2.3. Social Issues

- ➔ According to the data of the official statistics, the population of Armenia, as of January 1, 1998, is 3,791.2 thousands, but the population in real terms is estimated at around 3 million.
- ➔ 700 thousand people mainly males aged 25~39 years old have flown out abroad in the past 6 years. The number of marriages and childbirth is rapidly declining in a large quantity in recent years.
- ➔ The outflow of population still continues. The main reason is supposed to be non-existence of job and income. However, if the present situation continues, it causes further decrease of the number of males, on the other hand, upsurge of ratio of senior people and females in population structure. It also leads to decrease of productivity and salary, high load of social cost and occurrence of various social problems. Moreover it may bring about decline of the country in the future.
- ➔ It is very important for Armenia to execute a census in 2001 and necessary to make preparation for it immediately.

2.3.1. The Outflow of Population and Importance of CENSUS

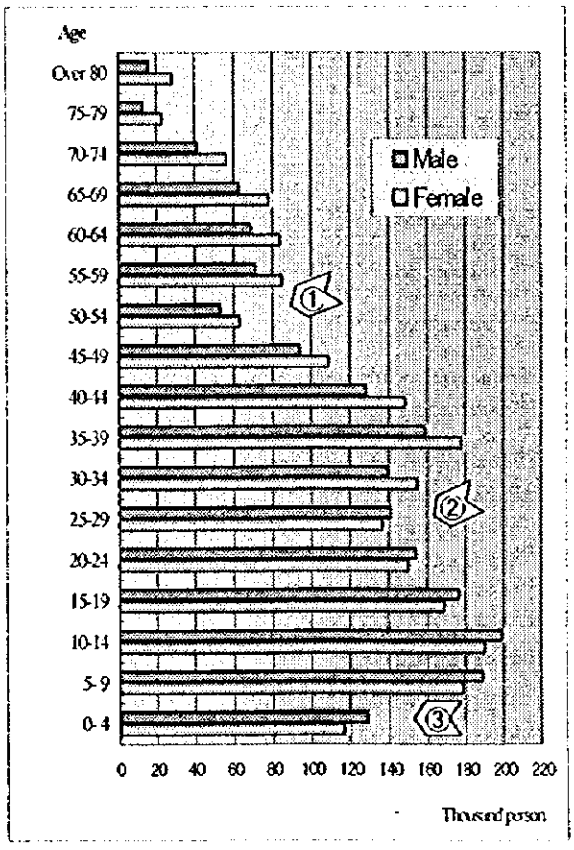
(1) The Current Population of Armenia

According to the data of the official statistics, the population of Armenia, as of January 1, 1998, is 3,791.2 thousands.

All the economic data related to population such as GDP per Capita is calculated based on the above-mentioned population both by the government authority of Armenia and the international organizations.

The population structure by sex and age is shown in Fig. 2.3.1.1. Fig. 2.3.1.1 shows that the population structure of Armenia has the following characteristics.

- The population of 50~54 years old is scarce (result of the large decline of the birthrate during 1944~1948 affected by World War II, Arrow①).



(Source: Ministry of Statistics, State Register and Analysis)

Fig. 2.3.1.1 Population Structure by Sex & Age

- The decrease of population of 20~34 years old is seen (it is thought that the emigration focuses on this generation, Arrow②).

- The birthrate in recent years has declined a lot due to the population decrease of the above 20~34 years old childbirth generation (Arrow③).

Nevertheless it can be presumed that this total population of 3,791.2 thousand of Armenians and its area distribution which is shown in Table 2.3.1.1 differs from the population actually residing in Armenia.

Table 2.3.1.1 Population Distribution

Prefecture (Marts)	Population(Thousand)
Yerevan	1,249.2
Aragatsotn	165.4
Ararat	309.0
Armavir	319.6
Gekharkunik	276.3
Lori	393.8
Kotayk	328.5
Shirak	360.8
Shunik	163.1
Vayots-Dzor	68.9
Tavush	156.1
Total	3,791.2

(Source: Ministry of Statistics, State Register and Analysis)

Therefore, it is presumed that the actual population structure by sex, age, as well as the area distribution are also much different from the official figure for the following reasons:

- In Armenia there was a big population movement from the northern area to other areas due to by the 1988 earthquake in the northern area (Spitak earthquake) which made 25,000 victims.

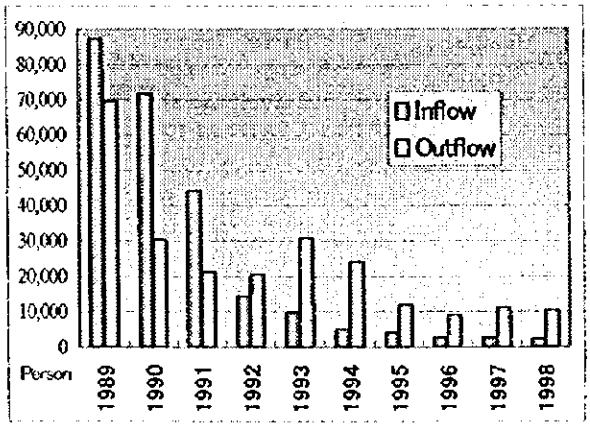
- As a result of the conflict with Azerbaijan during 1988-1994, there was an inflow of refugees exceