers should be shifted to other workshops where the need for them persists.

2) The Submarine Battery Factory is located approximately at a 10 km distance of the Golcuk Naval Shipyard Command, within the municipal borders of Seymen District. The lunches for staff employed at this facility are gathered from the Naval Shipyard Command, for which purpose readily 4 workers are set on duty, who also perform their hot servicing.

Land Vehicles and Construction Machinery Repair Factory located adjacent to the worksites also implements a refectory for its regular workers, which cooks meals, separately. Therefore it is considered essential for personnel savings that, instead of operating two refectories at both of the two worksites neighboring one another,

- a. Submarine Battery Factory staff should also be included within the coverage of services given by refectory of the Land Vehicles Repair Factory,
- b. All meals for the personnel should be departed from the Refectory of Golcuk Naval Shipyard Command, instead of having the refectory of Land Vehicles and Construction Machinery Repair Factory deliver meals daily.

3) Observations made also suggests that the number of worker administrator assigned to post at the Naval Shipyard Command is also in excess of requirements, getting even higher in some certain functions, in breach of the Collective Bargaining Agreement. The basic function of worker administrator is to superintend and manage technical and operational aspects any work set in progress, where the number of available NOCs, enlisted specialists or civil servant is insufficient to take up the post and assign other worker administrator among the staff members who have adequate qualifications. However, as the investigations made on the issue have revealed;

a. type B worker administrator have been assigned to worker administrator, despite that there is already a colonel and a lieutenant to fill the position of executive in Staff Department,

b. of a total of seven worker guards employed at security department five are worker administrator. (One is Type B and rest of Type C),

c. some posts retained at Electronic Equipment Factories consists of two workers, one of which is being assigned to worker administrator.

The situation presented above in relation to worker administrators applies to almost every workshop operating under the Naval Shipyard Command.

Accordingly, appointment of worker administrator from among the workers should be arranged and implemented so that the total number of worker administrators would suffice to cover real needs and should not exceed the extent and limitations of the positional staffing arrangements of the worksite. For avoidance of this situation, it would be appropriate to;

a. Avoid appointment as worker administrator and dilute the positions and number of workers at factories attended by Officer or NCO executives,

b. Duly follow and abide by the rules and appointment criteria set out under Sections 67 and 69 of the Collective Bargaining Agreement in time of worker administrator appointments,

c. Review the worker administrator on duty and discharge those whose qualifications non-conforming to the requirements for an executive, once and for all.

4) An audit performed on the cost accounting practices at the Naval Shipyard Command. In time of computations of labor costs associated with maintenance, repair and production activities, process times are multiplied with determined hourly labor costs. The determination of hourly labor costs is rendered according to the following formulate:

$$A \text{ (Total Costs)} = (\text{Staffing}) + (\text{Procurement of Goods}) + (\text{Procurement of Services}) + (M\&R) + (\text{Depreciations and Aging})$$

$$B \text{ (Annual Operating time)} = (\text{No. of Direct Workers employed at the Naval Shipyard}) \times (\text{Daily Operating time } G \{8,5 \text{ hrs}\}) \times (\text{Workdays during the year } \{219 \text{ days for term } 2004\})$$

$$\text{Hourly Cost of Labor} = A \div B$$

Audits held at the worksite revealed, with respect to determinations as to the annual operating time (B) employed for calculation of hourly cost of direct labor, that;

a. Workers employed within the organization of the Naval Shipyard Command were separated as direct and indirect labor based on their occupation and professional category as written on applicable service contracts and such workers as turners, vessel floaters or welders and Type A and B worker administrator are collectively recognized as direct labor,

b. Operating time of 8.5 in favor of their workers, although they are normally subject to operation for 7.5 hours per diem (facilities include Smithies, Metal Coating, Tire, Fiberglass Submarine Battery Factories and etc.).

Using the above formula, the hourly cost of labor per capita worker has been calculated as 29.25 YTL. for the term 2004. However, considering that work is subject to 7.5 hours daily operation at and separation has been made among workers for direct and indirect labor categories, The hourly labor cost should increase by 21% to become 35.26 YTL. per capita worker. (This calculation was made according to the hourly worksite wage assumed in the cost accounting of the worksite described in Chapter 3).

Undervaluation of labor costs in time of cost accounting would eventually lead to misleading conclusions especially during the decision-taking as to whether or not to carry out market productions at the worksite as well as the conduct of cost-efficiency analysis.

For reasons depicted above until this point, there appears the essential need for rechecking the cost accounting practices and thereafter, performance of recalculations so as to cover all expenditure items according to the worksite's real labor capacity.

4.15 İstanbul Naval Shipyard Command Worksite

This worksite is currently responsible for;

- 1) Carrying out ship building and repair activities,
- 2) Maintenance and repairing of weapon and navigation systems of ships.

The inspections covering this workshop took place during Feb 21st – March 4th, 2005.

4.15.1 Findings About The Worksite

1) A review of the cost accounting procedures run by the worksite reveals that an hourly labor cost of 40.58 YTL. has been recognized. Although the same and identical cost accounting method applies to both the worksite and Golcuk Naval

Shipyard Command which have similar levels of worker seniorities and average worker wages, significant differences have been found to exist between the unit labor costs, which can be attributed to:

- a. variant numbers of direct labor included by worksites in labor accounting,
- b. getting different in daily working times of direct labor,
- c. failures to include the all expenses of certain worksites to calculations.

Worksites generally show the trend to state their costs lower and laboring capacities higher than real, in order to proclaim unit labor costs below actual. Therefore, there seems to be the need for a study to be performed to allow for standardizing of cost accounting practices across the worksites and for all worksites to enforce and implement the same, to prevent incorrect prospective decisions and ensure integrity between different worksites

2) Despite the hourly labor cost calculation of Istanbul Naval Shipyard Command at a level of 40.58 YTL. a different cost accounting practice was observed to be adopted for jobs run for raising of funds to the revolving fund activities, in which case, hourly labor cost was calculated lower than the normal.

Wages paid to workers in consideration for their efforts under revolving fund activities raising campaigns at lower levels than usual implemented by the worksite management automatically yields the conclusion that work has been performed for loss. However, on the other hand, the said campaign facilitates evaluation of idle times (and idled workforce) that fall outside the maintenance, repair or production activities thus returning of a certain part of payments made to workers for idled times back to the government.

At the Istanbul Naval Shipyard worksite, hourly labor cost for assignments to be carried out under capital-raising campaigns are calculated according to the provisions of “Revolving Fund Activities Accounting Guidelines” of June 1961.

According to this calculation, the average wages earned by workers performing at the worksite and other statutory deductions constitute the direct labor cost of revolving fund activities. Deductions offset from direct labor costs at a rate of 2% are returned to the Office of Secretary-General of revolving fund activities as to cover the body’s pro rata share in costs while sums offset from direct labor costs at a rate of 150% are credited to the costs of indirect labor, officers, non-commissioned officers and civil

servants as well as operational overheads of the worksite such as power, water and heating service bills. The sum of these three items plus a profit margin of 12% and mandatory deductions make the initial preliminary cost, which then receives application of Value Added Tax at a rate of 18%. The formula applicable to this calculation is, as follows:

(A) Direct Labor Cost = (Average net wages received by workers employed at the worksite)

(B) OSG Revolving fund activities Share in costs = (2% of cost of direct labor)

(C) General Costs (Production Overheads) = (150% of direct labor cost, in remuneration of such operational overheads as costs of indirect labor, officers, non-commissioned officers and civil servants and power, water, heating and other like utility consumptions of the worksite)

(D) Total Cost = $A + B + C$

(E) Initial Preliminary Cost = $(D \times [1+K]) \div (1 - L)$

K : Profit (%12)

L : Statutory deductions (%23)

-Childcare Institution Fund (%1)

-Depreciation costs (%2)

-Operating expenses (%5)

- Share in cash income (%15)

Revolving fund activities Labor Price = $E \times (1+\text{VAT [at \%18]})$

The hourly labor cost for assignments carried out under working revolving fund activities reveals to be 22,40 YTL. in average (or 26,43 YTL. inclusive of VAT) for term 2004. Table 4.23 below shows costs incurred by the worksite during term 2004.

Operating time during 2004	=	3.703.464 Man-Hours	
Direct labor hours realized in 2004	=	2.129.239 Man-Hours	
Labor time spent to capital-raising assignments During 2004	=	448.919 Man-Hours	
EXPENSES OF ISTANBUL NAVAL SHIPYARD COMMAND WORKSITE IN 2004			
Net wage	=	22.574.106,60	YTL.
Overwork Bonus	=	87.757,90	YTL.
Week-end and Holiday Work Wage	=	7.723.222,40	YTL.
Annual paid leave allowance	=	3.212.508,25	YTL.
Severance Liability Payments	=	2.587.653,85	YTL.
Discretionary Firing Compensations	=	4.465,45	YTL.
Bonuses and tips (under effective laws and service contract)	=	11.314.731,80	YTL.
Sailing experience bonus	=	589,70	YTL.
Worker's Insurance Coverage Employer's Liability (% 20.8)	=	9.075.759,85	YTL.
Unemployment Insurance Employer's Liability (%2)	=	873.534,85	YTL.
Graveyard shift bonus	=	55.020,15	YTL.
Healthcare expenses (periodic and porter checks)	=	97.339,20	YTL.
Food allowance (in specie – in kind)	=	962.640,80	YTL.
Maternity-Death-Marriage Allowance	=	10.318,95	YTL.
Social Allowance	=	1.149.546,30	YTL.
Boat allowance	=	104.996,80	YTL.
Health-decrementing work bonus	=	164.400,00	YTL.
Productive Work Encouraging Bonus (% 15)	=	3.072.173,45	YTL.
Shift bonus (% 10)	=	187.300,00	YTL.
Dosimeter (x-ray radiation measurement)	=	1.500,00	YTL.
Uniform and towel allowance	=	153.639,10	YTL.
Executive Bonuses	=	349.056,40	YTL.
Engineer and Master Engineer wage bonuses (%25-%30)	=	54.500,00	YTL.
Service vehicles	=	1.647.182,30	YTL.
Other permanent worker payments (notaries, courts and etc.)	=	211.317,30	YTL.
TOTAL LABOR EXPENSES	=	65.675.261,40	YTL.
Payments for Officers, NCOs and civil servants	=	8.667.223,00	YTL.
Operating expenses	=	6.766.103,24	YTL.
HVACS expenses	=	261.541,50	YTL.
Depreciation costs	=	3.733.553,20	YTL.
Command Headquarters running costs	=	1.299.627,42	YTL.
GRAND TOTAL	=	86.403.309,76	YTL.

Table 4. 23 : Breakdown of costs incurred by the worksite

When determining the hourly labor cost calculated for revolving fund activities, it was found that;

a. The direct labor cost assessed for efforts rendered under working-capital raising campaigns constituted a 34% of labor costs of the worksite, due to consideration of net rates for worker wages,

b. The ration reserved at 150% of direct labor cost as provision for costs of labor, officers, NCOs and civil servants and running overheads such as obligations

standing on power, water, heating etc. service subscription bills left below the accrued amounts of these accounts.

A consideration of data provided in the above table yields a net wage payment of 22.574.106 YTL. to workers during the term with extra non-wage costs made for workers being in an amount of 65.675.261 YTL. In fact, the provision at 150% for operating overheads component also retained a poor level, given the actual costs yielding around 283%. It is for this reason that a difference occurs between the hourly labor cost and hourly cost of labor allotted to working revolving fund activities of the worksite. Table 4.24 attempts to provide a big picture of this situation.

	Ratio to Net Worker Wage (%)	Amount (YTL..)
Payments made with regard to workers in addition to net wages, pursuant to effective Statutes and Collective Bargaining Agreement	190,93	43.101.154,80
Total wages of Officers, NCOs, civil servants and other expenses of the worksite	91,82	20.728.048,36
Expense items except net wages of workers employed at the worksite (Overhead Share)	282,75	63.829.203,16

PS: Net worker wage has been YTL. 22.574.106.60 for term 2004.

Table 4.24 : Distribution of expenses made at the worksite

In the light of above assessments, there appraised to be an evident need for updating the method of calculation. The hourly rates identified in association with the working Revolving fund activities, which represents a 36% of the total labor capacity of the worksite retain a level insufficient to cover up costs realized.

3) There are 46 land transport vehicles of various type (i.e. pickup vans, minibuses, passenger cars and etc.) at the worksite. A review of the costs during 2004 in relation to these vehicles reveals that the total spending for a 1994 modal Tofas Sahin sums up to 17.591 YTL. and it was 59.327 YTL. a 1998 modal Ford Transit. For some certain vehicles, the labor costs made during term 2004 exceeded the new sale prices of their equivalents in the market place. Table 4.25 delineates a comparative listing of labor costs versus authorized service charges in connection with the maintenance / repair work performed in 2004,

TYPE	MODEL YEAR	MAINTENANCE AND REPAIR WORK			
		WORK PERFORMED AT SITE		AUTHORIZED DEALER CHARGE FOR EQUIVALENT LABOR	COST SAVINGS ON OPTIONAL USE OF AUTHORIZED SERVICES
		(Man-Hours)	(YTL..)		
Renault Megane Passenger car	1998	518,5	20.950,44	16.519,41	4.431,03
Fiat Şahin Passenger car	1994	433,5	17.591,18	15.345,90	2.245,28
Renault 19 Europa Passenger car	1999	544,0	22.075,21	17.331,84	4.743,37
Land-Rover 4x4 Field Vehicle	2000	229,5	9.312,98	8.124,30	1.188,68
Land-Rover 4x4 Field Vehicle	2000	323,0	13.107,16	11.434,20	1.672,96
Land-Rover 4x4 Field Vehicle	2000	510,0	20.695,51	18.054,00	2.641,51
Ford Transit Minibus	1998	1.462,0	59.327,13	51.754,80	7.572,33
Ford Transit Minibus	1999	603,5	24.487,69	21.363,90	3.123,79
Ford Minibus	1986	858,5	34.837,44	30.390,90	4.446,54
Ford Ambulance	1998	450,5	18.281,03	15.947,70	2.333,33
Iveco Midi bus	2001	510,0	20.695,37	18.054,00	2.641,37

Table 4.25 : A comparison of worksite maintenance costs versus market maintenance costs of passenger cars.

Authorized service labor costs for the above vehicles have been calculated based on the prices of Ford, Tofas and Renault Brand authorized services charged during 2004 inclusive of value added tax. Accordingly, if preference would be toward meeting for such demands of the worksite from the market, it is appraised that a saving of YTL. 69.000 and 12.500 man-hours in average. It is therefore considered appropriate to realize savings in maintenance and repair of vehicles assigned to worksite to;

- a. Replace old vehicles whose economic lives have already been expired with new and unused vehicles, and
- b. Have all maintenance and repair works as may be required for vehicles thus purchased throughout their useful lives, performed by private companies.

4) The worksite is also engaged with repairing or production of replacement valves of various types and with varying dimensions. The standard time study made at the worksite for the production of a valve with a diameter of 6 inches and cost of labor according to the times thus established are given in Table 4.26.

HOURLY WAGER RATE : 40,58 YTL./Hr
No. OF VALVES EXAMINED : 4.
SAMPLE CHARACTERISTICS : No visually detectable imperfections, low seat, male valve component torn, sealing gland robust, valve cavities fit, valve rod sound, no valve handles, valve threading test positive

PROCESS DESCRIPTION	PROCESS TIME (Man-Hours)	LABOR COST (YTL.)
Valve Removal and cleaning at leveling post	0,45	18,26
Complete placement of valve body on seat and opening threads at lathe	3,00	121,74
Production of zodiac from bronze material on the lathe	2,00	81,16
Insertion of the zodiac on valve body through the threads on leveling plate.	1,00	40,58
Thin cutting of the valve after being dried in a gradual manner.	2,00	81,16
Cutting of the male valve from both sides 3 mm in average inwards.	1,00	40,58
Cutting two spacers, leaving space for lathing	0,33	13,39
Attachment of the spacer to male valve component through oxygen welding.	1,00	40,58
Running the valve body in lathe	8,50	344,93
Sending the valve handle to casting	0,50	20,29
Cleaning the lathe off casting burrs	0,33	13,39
Processing of the valve handle in the lathe.	0,50	20,29
Making square molds on lathe.	0,16	6,49
Complete running of the valve body in lathe.	0,25	10,15
Testing with manually-driven pump	0,16	6,49
TOTAL	21,18	859,48

Table 4. 26 : Standard time and cost of production to worksite of 6-inch valve

The valves with a cost of labor exclusive of material of YTL. 859, were learnt to have market values varying in a range of YTL. 400 to 700. It is therefore considered appropriate to have these materials from the markets.

4.16 İzmir Naval Shipyard Command Worksite

This worksite is already responsible for;

1) Carrying out ship building and repair operations with weight on support vessels like landing ships, supply ships etc.,

2) Performing the maintenance and repairs of weapon and navigation systems of these ships.

The inspections covering this workshop took place during April 4th – 13th, 2005.

4.16.1 Findings About The Worksite

1) It is learned that the shipyard has announced contract callouts, requesting proposals for 16.500 kg of steel processing work for chute production (ship oil accumulation reservoir) and 165,000 kg of steel sheet manufacturing for repairing Dock No: 9 by patching. Table 4.27 below illustrates the production costs if the contracted works were handled by workers employed at the worksite.

ACTIVITY	STEELWORK MADE IN A FULL WORKDAY PER CAPITA WORKER	FOR 1 KG OF STEELWORK		
		COST TO SHIPYARD COMMAND	PRIVATE SECTOR COST ESTABLISHED THROUGH BIDDING	NET SAVING
Vessel turning in for repairs in bad condition	30 Kg.	0,60 YTL.	0,12 YTL.	% 80,0
Steelwork used in reparation of docks at the Shipyard	50 Kg.	0,36 YTL.	0,04 YTL.	% 88,9
Brand new ship building operation	45 Kg.	0,40 YTL.	0,05 YTL.	% 87,5

PS : (1) The hourly labor cost of the Shipyard Command for direct labor has been calculated as YTL. 17,92.

(2) The quantities of work performed in a full workday have been taken from the worksite officials.

Table 4.27 : Worksite versus private sector costs of labor for steelwork

A review of the worksite carried out in relation to works supplied under contracts showed;

- That the labor cost tend to decline with rising quantities of work,
- That savings around 80 to 89% has been achieved.

Moreover, although 17,92 YTL. has been taken as direct labor costs of the worksite, the hourly labor cost is 35.25 YTL. when the indirect labor costs and production overheads are considered. In this case total savings are doubled. For this aspect, it is considered to be the practice for ensuring efficient use of resources to have works of this kind to be supplied from the market place, gradually after official resignation of workers currently

attending the site, without making any further recruitments to positions vacated by them.

2) The worksite carries out the production of rubber parts necessitated by the Naval Command through its Rubber Parts Production Workshop. For each lot of rubber parts to be produced, first molds are prepared, into which rubber in paste form is poured after being readied and the molds are heated in presses under extremely hot temperatures for 5 to 20 minutes in average.

However, the inspections held at this workshop showed that molds were prepared for mostly single production . Current practice of preparation of molds for single rubber part production, despite the possibility of obtaining 15 to 30 units in a single run depending on the size of the press surface area is apparently the lead factor of the sharp decline in the number of finished products released out of the systems. Table 4.28 shows process times required for production at a rate of 1 single unit per mold of 200 gaskets as obtained by the standard time surveys held at the workshop comparing to those applicable to production of 15 units per mold at a time.

Product Description	Quantity to be produced	Using the existing molds		Using molds readjusted to the surface area of Press	
		Time required for production of one gasket	Total time of production	Time required for production of one gasket	Total time of production
Rubber Gasket	200 Units	7,35 Min.	1.470 Min.	0,52 Min.	102,9 Min.

Table 4.28 : Comparison of rubber gasket production times depending on the molding technique chosen

Production of one single gasket at each blow of the press assembly requires a time of 7,35 minutes per unit. Should the mold to receive the gasket is resized properly to give 15 units at a single pass, there occurs a 93% saving in time required for obtaining 200 units. Therefore it is considered essential to duly address this matter in time of mold preparation activities for newer productions at the worksite.

4) The worksite also carries out the maintenance and repairs of guns used by the marines attending ships. However, it is believed that the current action with the maintenance and repairs of the aforesaid weapons by the Shipyard especially given the present Aegean Army Maintenance Facility Command serving to the land troops at a location that falls within the provincial boundaries of the city of Izmir, would cause a duplication in efforts. The tempering procedures required for the aforesaid guns as well as other repairs thereof that are unavailable within the organization of the Shipyard are

already sent to the Army Maintenance Facility Command Worksite. It is considered as the most appropriate action for preventing duplications to transfer all operations with respect to maintenance and repairs of light arms to the Aegean Army Central Maintenance Facility Command Worksite.

4.17 İzmir Maintenance Repair and Bulwarking Command Worksite

The worksite is responsible for providing IIIrd and IVth maintenance level support for troops in the region. The inspections covering this workshop took place during May 4th – 13th, 2006.

4.17.1 Findings About The Worksite

It is found that a 43% (totally 169 persons consisted of two non-commissioned officers, 10 enlisted specialists and 157 workers) of the personnel employed at the work site (a total of 393 persons) form up the direct production labor and that such rate was below the rates established with any other worksite covered by this study. There is more than one indirect personnel per capita direct labor on the worksite. Table 4.29 below illustrates the numbers of staff employed at the worksite both as direct and indirect labor, also allowing a comparison with private sector practices.

	Worksite	Private Sector *
No. of personnel employed as direct labor	169	65.105
No. of indirect labor and non-production staff	224	19.678
Rate of direct labor to total staff	% 43	% 77
No. of indirect or non-production staff per capita direct labor	1,33	0,30

Table 4.29 : Comparison of number of indirect labor at the worksite, with those of private sector. Private sector data were retrieved from statistics published by the Metal Industrialist Employers' Trade Union (MESS).

Given the fact that the proportion of workers employed as direct workforce at the worksite (including NCOs and enlisted specialists) to private sector labor yield more than 4 folds, it is considered wise to

- a. Recheck the positions to receive indirect labor employments,
- b. Supply demands associated with operations not falling within the core operations of the worksite from the market and let no workers to be recruited for such tasks within,
- c. Reappoint technically qualified workers already employed as indirect non-production labor to production posts that match their professional skills.

4.18 Conclusion

Chapter 4 focuses on the point that are believed to have adverse affects on the productivities of individual military worksites at which inspections were carried out. The points highlighted as findings for each worksite covered by this study are inclusive of all matters which are deemed vital for the worksite in consideration. Only impressive, outstanding examples were imported to this text to ensure simplicity and clarity of reading and best perception of the situations in the reader, rather than putting forth every single occasion specific for each and every worksite. However, if requested and approved, these further details on findings about the worksites of coverage can be supplied. For instance, although the capacity usage ratios, calculation of costs of production to the worksite and results of standard time studies are revealed for each worksite of coverage, separately and independently. But only a number of determinations, which are deemed as of high essence were made for certain worksites, to draw attention to the context of proposed solutions exclusively. The chapter does not incorporate data and findings on the 4 further investigations held to cover 17 worksites as specified above, to avoid reiterations, attributable to their almost identical nature with one another.

As would be evident from a reading of the findings presented on a per worksite basis throughout the document, the problems with military worksites tend to concentrate on certain areas and frequently recur as common for most worksites. Varying policies in cost accounting practices, surplus indirect labor and exasperatedly higher standard times with respect to times actually required to conduct business are only a few among examples that can be given at this extent. These problems should be discussed in more depth to locate and then eliminate once and for all, their probable causes, if military worksites are to be transformed into efficient, cost-effective and productive entities of the future.

Summarizing these particular problems which were seen in field study, done in chapters 5, 6, 7 and 8 by grouping them into contextual subcategories, to effectively highlight proposals as to their solution on a per subject basis. We are of the belief that the problems highlighted in this document on a per worksite basis can contextually be divided into 3 main sections. These are (i) the “staffing” section dealing with such matters concerning the personnel as employment of government official in worker status, excessive numbers of indirect labor and etc.; (ii) the “cost accounting” section

covering the calculation methods for the cost of production held at the worksites and hourly cost of labor used in working-capital raising activities; and finally (iii) the “productivity” section dealing with such issues as the excessive process times, inefficient capacity usage and production of goods with no added values at the worksites. Chapter 8 will deal with the actual positions of the worksites and their selections based on the geographical locations of troops for which they serve.

CHAPTER 5

THE PERSONNEL STRUCTURE OF THE TURKISH ARMED FORCES LOGISTICS SYSTEM

5.1 The Rights And The Statutes Of The Personnel Hired In The Military Facilities

The personnel are employed in the military factories of the Turkish Armed Forces in five different statutes due to the regulations, rights pertaining to the personnel and the laws they are subject to. The personnel mentioned are namely; the workers, officers, noncommissioned officers, civil servants, and specialist sergeants. The workers, who are one these five different classes are participated in the factories which form the backbone of the logistics system and directly employed as the productive power. The officers, noncommissioned officers and civil servants are working in indirect jobs like planning and design. Specialist sergeants together with the noncommissioned officers, who have technical background on their own areas of specialization, are employed as the direct labor of the workshop and are included in the man power capacity in some factories.

Explanatory information on the personnel employed in these different statutes is given below. In this study, the workers, who are employed as the direct productive power, are mainly mentioned.

5.1.1 The Civil Servants

The civil servants who are employed from different educational levels (high school graduate, management, economics, and engineering graduates) do the administrative, technical and office jobs. In accordance with the Civil Servants Law Number 657, the civil servants are employed for the general administrative services, administrative services and technical services, due to their educational background. Rights pertaining to the personnel are also determined by the same law. Civil servants employed in the Armed Forces are subject to the articles of the Internal Service Law involving the disciplinary rules, same as the military personnel. Salaries of the civil servants may be different due to the permanent staffs which are indicated in the civil servants law.

The classes of the civil servants working in the military facilities and the related costs for the state are shown in Table 5.1 (Civil Servants Law 1965).

Title	Degree/Level	Cost for the State (YTL.)
Engineer	7/1	1.410
Specialist	7/1	965
Data Preparation	7/1	910
Writer	7/1	895
Technician	7/1	940
Teacher	7/1	1.010

Table 5.1 : Cost of the civil servants according to the classes
(Share of state is taken as 20%. Average costs as of January 2006.)

5.1.2 Officers And Non Commissioned Officers

The officers are employed for the administrative positions such as the department chief, shop chief or technical directors. The noncommissioned officers are employed as the shop, section and department chiefs or as technicians in the military facilities. Officers and noncommissioned officers are subject to the internal service law. Their personnel rights are determined by the Turkish Armed Forces Personnel Law No:926. They are the chiefs of the workers, and evaluate the workers under their service for the employment record. The commander of the facility is also a higher degree officer. The officers employed in the military facilities and the related costs for the state are shown in Table 5.2 (Turkish Armed Forces Personnel Law 1961).

Title	Degree/Level	Cost for the State (YTL.)
Non commissioned officer (third rank)	8/3	1.304
Non commissioned officer (second rank)	5/3	1.434
Lieutenant	8/1	1.450
First Lieutenant	7/1	1.490
Captain	5/1	1.530
Major	2/1	1.600
Lieutenant Colonel	1/4	2.400
Colonel	1/4	2.900

Table 5.2 : Cost of the officers and noncommissioned officers (Share of state is taken as 20%. Average costs as of January 2006.)

5.1.3 Specialist Sergeants

Similar to the workers, some of the specialist sergeants who are graduated from the occupational high schools are employed in the production and included in the total man power capacity (man x hour). As well as the specialist sergeants who are employed in the production, there also exist sergeants who are employed in indirect jobs as driver or security. Some of the permanent staffs for workers are converted into specialist sergeant ones recently. Specialist sergeants are, as the other military personnel, also subject to the Internal Service Law for their personnel rights. The specialist sergeants and noncoms working in the military factories and the related costs for the state due to their degrees are shown in Table 5.3. (Turkish Armed Forces Personnel Law 1961

Title	Degree/Level	Cost for the State (YTL.)
Specialist Sergeant	10/1	1.194
Specialist Noncom	11/1	1.164

Table 5.3 : Cost of the specialist sergeants. (Share of state is taken as 20%. Average costs as of January 2006.)

5.1.4 Workers

They are the personnel who are hourly paid, and form the main man power in the factories. The workers are subject to the Work Law No. 4857 and employed in accordance with the articles of the 20th Term Collective Agreement signed between the Ministry of National Defense and Türk-Harp İş /Labor Union. The personnel rights and the working conditions of the workers are determined by the same agreement.

According to the present collective agreement, the workers have to work 5 days a week, 8,5 hours a day and totally 42,5 hours a week in act. But 30 minutes of resting time, 15 minutes of which is in the morning and the 15 minutes in the afternoon, is included in these working hours due to the collective agreement. In addition to that, another right granted to the workers by the collective agreement is the cleaning time. Paragraph “g” of the article no. 85 states that;

“The employer agent accepts that the workers can quit 5-15 minutes earlier (according to the level of dirtiness) in order to clean up their workbenches and themselves. This time is included in the working hour.” (20th Term Collective Agreement 2005)

For this reason all facilities allow the workers to quit earlier in order to clean up their workbenches and themselves. That's way the net daily working hour is 7 hours and 45 minutes, in other words daily man power capacity. (20th Term Collective Agreement 2005)

The workers are paid for 52 working hours in return to the net working time of 38 hours and 45 minutes. Over 45 hours a week is counted as the overtime, and according to the present legislation, these extra hours are paid with 80% additional charge. According to the present Collective Agreement and the Law No. 6772, every year 390 and 450 hour bonus additional disbursement is paid. Apart from these payments, in accordance with the articles of the present Collective Agreement, there exist additional payments like social support, food support, etc. (20th Term Collective Agreement 2005)

The bonus for the incitement of productivity is given to workers due to the Collective Agreement to decrease the absenteeism and increase the productive time. This subject will be mentioned later in detail.

The workers are paid individually according to the hour fee scale as per the Collective Agreement. There exist 45 different fee degrees in this scale. The workers are employed due to this fee scale, and in every two years they are promoted to one higher fee degree if their employment record is good enough. Also, according to the "exceptional promotions" statement which is indicated in the article 55 of the present Collective Law, the workers who show exceptional success or develop methods to increase the production and productivity, are promoted to the higher fee degrees.

The fee scale of employment depends on workers' educational background (secondary school, high school, technical high school etc.) and their previous experiences. The degree from which the workers will be employed is explained between the Articles No.34 and 40 of the Collective Agreement in detail. The average degree of all of the workers employed in the military facilities is degree 17 according to the May 2006 data. The number of workers employed in the military factories is given in Table 5.4.

Employer Organization of the Workers	Number of Personnel
Turkish General Staff	136
MinisYTL. of National Defense	897
Land Forces Command	9.838
Naval Forces Command	7.818
Air Forces Command	4.768
The General Command of Gendarmerie	1.945
Coast Guard Command	342
TOTAL	25.744

Table 5.4 : Number of the workers

Average labor wages together with the costs are shown in Table 5.5 related with the average seniority and education level(20th Term Collective Agreement 2005).

	YEAR OF SENIORITY	COST	MONTHLY NET PAYMENT	MONTHLY PAYMENT WITH BONUS
ELEMENTARY SCHOOL	NEW STAFF	2.207,98	1.379,30	1.694,92
	5	2.249,47	1.414,39	1.736,13
	10	2.302,26	1.438,42	1.767,95
SECONDARY SCHOOL	NEW STAFF	2.275,87	1.421,87	1.747,50
	5	2.366,38	1.478,63	1.817,62
	10	2.501,32	1.563,24	1.922,15
INDUSTRIAL VOCATIONAL HIGH SCHOOL	NEW STAFF	2.400,32	1.499,91	1.843,91
	5	2.543,63	1.589,77	1.954,93
	10	2.622,83	1.639,43	2.016,28
COLLEGE (ENGINEER)	NEW STAFF	3.700,80	2.319,77	2.864,44
	5	3.789,86	2.375,73	2.933,76
	10	3.924,39	2.460,24	3.038,45
AVERAGE FEE		2.837,80	1.774,22	2.182,80

Table 5.5 : Cost and fees of the workers. (It shows the average fees applied as of March 1st 2006. The bonus for the incitement of productivity is included.)

Employment termination benefits which must be paid by the employer in case of retirement, or cancellation of the contract by the employers is not taken into account in Table 5.5. Employer shares, which are paid by the employer, are included in cost section. (*Employer's share for social security* : 20% of the base pay, *Employer's share for unemployment insurance* : 2% of the base pay)

5.2 Conclusions On Personnel Matters After Field Study

5.2.1. The Bonus For The Incitement Of Productivity Paid To The Workers In Military Facilities

The job guarantee given by the state for either the working or the non-working workers encourage people not to work enough. Due to the Collective Agreement, the bonus for the incitement of productivity is applied in military facilities, in order to increase the workers' motivation and inspire working. It is thought that, the bonus for incitement of productivity, which is formed to increase the working time of the workers and to decrease their absenteeism, cannot fulfill today's needs.

According to the article 60 of the Collective Agreement, the bonus for the incitement of productivity is paid for every working hour as, 15% of the hour fee for the ones working 8.5 hours a day and 10% of the hour fee for the ones working 7.5 hours a day. This bonus is paid to everyone who comes to work, as long as they stay in the facility. But the bonus is not paid to the workers who are absent for an excuse, who are on annual leave or who have a medical report. For these reasons, this bonus is only effective to decrease the absenteeism but not to encourage workers to work harder during working hours.

Because of these reasons, following points need to be mentioned about the bonus for the incitement of productivity;

1) A study on the modification of this bonus must be made to increase the productivity of the worker in the workshop.

2) Arrangements must be included in the Collective Agreements that this bonus would be applicable to the workers who are the direct productive power in the workshops, and to inspire the others in indirect and office jobs to take place in the production by taking them out of the scope of this bonus.

5.2.2. Faulty Fee Policy In Military Facilities

Employment of different people in different statutes having different rights has a negative effect on work peace in facilities. The fact that the personnel in worker statute earn about 2.8 times more than the civil servants who do the same jobs in the same facility and earn more or about the same as their officers causes the injustice in fee which leads to ruin the work peace. This can be considered especially for the office jobs where the civil servants and the workers are doing the same jobs in the same rooms but

with about 2.8 times difference in their income just because of their statutes. In this situation, this causes the civil servants who earn less to lose their motivation and not to work. The same is also applied for the officers and noncommissioned officers who are in administrative positions in the military factories. The officers and noncommissioned officers who evaluate the employment records of the workers under their command, earn less than their workers, and this fact causes a great contradiction.

In the private sector, except from the very special occasions it is impossible for managers to earn less than the personnel under their command. In any case, this situation violates the certain upper-under position relationships. The idea of higher fee for under position ruins the leadership properties of the managers and causes troubles for the management. This situation causes the following facts;

- 1) Lack of motivation of the chiefs because of the fee policy,
- 2) Negative behaviors of the chiefs who are psychologically affected, towards the workers,
- 3) Privileged applications in the departments where both the workers and the civil servants are working.

For this reason, in order not to ruin the work peace in the military facilities, it is concluded that the current fee policy which causes the loss of productivity, should be rearranged. In this scope;

- 1) Establishment of a new fee-policy that prevents the chief to earn less than the workers under his command.
- 2) Making arrangements for the personnel in different statutes to earn equal salaries who are doing the same job.
- 3) In case, the arrangement for the personnel doing the same job to earn equal salaries cannot be done,
 - a. Rather than employing the personnel from different statutes to do the same jobs in the same departments or sections, it must be preferred to employ the same statute personnel in similar departments and jobs.

- b. Using the worker directly in the production whereas the civil servants in the administrative activities,
are important to set the work peace and to increase motivation in the workshops.

5.2.3. Transfer Of Unqualified Jobs To The Subcontractors

Higher labor wages in public sector increases the cost of jobs done in public institutions and organizations. For this reason, most of the public institutions and private sector open bids for the jobs like cleaning, gardening and catering, which are out of their primary concern but need to be done. By this way, the organizations have the opportunity to decrease the number of the workers, and the general production costs by having done the non-value added jobs cheaper and considering the man power of the qualified and highly paid workers as their main scope.

As it was previously mentioned, the current fee policy applied in the military facilities is based on the hour fee and does not depend on the property or difficulty of the job but on the seniority and education of the workers.

There are also exist jobs in the military facilities done by the unqualified workers for high labor wages. For example, approximately 300 workers are employed in the catering activities for the lunch of the personnel of the military factories. It was shown in Table 5.1 that the cost of the workers in the military factories is approximately 2.800 YTL.. By awarding these services to the private sector, 60.71% of the personnel cost could be saved. Furthermore, this amount increases if the employment termination benefits paid to the workers are taken into account (Note: average labor wages of 5 of the biggest catering firms are taken into consideration for the calculations. Average labor wage is found to be 1.100 YTL. per capita.). For this reason, it is concluded that letting contracts for such services like catering and cleaning is important to decrease the high general production costs of military factories. Letting contracts to the private sector for such services by taking no more workers in place of the retired ones is important to increase productivity.

5.2.4 Business And Occupation Branches Of The Workers Employed In The Military Facilities

The workers are employed according to the business and occupation branches stated in the Collective Agreement for the jobs suitable also for their educational background (occupational high school, technical high school). There exist totally 334 different business and occupation branches in the Collective Agreement, 35 of which are for the officer's clubs and 295 for military factories and other units. Table for the Business and occupation branches can be seen in the 20th Collective Agreement which is used in MOD (Ministry of Defence).

It is thought that such large number of business and occupation branches is an handicap for productivity and effectiveness of the workers. Different business and occupation branches are set in the Collective Agreement even for very similar jobs. Because of this, in case of a need, it becomes difficult to change the business and occupation branches of the workers for the similar jobs. Because of the fact that the facilities are mainly on maintenance, repair, and work load is high in one period and low in another. There is a need for repositioning from low work load departments to high ones in order to avoid possible bottlenecks. Besides, there is a need to employ the workers in another department or expertise and in other business and occupation branches similar to their own or even by changing them with appropriate education, in case of the existence of unnecessary workers as a result of closure of the departments and workshops. But the Collective Agreement makes it difficult to change business and occupation branches or to reposition the workers according to the needs.

Article 44 of the Collective Agreement states that; “in case of a necessity, the employer agent can employ the worker in or out of the workshop in another profession, which is the worker’s own, suitable or similar to his occupation only if the worker’s health is not risked and after the necessary education is given.”

Even though it seems to be possible to employ the workers in similar business and occupation branches through this article, there exist major difficulties in the application of the statement. Because of the fact that the similar business and occupation branches are not fully defined in the content of the article in question, conflicts between the workshop managers, workers and Türk-Harp İş Labor Union occurs. It is thought that the existence of 295 different business and occupation branches in the current Collective Agreement causes the main problem.

The main approach to the problem today is to accept the importance of specialization in certain areas but to set specialization as a collection of works comprising a certain activity rather than limited partial specialties. This approach is important to decrease the certain worker dependence together with the effective use of man power. Today, workers are subject to the rotations among different departments to achieve specialization in different areas regardless of the certain business and occupation branches. A new policy aiming workers to gain specialization and experience in more than one area and to employ them in various jobs is important to be applied in the military facilities in order to;

- 1) decrease the worker dependence,

2) solve the problems in changing the business and occupation branches of the workers,

3) prevent the conflicts about the business and occupation branche changes, between the employers and workers.

The necessity of decreasing the number of 295 different business and occupation branches, which are defined by the Collective Agreement, by taking the similarities and relations into account is thought. In this scope, it is important to study on grouping the similar jobs by classifying the business and occupation branches by taking the properties and specialties of the different jobs into account in order to utilize the manpower more effectively.

5.2.5. Employment Of The Workers Out Of Their Area Of Specialization

High labor wages in the public sector increase the production costs in facilities. Here, the point to pay attention is that, the highly paid workers are not employed out of the production process, for the jobs which can be done by the unqualified personnel and the office jobs that can be done by the civil servants. In the military facilities, the workers who are employed in “turner, battery technician, electrician etc.” statutes and should be working in the production, are utilized in the office services and unqualified jobs because of the following facts;

But it is concluded that, the workers who are employed in office work or unqualified jobs in spite of their technical qualifications should be employed in the production process because of the following facts, (who are not handicapped);

- 1) cost of about 2.8 times more than the average cost of the civil servants,
- 2) the number of personnel in indirect jobs is above the private sector average.

Also the necessity of utilization of the highly paid man power more effectively by analyzing the current personnel structure is concluded and following precautions should be taken;

- 1) cancellation of the unnecessary staffs
- 2) necessary staff in offices which are defined as for worker statute, should be rearranged for civil servants
- 3) employment of civil servants for the jobs in case of releases by the workers for any reason.

5.2.6 Education Levels Of The Workers

Today, the qualification and education levels of the workers are very important to mention the performance and productivity of the current man power and to determine its applications in certain standards. Especially, the maintenance characteristics of the jobs in the military facilities make the knowledge and skills of the workers much more important. Definition of the source of the malfunction in the vehicles which are sent to the factories as a result of damage or a defect is the most important point. The definition and identification of the source of the malfunction at once is important for many subjects like the effective utilization of the man power and early delivery of the vehicles.

Knowledge and skills of the workers are improved by continuous educations in homeland and abroad because of the fact that the most of the vehicles are the products of advanced technology and the continuous improvements in weapon technology. But, as there does not exist any motivation in the Collective Agreement on joining such trainings in which they participate and certified, it becomes problematic to decide on which workers to be sent for the trainings.

The idea of improvement as a result of the trainings is important for the workers' motivation. For this reason, the following facts may be important in improving the effective utilization of the man power;

- 1) identification of the qualifications that must be possessed by the workers who work in the departments where the malfunction of the vehicles is defined,
 - 2) employment of the personnel with these skills in the related departments,
 - 3) bonus for the true definition of the malfunction per vehicle or supplementary fee payment for the workers of these departments can be solutions to motivate the workers and to complete the process in shorter time. The main point in effective utilization of the man power is finding the true definition of the malfunction and accordingly repairing it at once (the bonus for true definition is thought to be much more effective as it leads the worker to be more careful in order not to make a mistake),
 - 4) arrangement about this bonus which is paid for every true definition must be set in the collective agreement to obtain a certain increase in the worker's fee (for example, 0.1% per true definition but 15% of total increase cannot be exceeded).
- Many other different approaches to this problem can also be found.

5.2.7 Application Of Flexible Working System In Military Facilities

Current collective agreement, which was prepared in the light of the Labor Act Number 1457 which was in force until 2003, is still being applied. But until June of the year 2003 the Labor Act Number 1457 was abolished and Labor Act Number 4857 has been in force.

Labor Act Number 4857 made it possible to utilize new applications on flexible working system in business life. New law gives chance to flexibility in employment and working hours.

Article 63 of the Labor Act Number 4857 states that; “In general terms, working time is forty-five hours maximum weekly. Unless the contrary has been decided, working time shall be divided equally by the days of the week worked at the establishment. Provided that the parties have so agreed, working time may be divided by the days of the week worked in different forms on condition that the daily working time must not exceed eleven hours. In this case, within a time period of two months, the average weekly working time of the employee shall not exceed normal weekly working time. This balancing (equalising) period may be increased up to four months by collective agreement” (Work Law 2003).

As it can be clearly understood from the provision of the law, the state does the appropriate arrangements in Labor Act Number 4857 to encourage the production in the country and to utilize the man power capacity which is a scarce source, effectively in case of essential necessity. As the main jobs in the military facilities are maintenance and repair based, the work load increases and decreases in some certain periods. The work load increases especially before the maneuvers and operations and decreases afterwards. This situation leads to bottleneck in manpower in certain times and idle capacity in other periods. In contrast to full time employment in Labor Act Number 1457, flexibility in working hours was brought by the Labor Act Number 4857. Through this law, following possibilities are arranged;

- 1) overtime can be done in return for vacation,
- 2) working more when work load is high and less when work load is lower,
- 3) overtimes are disregarded if average working time does not exceed 45 hours a week in some certain periods.

Flexible working system which was set by the new law is very important to be applied for increasing the productivity in the military facilities where the maintenance

and repair based jobs are done and the work load changes from time to time. In contrast to the new law in question that brings flexible working system, the Collective Agreement which was signed in accordance with the Labor Act Number 1457 makes it impossible to apply the flexible working. Article 33 of the Collective Agreement states that; “Overtime;

a. Works which are done more than the daily working time of the workers and are the continuation of that day, are called “working in extra hours” (overtime). Overtime cannot be done in return for vacation...”

Due to this article, it is not possible to do overtime work in facilities in return for vacation. Even though, two more Collective Agreement negotiations were made as of June 2003 when the Work Law No.4857 was put in force, but the articles about the flexible working system could not be imported into the agreement.

It is concluded that, it is important to set the flexible working system in the collective agreement because of the following aspects;

- 1) to handle workload in the military factories which changes time to time,
- 2) decreasing the idle man power in military factories,
- 3) increasing the morale and motivation of the workers by giving vacation to let them do their private duties out of their legal time when the workload is low.

5.2.8. The Number Of The Indirect Personnel

It is possible to divide the existing personnel in the military factories into three main classes, as explained in Chapter 3 and which are namely, the direct personnel taking place in the production, the indirect personnel taking place in the production and the indirect personnel who are not taking place in the production.

Working places of the personnel in the factories are shown in Table 5.6 according to the inspections on 24 military factories.

	L.F.C.	N.F.C.	A.F.C.	TOTAL
<i>Number of Direct Workers</i>	3.904	4.036	2.214	10.154
<i>Number of Indirect Workers in Production</i>	680	1.337	1.095	3.112
<i>Number of Indirect Workers Out of Production</i>	1.302	830	298	2.430
<i>Number of Indirect Workers per Direct Worker</i>	0,51	0,54	0.63	0,55
<i>Number of Personnel per Direct Worker</i>	0,95	0,87	0.98	0,92

Table 5.6 : Distribution of the personnel in the workshops according to the area of working. (Specialist sergeants and technician noncommissioned officers who are utilized as the direct productive power in the workshops are included)

As it can be clearly understood from the table above, there exist approximately one indirect personnel per direct worker in the military factories. The high number of the indirect personnel causes the general production expenses to rise which yields to the increase in the workshop costs.

The comparison of the direct, indirect power of the metal industry, which is doing the similar jobs, to that of the military factories is shown in Table 5.7.

	L.F.C.	N.F.C.	A.F.C.	Metal Industry.
<i>Number of Direct Workers</i>	3.904	4.036	2.214	65.105
<i>Number of Indirect Workers in Production</i>	680	1.337	1.095	19.618
<i>Number of Indirect Workers Out of Production</i>	1.302	830	298	
<i>Number of Indirect Workers per Direct Worker</i>	0,51	0,54	0.63	0,30
<i>Number of Personnel per Direct Worker</i>	0,95	0,87	0.98	0,30

Table 5.7 : Comparison of the number of indirect personnel per direct personnel to the metal industry. Private sector data were retrieved from statistics published by the Metal Industrialist Employers' Trade Union (MESS).

In the private sector facilities, the personnel in administrative positions (white collar) are included in the indirect worker statute. Similar to the private sector, military department based ratios of direct productive power to the total number of the personnel is shown in Table 5.7 in which the officers, noncommissioned officers, civil servants and specialist sergeants (specialist sergeants and noncommissioned officers in the production are taken into calculation) are included in the indirect workers statute. Military factories have 3 times more indirect workers than metal industry.

It is concluded that, following precautions should be taken in order to prevent the problems caused by the excessive number of the indirect personnel;

- 1) giving priority to the repositioning of the workers from the workshops where excessive man power exists in place of the quitting workers,
- 2) cancellation of the unnecessary staffs by doing personnel analyses,
- 3) repositioning of the workers directly in the production who are able to work in the production due to their business and occupation branches.

5.2.9 Worker Administrators In Military Facilities.

According to the Articles No.65-66-67 of the Collective Agreement, worker administrators are charged among the workers of the workshop in order the technical

and administrative jobs to be done and the workers to be directed. There exist 3 types of worker administrators due to the collective agreement. The types are given;

1) Worker administrators of group A: Worker who coordinates more than one workshop units that are connected to him. 14% of their hour fee is paid as the administration bonus. They are not included in the man power calculations.

2) Worker administrators of group B: Workers those are responsible for minimum two to maximum seven teams. 9% of their hour fee is paid as the administration bonus. They are not included in the man power calculations.

3) Worker administrators of group C: Workers who are responsible for one team, included in the team and directly working. They are included in the man power calculations. 6% of their hour fee is paid as the administration bonus. The teams are composed of minimum three maximum nine workers.

Worker administrators can be charged for certain times among the workers taking their education, capability, administrative attribute and seniority into account in case there exists a necessity or not enough officers, noncommissioned officers or engineer class civil servants. It is essential to give this position to the workers for some certain time until the necessity is covered. The following facts are noted as the results of the examinations on the worker administrator system application;

- 1) Worker administrators are more than necessary,
- 2) Worker administrators are charged in violation of the collective agreement,
- 3) Worker administrators are charged among the workers in units/ departments where officers and noncommissioned officers exist.

The worker administrators charged at present in the Turkish Armed Forces is shown in Table 5.8.

WORKER ADMINISTRATORS	DEPT. of NAT. DEF.	GENERAL STAFF	L.F.C.	N.F.C.	A.F.C.	T O T A L
A	-	-	55	53	8	116
B	9	-	352	218	127	706
C	42	4	1.035	738	308	2.127
T O T A L	51	4	1.442	1.009	443	2.949

Table 5.8 : Worker administrators charged in the military workshops (as of June 2006)

Totally 822 group A and B worker administrators are charged in the military workshops. Because of the fact that the worker administrators are not used in

production, the man power of specialist workers is lost and the labor capacity is decreased. The lost working time based on year according to the working time of the worker administrators is shown in Table 5.9.

Number of Worker Administrators	Net Daily Working Time (Min.)	Daily Lost Productive Power (Man x Min.)	Annual Lost Productive Power (Man x Min)	Annual Lost Productive Power (Man x Hour)
822	465	382.230	86.001.750	1.433.362,5

Table 5.9 : The lost productive power as the result of charging worker administrators of group A and B.

Annual, productive power of 1.433.362,5 (man x hour) cannot be utilized due to the absence of the worker administrators of class A and B in production. In addition to this, administration bonus paid to the workers increases the production costs in workshops Arrangements done in collective agreement about the worker administrators to take place in the production may be helpful for;

- 1) Effective utilization of the current man power capacity,
- 2) Decreasing the production costs in the workshops,
- 3) Decreasing the number of indirect personnel,
- 4) Utilizing the qualified workers in the production.

5.2.10 Classification Of The Jobs In The Military Facilities

Another point to be emphasized is that, the relationship between the cost of the man power and the employment is not in the same direction with that of between the qualified and unqualified worker. Especially if the private sector is examined, it can be identified that the fee system shows differences according to the jobs done. For example in the Mercedes-Benz service in İzmir (similar vehicles are repaired and maintained in the military workshops), the workers are observed to be classified into three groups as;

- 1) Apprentice,
- 2) Master Workman
- 3) Foreman

and the salaries are defined accordingly. Apprentices are composed of the graduates of vocational schools. They are doing the unqualified jobs (changing the tires, changing the motor oil, assembly etc.) for which any knowledge or skill is not required and ordered by the master workmen. The master workmen are composed of the personnel

who are the graduates of vocational high school, working in specialized jobs and have received various training on vehicles. The foremen are the graduates of the related engineering departments of the universities, have received trainings locally and abroad, and are the specialists of certain subjects. The office jobs like planning, procurement and accounting services are executed by the specially trained personnel.

The most important subject here is to set a salary-career system by classifying the personnel according to the jobs done. The company has classified the jobs in difficulty degrees and the trainings required and set the fee policy accordingly.

If the military facilities are examined, it can be observed that the education level is taken into account for employment but the property of the job is not considered in fee policy. For example, the workers repairing of the electronic circuits or the engine of a tank are working in the same statute with the gardeners or catering servants. One group earns the same money by taking risk and responsibility for the maintenance, whereas the other by doing an unqualified job without taking any risk or responsibility. Application of such a policy causes the following negativities;

- 1) the work peace to be spoiled,
- 2) direct productive power to tray to be transferred to indirect jobs,
- 3) insufficient working of the worker because of the injustice in the application.

The important point is that, the workers need to be treated equally and this need affects their motivation. The working personnel abnegates his faith on equality which leads to lack of motivation if he realizes that the others doing less tiring and easy jobs and earning the same amount of money. Equal money for equal job principle must be carefully set. Defining the following facts is important to obtain justice in fee policy, to increase the productivity of the facilities and to attract indirect personnel to the production.

- 1) Classification of the jobs according to the difficulty and contents.
- 2) Making classification according to the difficulty of the jobs.
- 3) Extra bonus should be paid with the hour fees according to the classification, starting from the most difficult and important job group.

5.2. Conclusion

The level of productivity is affected by the technology of the company, the personnel employed and administrative culture of the company. The personnel employed stands in the focus of these factors. Because, no matter how much new the

technology is or how modern it is, the productive utilization of that technology depends on the performance of the working personnel. Great savings can be obtained in the operation of turning inputs to the outputs by increasing the productivity even a little bit. It is essential to produce products or services out of the sources effectively for all of the organizations no matter profit or nonprofit. The man power is the very first one of such sources. Especially in the military factories where repair and maintenance jobs are carried out and mechanization is not high, the labor factor has great importance. In this chapter, personnel subjects which create difficulties in effective and productive utilization of the productive power, and useful solutions for these situations are mentioned.

CHAPTER 6

COST ACCOUNTING APPLICATIONS IN MILITARY WORKSHOPS

6.1. Cost Accounting System In Military Facilities

In this section, cost accounting system applied in the military facilities together with the improvements that can be made to calculate the production costs more realistically, to make better analyses and as a result to prevent the false decisions, are tried to be examined.

The main purpose of the cost accounting system applied in the military facilities is to determine, record, appropriately distribute the operational costs and as a result, to calculate the cost of the product. In other words, to define the final product cost and related expenses in previously defined expense items for the vehicles repaired and maintained and for the products produced. Main expense items are composed of mainly four different sections which can show differences in the literature.

Cost accounting has mainly four purposes in the military facilities. These are;

- 1) defining the unit costs
- 2) controlling the costs
- 3) forming the information for planning (like budget)
- 4) helping the management level and middle level managers in their decisions for future applications.

Cost accounting system works to form three main indicators in three levels in the military facilities. These indicators are separated into three as follows;

- 1) operation unit cost (workshop cost per hour)
- 2) cost of the product
- 3) budget.

6.2. Operation Unit Cost (Cost Of Workshops Per Hour)

6.2.1 Main Expense Items Forming The Operation Unit Cost

The first level of cost accounting in the military facilities is the calculation of operation unit cost. Operation unit cost is the average labor production cost for one man-hour. Operation unit cost is calculated by dividing the total expenses of the

workshop in a certain period by the total man power capacity in the same period. The operation unit cost is calculated based on the following expense items. These are classified as;

- a. direct labor cost
- b. indirect labor cost
- c. depreciation
- d. general management expenses (Layard and Glaister 1984).

a. Direct Labor Cost : It is the labor cost which is spent to produce the main production subject of the enterprise and is directly included in the total cost.

b. Indirect Labor Cost : This is the labor cost of the personnel who direct job is not defined but are supporting the direct work power (like workshop chiefs engineers and draughtsman) and defined also as the productive power.

c. Depreciation : Depreciation provision for the building, establishment, workbench and equipment in the production zone. Depreciation rates are defined by communiqué number 55 of the tax procedure law of the Revenue Administration of the Ministry of Finance. The calculations are done in the facilities according to these rates.

d. General Management Expense (Overhead Costs) : it is the expense item in which the costs for the management of the facility and command headquarters are included. The following costs are taken into consideration for general management expenses.

6.2.2. Calculation Of The Operation Unit Cost

For the calculation, every main expense item explained above is added in itself and separate costs are calculated. Then, the capacity of the man power is calculated by taking the net working hours of the direct workers manpower in the production into account (man x hour). The totals of every main expense items are divided by the net capacity of man power in order to find the labor cost per hour for each expense items. Operation unit cost is obtained by the addition of the unit costs of each of the expense items. Because of the difficulty in calculation of the labor costs separately, in the calculation of the indirect and direct labor cost, the method of distribution of the personnel expenses according to the ratio of the number of the direct workers to the number of the indirect personnel, is a widely accepted approach in many organizations. Operation unit costs of some of the military factories are shown in Table 6.1 (per hour).

	1st HİBM (YTL)	2nd HİBM (YTL)	3rd HİBM (YTL.)
Direct Labor Cost	16	16,3	11,6
Indirect Labor Cost	1,5	2,4	1,6
Depreciation	2,4	1,1	1,4
General Management	14,2	18,9	27,4
Operation Unit Cost	34,8	39,2	42,2

Table 6.1 : Operation unit costs of certain facilities (labor cost per hour)

As it can be clearly understood from the table, there exist important differences between the operation unit costs of the military facilities. The factors creating such differences can be given as follows;

- 1) the average seniority of the workers show differences
- 2) the number of the worker engineers
- 3) education level of the workers
- 4) the numbers of direct workers in the production, indirect workers out of the production and the personnel out of the production.

Beside the reasons above, different methods in cost accounting calculations in the facilities together with the disregarding of some of the expenses in the calculation of the unit costs create the differences.

These differences as the results of the calculations can cause the following consequences;

- 1) Unity in application among the workshops cannot be obtained,
- 2) Costs cannot be calculated realistically,
- 3) False decisions in future applications and for the evaluation of the facilities,
- 4) False decisions of the headquarters in purchasing or production of a certain product in the military workshops.

6.2.3. The Reasons Of The Differences In The Operation Unit Cost

Avoiding the differences resulting from the calculations is very important in terms of realistic definition of the costs. These differences can be summarized under two titles. These are the designation of the labor capacity more than the actual state and excepting some of the expenses in the facility.

6.2.3.1 Designation Of The Productive Power Capacity More Than The Actual

An increase in the total man power capacity of the facility leads to a decrease in the unit cost calculation of the facility. Some of the organizations designate the man power more than the actual state in order to obtain a lower production cost, which is regarded as a success. It is essential to define the direct labors correctly in the calculation of the man power capacity. The aim should be to decrease the unit production cost by increasing the number of the direct labors in the production (By increasing the production capacity). The mistakes about the calculacition of capacity can be summarized in three titles.

Taking The Net Production Time Per Worker Much.

Net production time of the facilities is 7.75 hours. But in the unit cost calculations of the facilities, the man power capacity is taken as if the workers are working 8.5 hours net. This virtual extra time causes the man power capacity to increase which yields the operation unit cost to be calculated less than the actual value. The same situation is valid for the workers working 7.5 hours a day. It is evaluated that, the cost would be more realistic if the net production time is taken into account in the unit cost calculations.

Disregarding The Workers Having 7.5 Hours Of Working Time.

Several jobs like welding, casting, battery production are evaluated in the scope of “The Regulations About the Jobs to be Worked on Seven and a Half Hours a Day Due to the Medical Safety” in the workshops. The workers working on such jobs are employed according to the current law for 7.5 hours of working time. But such workers are taken in the unit cost calculations as if they are subject to 8.5 hours of working time. This situation leads to the increase in the man power capacity and unit cost to be calculated less. It is evaluated that it is useful to include the actual working time of such workers in the cost calculations.

Addition Of The Indirect Workers Into The Net Manpower Capacity.

In the calculation of man power capacity, it is observed that the workers who are expected to be working in the production according to their branch of vocation but actually working out of the production departments are included in the man power capacity. For example, the workers who are expected to be working directly in the production as battery producer, engine technician can be charged for the jobs out of the

production like stock control, documentation, loading and unloading. Such workers should not be taken into account in man power capacity calculations if they are working out of the production. The personnel, no matter which branch of vocation is possessed, working directly in the production must be taken into consideration. The engine technician should not be evaluated in the productive power calculations, if he is actually working in catering and the dishwasher worker should be taken into account if he is actually working in the workshop for battery production.

6.2.3.2. Exclusion Of Some Of The Payments To The Workers

Various payments to the workers are valid according to the current laws and the collective agreement in force. Taking less or not all of the expenses into the unit cost calculation, causes the costs to be calculated less than the actual value. The costs of the supportive military units, premium payments for social security are not included in the calculations as they have no relation with the production. But it should not be forgotten that these company level units are equivalent to the personnel employed in the private sector for the services as security, cleaning and maintenance.

6.3. Cost Of Product

Direct material cost is included in the production cost calculation in addition to the four expense items forming the operation unit cost. Direct material cost is the price of supply of the material which is directly used in the product and whose amount is defined in job order base.

Product cost is found by adding the direct material cost to the multiplication of unit operational cost by time “man x hour” used for that job order. As the materials used in the military facilities are bought in high amounts and by letting contracts, it is possible to get the materials cheaper compared to the private sector. The material cost forms the minor part of the total cost because of the repair and maintenance characteristics of the jobs in the military facilities. On the other hand, because of the high labor cost in the public sector, the labor cost forms the major part of the total cost and becomes much higher than the private sector rates. Proportional distributions of the costs of certain facilities are shown below.

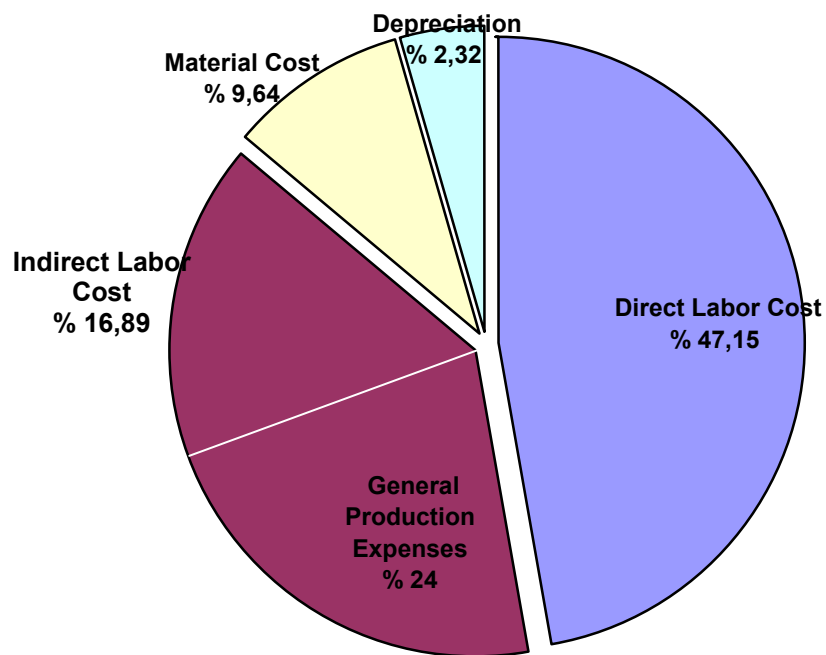


Figure 6.1 Distribution of the costs of a workshop on repair and maintenance of ships

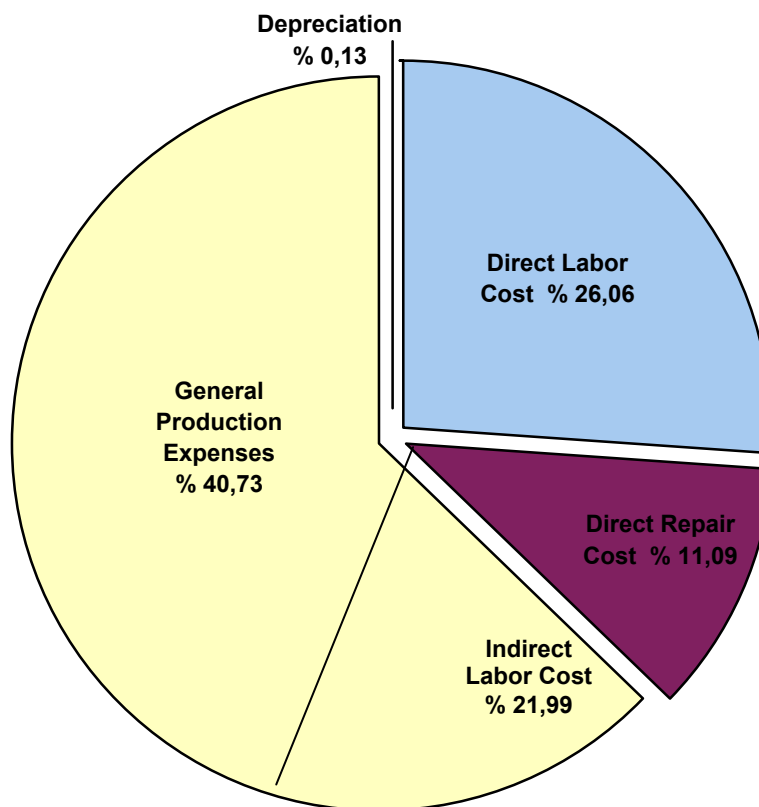


Figure 6.2 Distribution of the total costs of 6 workshops on repair, maintenance and renovation of heavy weapons like tank, caterpillar and karyer.

**Depreciation
Cost**

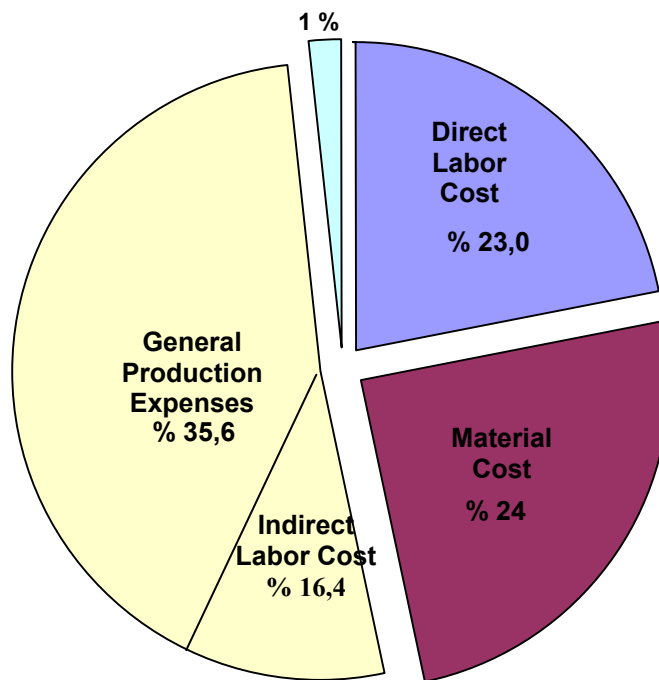


Figure 6.3 Distribution of the costs of a workshop on repair, maintenance and renovation of heavy weapons like tank, caterpillar and kariyer.

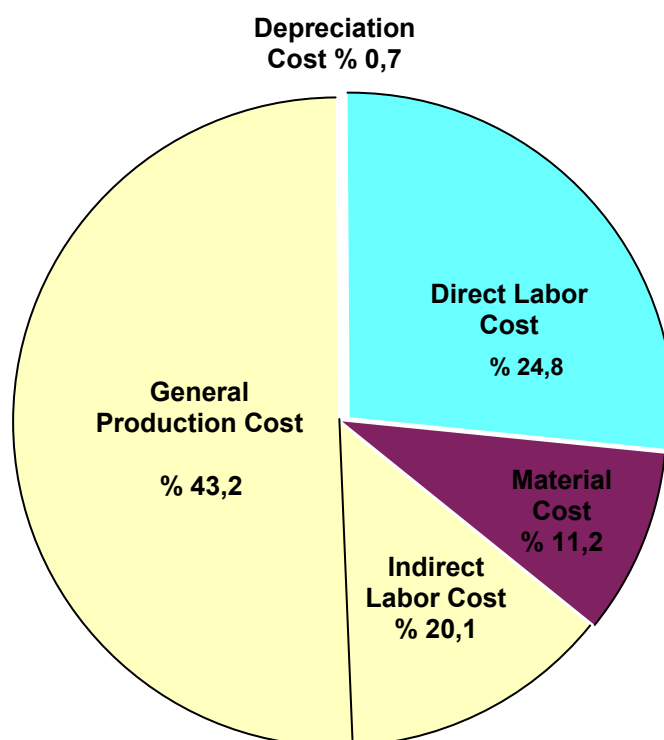


Figure 6.4 Distribution of the costs of a workshop on repair, maintenance and renovation of various vehicles (munitions, ordnance, and fortification classes)

Figure 6.1

A facility that is working on the repair and maintenance of the ships is taken as the example. The facilities of this type maintain the ships by utilizing high capacity of man power and work in labor-intensive way. The direct labor cost is higher than it is in the other three figures because of the labor-intensive characteristic of the job. It is thought that, it is important to separately evaluate indirect personnel cost which is not shown separately in the calculations of the organizations, in order to define the sources of the expenses. It will be appropriate to arrange the related legislations about the cost calculations, to permit such a method.

The high amount of depreciation compared to the others is due to the new pools built in the plant. High cost of these new pools and the high rate of depreciation in the first years cause depreciation cost to rise.

Figure 6.2

Distribution of the costs is presented in the graph by taking the average costs of 6 different facilities having different number of workers and demographic structures. These 6 facilities do the maintenance activities of the ordnance equipments like the tanks, cannons and wheeled vehicles, belonging to the L.F.C. As the result of the calculation, the ratio of direct labor cost of the facility to the total cost is found to be 26,06 %. 21,99 % and 40,73 % of the total cost is formed by indirect labor cost and general production expenses, respectively. High labor wages in public sector, ineffective utilization of the man power in the workshops, and high number of workers who are indirect and out of the production causes general production costs and indirect labor cost to rise. High indirect labor costs and general production costs prevent the facilities to work cost-effectively.

Figure 6.3

Cost distribution of a facility doing maintenance and repair activities of the air vehicles are shown in the third figure. The material cost is higher compared to the others as the cost of the materials required for the jobs to be done on the air vehicles is high. The other expense items forming the cost are similar to the others.

Figure 6.4

One of the facilities whose averages were taken for the second figure is shown in the fourth figure. This facility is showing similar cost distribution with the average values. The depreciation ratio is low because of the fact that the workbenches in the

facility is old and the mechanization is not much due to the repair and maintenance characteristics of the jobs.

6.3.1. The Comparison Of The Cost Distribution Of The Military Workshops To The Private Sector

The high labor costs in the public sector and number of indirect personnel cause unit production costs to be much more than it is for the private sector, distribution of the expenses to be different and production costs to be higher. The comparison of the proportional distributions of the average costs of the six military facilities to the average costs of the all of the companies in metal and chemistry industries is shown in Figure 6.5. The data on the metal and chemistry industries is obtained from the annual statistics booklet of Turkish Employers' Association of Metal Industries. The direct and indirect labor costs are calculated separately in the military enterprises whereas in the statistical data given on the private sector indirect labor cost is included in the general production expenses. Therefore, the indirect labor costs in the military facilities are added to the general production expenses.

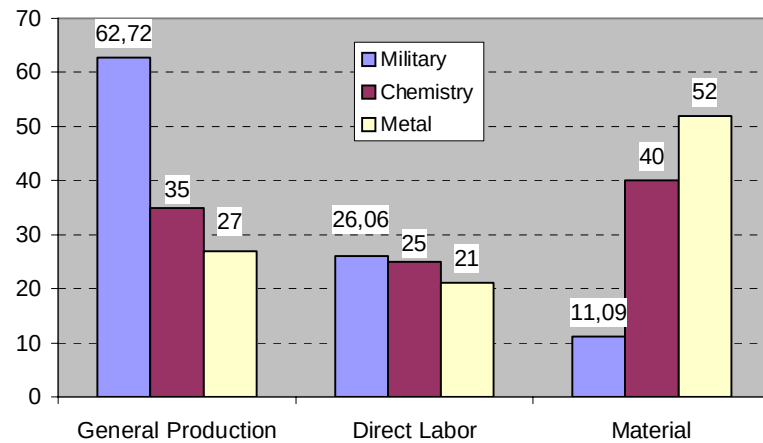


Figure 6.5 Comparison of the military enterprises to the private sector

It is once more observed how high the indirect workers is in the military facilities. General production cost, which is in the order of 35 % in the chemistry industry and 27% in the metal industry, is calculated to be 63 % for the military facilities. This ratios show how important it is to take appropriate precautions to decrease the amount of the indirect personnel. The general production expenses are 132,3 % and 79,2 % higher than that of the metal and chemistry industries even though the military enterprises do not have expenses like marketing, distribution, promotion and advertising. These precautions are explained in Chapter 5 in which the personnel subjects are presented.

It is observed that the ratio of the direct labor cost in the total cost is 26 % in the military facilities, whereas it is in the level of 21 % in the metal industry. and 25 % in the chemistry industry. The amount of difference in the ratios of direct labor costs is not too much to be considered. The small amount of difference is thought to be due to the high labor wages and to the jobs done which are repair and maintenance based labor-inclusive jobs.

If the material cost ratios in the total costs are examined, it is observed to be 11 % for the military facilities, 52 % for the metal industry and 40 % in the chemistry industry. Difference in the material costs is thought to be due to the following facts;

1) the military facilities, which are doing repair and maintenance based jobs, does not need material as much as a factory in metal or chemistry industry,

2) the material need falls as the parts disassembled from the vehicles other than inventories are used as the spare parts,

3) the materials are purchased in high amounts and by letting contracts; therefore the unit material cost is decreased.

6.4. Preparation Of The Budget

Third step after the calculation of the operation unit cost and the product costs in the cost accounting is the calculation of the budget. In annual cost estimation, the annual cost prediction is calculated by multiplying the operation unit cost of the previous year (in dollars and by adding the approximate inflation and price increase rates) by the planned amount of production, maintenance and repairs belonging to the current year. It must not be forgotten that a realistic budget prediction depends on the true calculation of the unit production cost and annual man power capacity.

6.5. Revolving Fund Activities In Military Facilities

Jobs are also done for the private sector in the military workshops in the scope of revolving fund according to the Law Number 3225 in order to utilize the idle manpower and to return some amount of the worker costs back to the state. The revolving fund activities are especially done in the shipyards and the workshops where repair and maintenance services of the air vehicles are done. The main philosophy of the revolving fund activities in the public sector is to record gains for the state and to return some amount of the worker costs back to the state by utilizing the workers in jobs instead of leaving them free. The revolving fund activities must be done in the scope of the “Law Concerning the Formation and Operation of the Revolving Fund in the

Institutions of the Ministry of National Defense together with Land, Naval and Air Forces Commands” (Number 3225). Article 10 of the subject law states that; any expenditure made in the scope of the revolving fund should be added to the hourly labor cost (operation unit cost) applied for the subject jobs. It is thought that it would be appropriate that the calculation of the hourly revolving fund price which causes different applications in the facilities (calculating it less than the actual fee per hour) and explained in the third chapter should be done by involving every expense of the factory for the subject job. Hourly labor wage calculation presented in the third chapter can also be used for such an application.

On the other hand, it must not be forgotten that the subcontracting of such jobs, apart from the special applications, in the military facilities would decrease as a result of the high labor costs, if all of the costs are included. It is clear that, such a situation which seems to prevent the return of some amount of the payments made for the inactive labor back to the state, is the starting point of the bankruptcy in private sector on the contrary. A company spending more than it gains has to fail at last. Revolving fund should not be considered as doing jobs at a loss. For this reason it is thought that it is important for the military enterprises to work with the same logic by comprehending the main job as the maintenances and repair of the vehicles belonging to Turkish Armed Forces and together with preventing the idle man power and compensating all of the expenses done by the turning fund.

6.6 Conclusion

There exist some differences due to the factors explained above in the calculation of the unit costs. It is thought that it would be advantageous to make the comparison of the costs among the facilities after a unity in application is established. For this reason, an approach related with the calculation of the labor cost is developed in order to standardize the inspections on the facilities and all of the facilities are examined accordingly.

It is concluded that it is important to apply the method of calculation explained in the third chapter or to find a new approach, to obtain standardization in the military enterprises. By this way, it would be possible to evaluate cost benefit analyses correctly in the decisions on purchasing or producing the products.

CHAPTER 7

EFFICIENCY IN MILITARY FACILITIES

Converting the available resources to products or services in the most efficient way is the main purpose of both profit and non profit organizations (Adam and Dogramacı 1981). Even obtaining a small amount of increase in the conversion of inputs to outputs creates significant amount of savings. As such, military facilities in our country may be set as a good example for large-scale organizations, which have a high number of employees. Therefore, benefits obtained with small increases in efficiency (productivity) will create significant savings in such a large-scale organization. Accordingly the issue of efficiency turns out to be an important case for military factories. The purpose is to make use of the limited resources of the country as well as of the Armed Forces, for obtaining the highest quality in production and maintenance with the least waste of resources.

The military facilities have a slow and bureaucratic structure, in which certain provisions of related legislations must be observed during production, since they are public institutions and establishments. The efficiency of factories is adversely affected from the legislation and redundant bureaucratic procedures that must be observed during personnel recruitment and dismissals as well as during the provision of raw materials and spare parts. While private facilities succeed in evaluating and implementing any efficiency-increasing factor, military facilities can never achieve these because of their awkward structure.

This part focuses on other factors, with the reasons, that are considered to have adverse affects on the efficiency in military facilities; and solutions have been offered for the elimination of such affects.

7.1 Standard Times And Operation Times

Principle aims to ensure that employees of an enterprise work in the most efficient way and the related machinery is used at the highest possible extent. In order to achieve such purposes, the facilities should, ideally, carry out its operations, especially the production processes, based on the type and quality, as well as on the standard times, professionally established.

Standard time, is the time in which a worker with normal capacity can complete a certain work under certain conditions and which is established in accordance with the rules of work study. The time required for the completion of a certain piece of flow, does not only depend on the person who is working but also on the working techniques, methods and conditions. Accordingly, the function of the person conducting the work study is not to measure time with a chronometer but to define the other factors; and to establish the time needed for completion of the work by measuring time after taking the measures required for the elimination of factors adversely affecting the working time(Barnes 1980).

Major increases in the efficiency may be obtained by making minor arrangements and measurements with a little cost. Work study has a significant role at this point. Work studies ensure that enterprise efficiency increases by work arrangement, standardization and establishment of the production data in the most appropriate way. Therefore, work study techniques can be considered as an important tool that may be used to obtain an increase in the efficiency of an enterprise.

Standard times, established for the ongoing manufacturing activities, by using the time study techniques are not applied in most of the military facilities. Instead operation times for similar works in the past, based on the averages of the last three or five years, are established. This raises the question of how much of this time based on past incidences is used only for manufacture or maintenance/repair processes, and whether is there any idle time. Within the framework of this study, the standard time studies made, in the military facilities using the work study techniques, show that the operation time allocated for shops is more than the required, which is the basic problem experienced in many facilities, as explained in Chapter 4.

Such a case results in;

- a. the rates of shops' use of workforce capacity is higher than the required,
- b. creation of hidden idle workforce,
- c. higher results obtained in calculation of facility costs related with weapons, equipment and vehicles, due to long workmanship times,
- d. incorrect determinations are made in facility such as future workforce planning, production planning etc.

For these reasons and in order to ensure that the operation times, defined by facility assessment units, are close to the times needed for the performance of the work, it is considered that standard time studies should be carried out in facilities using the

work study rules. The fact that the activities in the military facilities are basically focused on maintenance and repair, renders the establishment of standard times to be more difficult. However, it is considered that standard times may be established for such operations with the classification (a classification that depends on the type of equipment or failure) of maintenance and repair processes.

In the following section, brief information is given on the ideal method of standard time work, to be made in accordance with work study techniques. Detailed information may be obtained from Ralph M. Barnes' book titled "*Motion and Time Study Design and Measurement of Work.*"

7.1.1 Carrying Out Standard Time Study

The method that is mostly used in the measurement of work is the time study. Standard time may be defined as the time, which is found out as the result of the measurement of the work by the related expert and which is also required for performance of the work at normal speed (Barnes 1981).

In order to perform a standard time study, the criteria given below should be met. This is the only way to achieve a reliable and accurate measurement. These criteria may be listed as follows:

- 1) the suitability of the labor to the job,
- 2) work done by a worker, who have all the required educational/training background,
- 3) working by using a specific method,
- 4) work performed by the worker at a normal speed.

Time study can be made and standard time can be established as long as these conditions are provided. An inseparable part of standard time study is motion study and facility design. This issue has significant importance in ensuring the suitability of job to labor. Within this scope, it will be an appropriate approach to make a standard time study as long as the facility is designed in a way that all the materials and equipment are placed close to the area in which they will be used. The equipment used for the work is designed to ensure easy movement of hands and feet; the materials and equipment are designed in a way that they are readily available for the following operation; the levers, buttons and other control equipment are designed to ensure that the operator's body position of the operator changes in the least possible way. Additionally it is really

important to collect detailed information on the machinery and the functions of the operator, before conducting a standard time study (Barnes 1981).

Measurement Of Standard Time

In order to ensure that standard time study is made in the appropriate way and that the obtained results reflect a meaning, various stages should be observed during the performance of a time study. These may be listed as:

a. By asking questions related to the performance of the work, a detailed research should be made on each point that may facilitate the work. The questions that may be asked within this scope may be as follows:

- 1) can the machine speed be increased without damaging the optimum item life and without disturbing the product quality?
- 2) can a change in the used items increase the operation time?
- 3) is there any need for the rearrangement of the workflow in order to decrease the operation time?

Time study should start after asking such questions and detailed examination of the operation. The performed standard time study is applicable only for a certain case. A change in the workbench, method or workflow requires that the calculated standard time is updated (Barnes 1981).

b. In order to make that standard time calculation easier, the work to be measured should be divided into sub-components which can be defined and measured. The start and end points of each sub-operation should be clearly defined. There are three important rules that should be applied in dividing an operation into sub-operations, which are:

- 1) division of operations into sub-operations, which will allow for the measurement of operations,
- 2) considering the carrying time apart from the machine time,
- 3) separating fixed type operations from changing type operations (pieces with unchanged operation time depending on the piece size and material type). Within the scope of the points mentioned above, division of operations is important for ensuring a reliable standard time study (Barnes 1981).

c. Standard time study is a kind of sampling study. As it is a study based on a certain number of samples, times established with more samplings will ensure that the calculation will have more realistic results and will be included in the demanded range

of reliability. For this reason, in such measurements, the amount of measurement should be calculated being based on to the formula below(Barnes 1981).

$$N' = \left[\frac{20 \sqrt{N \sum X^2 - (\sum X)^2}}{\sum X} \right]^2$$

X : Measurement value for each sub-operation

$\bar{X}$: Average of measurement value

N : Number of measurements made

N' : Number of observations that should be made within the 0.95 range of reliability

d. The most difficult part of the time study is to measure the operator's working speed or work completion speed. The expert making the time study should evaluate the speed of the operator. It is a fact that different people working at a normal speed have differences in speed. While some people walk slowly at normal speed, others walk fast. In this case, the distances that people will walk within a certain time will also be different. Speed and tempo should be defined. If 3 miles in an hour is considered as a normal performance and, if it is taken as 100, walking 2 miles an hour will be equal to 66% of the normal tempo; while walking 4 miles an hour will be equal to 133% of the normal tempo. In case the amount that should be produced at the normal work tempo is not obtained; the result of the standard time calculation will be more than it is required, if the operator, works fast or less if the operator, works slowly. Both of these cases cause making wrong decisions (Barnes 1981).

Studies and observations have shown that there are individual capacity and capability differences in different areas of life. In "The range of human capacities," David Wechsler has shown that the ratio of difference is 2 times between the best and the worst in physical activities. In a study made on 120 factory workers, it has been found out that the operator working at the highest speed, can produce, approximately, two times more than the other operator working at the slowest speed, within the same time. In standard time studies, it is important that an average time should be obtained taking this point into consideration. Detailed information may be obtained from Ralph M. Barnes' book titled "*Motion and Time Study Design And Measurement of Work*".

e. In the time measured, there is not any time shared for rest and other various lost times. The time is the period, in which the operator performs the work at

the normal working speed. However expecting uninterrupted work from the personnel all the time is not the proper approach. Operators may take breaks during production for their needs such as bathroom, rest and concentration. Accordingly, standard times should be calculated to include such lost times. Time portions that are added to such lost times may be considered in three groups:

1) Portion for lost time resulting from personal reasons: This time portion may be calculated with time measurement study that covers the whole day. On the other side, it has been found out that the resting time of a worker, working 8 hours a day, with a non-heavy workload, and not having specific resting periods, is between 2% - 5%. However, personal times that people may need vary depending on the quality of the work. Workers with heavy work loads may need more personal times. For such types of work, more than 5% should be given to workers (Barnes 1981).

2) Time shared for fatigue: Fatigue is directly related with the quality and period of the work performed. Personnel fatigue increases as the working time and the difficulty level of the work increases. Although there is not any specific method to measure the level of fatigue, related studies are made on the time period in which fatigue is effective on people, in which concentration is low and how long should people rest to overcome fatigue. In many factories and production units a fixed rest time is given for the workers on average times in the morning and afternoon, which increases the concentration levels of workers and decrease their fatigue. And the most important point is the length of the resting time. This time depends on the difficulty and continuity of the work performed. However the generally accepted approach is to apply two resting periods of 5-15 minutes at an average time of the morning work session as well as at an average time of the afternoon session.

Based on the Collective (Labor) Agreement, two 15 minute breaks, which are at 09:00 a.m. and 15:00 p.m. and additionally a 5-15 minute personal cleaning time is given at the end of the work day for the workers working at the military factories. So, it is deemed appropriate in the standard study that:

- a. The fatigue time should be added to the standard time study, if the calculation is to be made being based on the gross working time of 8,5 hours, as the resting time is given separately,
- b. The fatigue time should not be added to the standard time calculation, in case the net workmanship time is calculated as the daily working time which is

considered as the basis for the calculation of the production that should be made in accordance with the standard time(Barnes 1981).

Proportion of resting times to the types of work performed and detailed information may be obtained from Ralph M. Barnes' book titled "*Motion and Time Study Design and Measurement of Work*".

It is thought that standard time study, performed by expert teams to be established by taking the above-given criteria into consideration, on spare parts, weapons and products that are manufactured at military facilities, is an important factor for increasing efficiency.

7.1.2 Standard Time Study For Repairs

Maintenance and repair operations are frequently carried out in military facilities. Any tool, weapon or equipment is taken under maintenance as a result of a failure; then the reason for the failure is found out and it is eliminated. When we compare the whole production process of a new product and repair process of a product to be maintained or repaired, it is hard to estimate the time required for the repair. More time than the estimated is spent for some repairs, while less time than estimated is spent for others. Although what can be done, how can it be done or how long will it take is established just once and for all in production and manufacturing activities, different times for failures is required for maintenance and repair processes.

The first and the most important stage of the repair processes, is to define the processes required for the establishment and elimination of the failure. Determining the failure and the reason once in the correct way is a critical point for workforce efficiency. Incorrect determination of failures causes, workers repeat the same processes more than once and this result in a decrease in the workforce efficiency.

The most important point related with establishing the reasons of failures at one time is the quality of workforce. The personnel should have the required educational background, information and experience and should have succeeded the related courses in order to be able to determine the failure in the correct way at one time and establish the time required for operation time. Selection of such workers establishing the failures in such a way is an important point for efficient use of workforce. Otherwise, time more than required for work completion is given in the work orders that the assessment unit send to shops, which creates idle workforce.

Within this framework, it is deemed that the following points are important for increasing the efficiency in facilities:

1) creating and evaluating a table including the criteria such as educational background, vocational branches, register, personal characteristics of the workers employed in the facilities, and making a classification (A-B-C-D class workers) starting from the most qualified to the list, with the units or shops they work,

2) selection of the workers to be appointed in the assessment unit among those who are the most qualified,

3) establishing a reward mechanism for each determination confirmed by the related unit and defined completely, (like 10% of the work hour for correct determination)

4) defining the failures of equipment at facilities, measuring the time required for such operations and establishing a databank for assessment.

7.1.3 Factory Level Maintenance And Repairs:

As mentioned in the previous sections, the main combat systems (tanks, buses, personnel carriers) are subjected to factory level maintenance and repair in certain periods. A document, including the minimum required maintenance and repair and the required times according to the type of equipment, has been prepared and is applied by the military factories. However, the examinations show that although the processes that should be carried out at the lowest level are determined, the fact that what should be done at the high level is not determined, results in use of different applications by the facilities differs. Examinations have also shown that there are differences in factories between factory level maintenance processes for the same vehicle. As it's mentioned in Chapter 4, while 270 man x hour is spent for a specific type of vehicle, it is seen that another vehicle, having the same features, is subjected to a maintenance and repair of 630 man x hour. Differences in hours of these operations cause:

1) lack of unity of application among factories,

2) inability to compare those completing the maintenance and repair processes within a short time with those completing in a long time,

3) inability to understand how much time has been efficiently used or left idle by the factory making the maintenance in a long time.

For such reasons, factory level maintenance provided for equipment should be standardized, and unity in applications should be provided by establishing a team for;

- 1) defining the operations to be made on the vehicle to be subjected to maintenance processes,
- 2) calculating standard times for specified operations and vehicles,
- 3) identical application of the operations and standard times to be specified, in all facilities.

These points are thought as critical for increasing the workforce efficiency in facilities.

7.2 Stock Level And Control

Another point which is important for the efficient use of workforce in factories is the stock level. Spare parts and raw materials required for preventing workers from being idle; assigning them with the works and performance of their works should be provided for the shops, when it is required. Delays in the supply of raw materials and spare parts result in idle workforce, as explained in chapter four, facility examinations.

The following reasons hinder the military factories in defining their stock policies:

- 1) Performing maintenance and repair operations more than production,
- 2) Diversity of equipment, different types of the same equipment are included in the inventory,
- 3) All different types of equipment require different spare parts.

While defining the stock policy at military facilities, it is considered that the following points should be examined and used as inputs during this study. Effective factors may be listed as follows;

7.2.1 Workforce Capacity

The establishment of the stock amount to be kept available in annual or monthly basis at facilities depends on the establishment of total workforce. Annual facility plan for production, maintenance and repair, based on the workforce capacity. Within this framework, the personnel participating or not participating in the production or those working indirectly should be defined and annual workforce capacity of the factories needs to be determined.

7.2.2 Procedures At The Tender Stage

Raw materials and spare parts are supplied for military facilities in accordance with the provisions of Public Tender Law. Public Tender Law, which regulates the purchases made in the public sector, is accompanied by many bureaucratic processes. The supply period of a material or raw material depends on the tender procedure; which

may mean that a material that has been previously provided in three months may not be provided during the following year. The basic factor for inability to provide the required material at the required time is the difficulties experienced during the tender procedure. Factors, such as the repetition of the tender due to insufficient number of participants or repetition of meeting of the commission for the second time to make the required evaluations as a contractor makes an objection, extend the tender procedures. Therefore, the analysis of provision periods of the previous years' tenders should be made and tender period need to be determined. Different approaches may be applied depending on the quality of the work performed by facilities. For example, in facilities having a high number of workers, as the idle workforce can create a heavy burden for the country, period for the provision of the raw material requirement which is established considering the worst case scenario can be accepted as the tender period. The time for the worst case is taken into consideration during the establishment of stock policy, which is followed by the establishment of ordering point.

7.2.3 Standard Times

After establishing the total workforce capacity at facilities, the product, the amount of production and the equipment to be maintained or repaired, based on this capacity, should be defined by using the standard times. It is important that standard times are defined by the use of time study techniques in accordance with the time required for the performance of the work. However both reliably defined standard times and annual production plans of facilities should be established in realistic terms, which will be followed by the definition of stock level and policy.

7.2.4 Amount Of Budget

As the time required for the provision of materials, that military facilities need, is long due to bureaucratic procedures, the efficiency is adversely affected. As there is no possibility for immediate provision by the military facilities and materials cannot be provided from the same company for a long time, there is a need to keep high amounts of stocks. However, gradually decreasing amount of appropriations for Armed Forces, due to government's savings measures, requires that optimum stock level is defined and savings on the stock amount is ensured. For this reason, budget may be deemed as a significant limitation for the establishment of stock policy.

7.2.5 Time For Delivery Of Acquired Materials To The Storehouse

In addition to establishing the tender period, another point that should be taken into consideration is the time required for delivery after the contract is awarded, as defined in the related specifications. Despite this period is different for materials or spare parts, delivery period for materials having similar qualities is similar too. Accordingly, it is considered as a requirement, during the establishment of delivery periods to be used for stock levels at facilities, that group based material delivery periods should be defined, using the previous related data.

7.2.6. Facility Storage Capacity

Although there is not any storage limitation in many of the military facilities, there may be some limitations at small facilities. This point should be taken into consideration.

7.2.7 Amount Of Stock That Must Be Kept By Facilities For Peace And Warfare

It is a requirement for many of the military facilities that they keep spare parts and raw material stock at an amount that will be sufficient to provide support for available troops in warfare and peace. Such an amount of stock shows the stock level to be used under special conditions other than maintenance and repair to be made on the available equipment during the year. Stocks for tasks related with the annual production plans of the facility should also be kept. For this reason, the stock amount allocated for failures must never be taken below the limits and the amount of stock required for the maintenance and repair of the equipment in accordance with the available production plan should be periodically established. It is deemed appropriate that the time for making the order should be calculated in a way that the stock level, required for production during the time before the tender and delivery take place, is not taken below the limit and this should be considered as a restriction.

7.2.8 Establishment Of The Amount Of Equipment In The Inventory

The types of the equipment and systems for which the facility is responsible for maintenance and repair should be established. If the facility is a production facility, the annual amount of production should be established. These amounts should be determined for each vehicle, tool and production type.

7.2.9 The Amount Of Equipment And Distribution Of Replaced Parts

After the amount of equipment is established, the number of times in which such equipment was brought to the facility for maintenance or repair, as well as the amount of replaced parts in the maintenance process should be statistically defined. Additionally, due to limitations in appropriations, parts should be prioritized and the minimum amounts to be purchased should be determined.

7.2.10 Establishment Of Minimum Stock Level Defined By Facilities

It's been evaluated that the stock amounts that must be kept by the military factories both within the scope of their duties and responsibilities and for purposes other than production and maintenance operations to provide support for the troops for a certain time period.

It's been evaluated that more efficient use of money may be ensured provided that a study, covering the main issues explained above and intended for determination of optimum stock level and ordering point, is made. Conducting a study about stock level in military factories may be appropriate in order to ensure the followings;

- 1) establishment of an efficient stock policy,
- 2) establishment of the ordering point, by clearly establishing the amount of spare parts and raw materials,
- 3) establishment of the amount of budget that may be required depending on the work demand of the facility,

7.3 Provision Of Works And Goods That Are Cheaper To Provide From The Private Sector,

In the examinations made on the factories established in different parts of Turkey, it's seen that some works are indispensable for the national defense, while some works:

- 1) are made in a more expensive way due to high workmanship fees
- 2) are included within the scope of the capacity and capabilities of the private sector,
- 3) can be provided from the market in a much easier and cheaper way, which have been explained in Chapter 4. Accordingly, after making an evaluation of such production on facility basis, a decision on which products to buy from the market and on which products whose production by the military facilities may continue should be made. In consequence it's required that cost efficiency analyses on the products should be made on facility basis.

7.4 Prevention Of Duplications

There are 38 facilities, each employing 250 or more workers, in the Turkish Armed Forces. These facilities have been distributed among the Land, Air and Marine Forces. These facilities, having large-scale opportunities and capabilities, provide services for Turkish Armed Forces. In the examinations, made within the scope of the study, it's been observed that there are duplications among the facilities, which are even within the borders of the same province. What duplication refers to here is the establishment made by the Force Commands, of different shops for the performance of the same works. It's also been observed in the examinations that works performed by two shops can be easily performed by a single shop. It's also been observed that the same product is produced by two different Force Commands. Such a case is deemed to result in inefficient use and waste of resources.

In addition to the establishment of facilities performing the same works, another important point is the inefficient share of work among the Force Commands. As explained in Chapter Four, despite Land Forces Command have an expertise on the maintenance and repair of infantry. weapons, the Air and Marine Forces have also established separate shops for the maintenance and repair of such weapons. Such a situation results in inefficient use of limited resources as the required cooperation among the forces cannot be provided. The basic approach should be the provision of cooperation among all Force Commands for meeting their requirements related with a product from the facility having an expertise on a specific subject and not establishing a separate shop.

On order to eliminate duplications in facilities and increase the cost efficiency in facilities, the following are deemed appropriate:

- 1) Making a study to establish an inventory, by including all resources and capabilities in a database, on Force basis,
- 2) Establishing a single Logistics system, in order to eliminate conflicts, related with collective uses, that may arise among Force Commands and to ensure central control of the resources and capabilities of each command,
- 3) Coordinating and planning of all the logistic system operations, by the central structure to be established.

CHAPTER 8

EXAMINATION OF THE CURRENT LOCATIONS OF THE MILITARY FACILITIES

If you ask what to look for in buying a house, any realtor will tell you that there are three important things: location, location, location. The theory behind this answer is that the community in which you select to live and the location within that community are likely to affect your quality of life at least as much as the amenities in your life. Decisions related with location also arise in various public and private sector problems. For example, state governments need to determine the locations of fire stations or hospitals. Poor location decisions in this environment lead to increase in costs and a decreased competitiveness. In short, the success or failure of both private and public sector facilities depend partly on the locations chosen for those facilities.

Mathematical location models are designed to address a number of issues including;

- 1) the number of facilities that should be established,
- 2) the location of each facility,
- 3) the area covered by each facility,

4) how should demand for the facilities, services be allocated to the facilities. The answers to these questions depend especially on the context in which the location problem is being solved and on the objectives underlying the location problem(Daskin 1952). Facility location models are also concerned with the allocation demands to facilities. The objective should be maximizing the number of demands that can be covered within a specified service standard using the capacity of the facility.

Factory location is a highly important issue in order to ensure that maintenance and repair needs of military troops as well as the units are provided with the minimum cost of transportation. All the questions above need to be answered for all military factories. This section's main focus is on the things that need to be take in ta account to make analysis of current locations of the military facilities, servicing at the 4th echelon. Within the context of ensuring the minimum cost of transportation to the units and on making the unit assignment, for which the facilities will be responsible.

The issues related with maintenance and repair activities at the Land Forces as well as the tasks and responsibilities of the 4th echelons have been explained in the previous parts. The 11 provinces, in which the facilities are located.

Transportation of the weapons, vehicles and equipment, to be maintained, to the facilities is provided through trucks and trains. Vehicles may be transported to units for maintenance and repair; however, in case the condition of such vehicles is not available for coming to the factory and in case the transportation cost of such vehicles is found out to be expensive, some mobile maintenance and repair teams are assigned by facilities for servicing units.

There is also a certain cost for assigning mobile teams to reach troops. Assigning workers to mobile teams create cost items such as travel allowance, paid as per the Law of Travel Allowance, and expenses related with the vehicle used for the transportation. It is not a requirement to include the workmanship costs in the calculations, as the workers are entitled to receive their salaries in any case, whether they are assigned to the mobile team or not. Mobile teams assignment is made within the regular periods and by a plan, not including the exceptions that are made in urgencies. In accordance with the previously defined route, maintenance and failure detections are made by the team at the troops. Non-planned tasks are related with the maintenance of failed vehicles, used especially in terror regions. However, it is considered appropriate that the cost of assignment of mobile teams is not included in the calculation made within the scope of the study, as it is a very minor cost in comparison with the cost of vehicle transportation to the facilities.

It is deemed important that a study should be made to ensure that a re-allocation is made to provide that the transportation costs of units, supported by the facilities, are kept to minimum by reassigning the troops to the military factories to minimize the costs of vehicle transportation to the facilities.

This section's focus is on the issues that should be taken into consideration during such a study and on the related point of view.

8.1 Establishment Of The Location To Minimize The Transportation Costs

Costs for transportation of vehicles from military units to facilities, include costs such as fuel, driver costs for road transportation etc. If the transportation is done by

railway it includes costs per kg and per mile. In order to make a reliable and a realistic study, the following points should be taken into consideration:

- 1) The number of travels made by trucks or trains within a specific time period from the facilities to units as well as from units to facilities, within the scope of maintenance and repair of vehicles at the troop basis,
- 2) Establishment of the amount of workload sent by troops to factories within a specific period of time (man x hours), (this will be used as a limitation during the allocation of units to facilities),
- 3) Establishment of annual workforce capacity of facilities,
- 4) Establishment of the method of vehicle transportation from troops to maintenance centers, (such as with train, tank carriers or trucks),
- 5) Establishment of the amount of vehicle shipping to the 4th echelon and the operation times used for maintenance, based on the statistical data of the previous years (making this study without considering the works within the scope of the private sector capabilities, having no added value, is important in terms of its applicability. In example, compressors, fire-extinguisher equipment may be excluded; while activities intended for main combat weapon systems such as tanks, obuses are considered),
- 6) Statistical calculation of operation times spent for vehicles coming to shops for maintenance and repair, being based on the data of the previous years, (In example, the operation time for a tank should be found, being based on the previous years' operation times spent in workshops of track laying vehicle, optics, radios etc.)
- 7) Establishment of distances of military factories to the troops, for which they must provide support, in order to use them in the calculation of costs for transportation with truck or train, (the length of road should be established using a map, each facility has the locations of units they provide support).
- 8) Establishment of fuel consumption of transportation vehicles,
- 9) Adding the driving costs to the transportation costs for transportation with truck, (in case the driver is a worker, the cost of a, 17th grade and a high-school graduate worker; if he is a civil-servant, the cost of a civil servant with a 10 years experience in auxiliary service; if he is a soldier, the cost of a soldier for the state need to be included in this calculation),
- 10) In case the vehicles are transported to facilities by railroad, establishment of the cost for transportation from the factory to the troops being based on the current schedule of rates applied by the State Railroads Authority,

11) As transportation by railroad is more economical and there is a priority for carrying equipment at locations where railroads reach, establishment of the number of times the vehicles are transported by roads to the facilities, because of critical situations and the establishment of its distribution.

Above-mentioned points are information which could be obtained from factories.

Upon making such establishments, the cost efficiency of transportation from units to facilities may be tested in different aspects. These may be listed as follows:

A decrease in the number of 4th echelons is on the agenda within the framework of the recent restructuring process of the logistic system. Force Command and Logistics Command has been studying for making such decisions. Within this context, the existing facilities can be examined for various scenarios:

1) The situation of transportation costs that may result from the closure of one or more of them; and whether the existing capacity can cover the workload

2) Making the comparison of transportation costs according to the closure scenarios of different facilities, establishment of the location that will provide the least cost of transportation.

All of these points are considered to be of high importance in order to ensure that reliable and right decisions are made in studies intended for increasing the efficiency of the facilities while decreasing the number of factories. This study will provide the definition of the location with the least cost of transportation, the number of factories and which troops to be reassignment for which facilities in mathematical terms. The following stage will be the calculation made for the establishment of facility manpower capacities for the new location, or whether the capacities will be adequate for the existing allocation. The workload sent by existing troops to factories may also show the required workforce capacity in worksites.

Standard operation times should also be established during the calculation of workload. As mentioned in the previous parts, the vehicle maintenance and repair times should be defined based on the standard time study or on the data of the last 5 years. These operation times should be defined for each kind of item sent to facilities for maintenance and repair or their distribution of operation times should be calculated using the previous data. Then, the workforce requirement of the facility may be found dividing the workload to the daily work hours. Defining the annual manpower (man x hour) requirement in military factories.

While establishing the capacity, the tasks of mobile teams should be added to the the workforce capacity calculation of the factories. (Since the cost of assigning a mobile team is much less than the total cost of transportation, it is not deemed necessary to be included in the calculation).

8.1.1 Reassignment Of The Troops To Facilities

This study will focus on the reassignment of troops to factories in order to ensure the minimum cost of transportation. As the re-establishment of facilities is much more expensive than the cost of reassignment of troops to factories. To ensure minimum cost of transportation, it is aimed that that the existing troops and factories will be reassign in a way to ensure that cost of transportation is kept at minimum. The capacity that may be required by factories after allocation of units to facilities will be calculated as mentioned in the section above. In case a workforce exceeds the demands upon the unit allocation stage, idle facilities may be closed after determining which facility's closure will have minimum effect on the cost.

8.1.2 Study On Determining The Location Of Facilities.

As the re-establishment of an already existing factories in a different cities may result in high transportation costs. It is considered that this may not be a realistic approach. However, the basic outcome of this study is important because it will show the efficiency of the existing locations within the scope of the location which has the minimum transportation cost. It is aimed that eleven facilities are located in the provinces to be defined, (the most important thing for such a province is being in a central position for transportation and deciding whether the facilities can be established in these provinces according to the pre-defined military security principles) being based on the location of existing troops, in order to ensure that minimum cost of transportation is ensured. Therefore, a comparison of the possible minimum cost that can be provided by existing facility location will be made.

Before starting this study, it is important to make decisions on the types of work to be performed in facilities and the types of work that can be stopped and provided from the private sector. It is evaluated that the amount of data will be increased and the study will be facilitated in case the types of work that can not be renounced are defined and the remaining is not included in the calculation. After eliminating the works with no added value, it is required that the workload for defined vehicles coming from the troops to the factories is calculated and their distribution is defined.

Since a proportion of the main combat weapons, possessed by border troops as well as some troops defined to have a strategic importance, should always be available for immediate tasks, maintenance and repair of these vehicles may be prioritized. Especially in terror regions, weapons are frequently repaired at troops or their positions. Accordingly, it should be expected that mobile team tasks for terror regions will be much more than those of other facilities.

As explained in the previous sections, the military factories take main combat vehicles (tank, howitzer,) of the military troops to factory-level maintenance in certain periods (5 years). Facilities do also have such tasks which require continuity in addition to immediate maintenance and repair activities.

However, as explained in the previous chapters, although the minimum periods of such maintenance tasks are defined by the Logistics Command, the upper limit has not been defined, which causes differences among factories. Therefore with the team (qualified personnel and work study experts on the maintenance of equipment used at military facilities) the operations and standard times of FASBAT maintenance for each equipment type need to be defined according to the time study techniques, as these times are deemed required in the calculations of factory workforce capacity. It is also considered that other operation times for maintenance and repair may be calculated being based on the analysis of previous years or standard time study. Problems may arise during the establishment of following points:

- 1) Establishment of the position of tanks and other vehicles at military posts, time spent traveling and excluding them from the capacity,
- 2) Definition of the approach in considering the security issue during the reestablishment of maintenance centers (defining the provinces in which factories will be established)
- 3) Although the maintenance and repair times are recorded by facilities, operation times more than required to ensure that capacity usage rates seem to be higher, will create unrealistic results. Accordingly, it is deemed important that the study should be made, taking the operation times to be established according to the standard time study as a basis,
- 4) As the number and kind of equipment is really high, the study should be made for equipment and tools, that have a critical importance for the Armed Forces,
- 5) New factory locations, to decrease the number of variables, should be defined supposing that maintenance centers will be located in provinces.

CHAPTER 9

CONCLUSION

The goal of this study is to observe and examine the efficiency at the military factories by identifying problem areas that have adverse effects to productivity and efficiency and suggest possible solutions that could eliminate these factors and decrease the overall cost. In this study we made a field study at military factories to put capacity usage ratios and to determine the problem areas which affect productivity. This study involves comparisons of military factories to private sector firms in the same field (number of indirect workers, price of the goods which are being produced in both etc.). Since the core operations at the military factories are maintenance and repair rather than production, manpower has a very important role. For this reason the primary problem at the factories is whether manpower is used efficiently or not. Considering this fact focusing on the manpower capacity usage at the military factories is vital in order to understand the efficiency at the military factories. On the other hand since there are a number of workshops that perform mass production, studying the machinery capacity usage rates would not give us the result desired. By taking into account of all these reasons, this study focuses on the manpower capacity usage rates.

In addition to manpower capacity usage, the following factors are identified as the potential problem areas at the military factories; high production cost of the products, differences between the cost accounting methods, high number of direct and indirect personnel, calculation of the standard time, etc. These factors are analyzed during the studies at the factories. Starting from 2003, 22 military factories are analyzed according to the methodology explained in Chapter 3. Following the observations and analysis, possible solutions that could increase the efficiency and decrease the cost are proposed.

The personnel related factors that effect efficiency in a negative way are described in Chapter 5. Application of the flexible work program which is described by the 4857 regulation and identification of the new pay and employment policies in the military factories are found as the areas that require further studies.

Regarding the cost accounting methods, different methods used in the military factories causes erroneous production cost calculations. It could also cause false

decisions of the headquarters in purchasing or production of a certain product in the military factories. During the analysis the need of a study to implement a standard for cost accounting method based on the labor cost per hour that is going to be used in all military factories is seen. In this regard using the labor cost per hour calculation technique described in Chapter 3 can be used.

Another important factor that is seen as having adverse effect to efficiency is related to standard time. It is seen that in most of the military factories standard time is calculated as higher than it should be or it is not calculated at all. For this reason production standard time for all products should be calculated based on the time study method. And this standard time should be used in all of the military factories for the same kind of products or jobs. The need of a study covering these aspects is seen.

Finally during the analysis the need of a study focusing on the minimization of the cost of transportation of vehicles and weapons from troops to the military factories. In order to achieve this a study on reassignment of troops to military factories and determination of factory capacity according to current work load is found as necessary.

The factors listed and the solutions proposed in this study can be applied to private organizations easily because of their more flexible working system. However due to the high bureaucracy in the military organizations the application of these solutions requires more time and effort. By the help of the developed methodology in this study, the factors that have adverse effects to the efficiency and production cost in the military organizations can be addressed more clearly and suitable solution can be proposed. It is also thought that this methodology can be developed further.

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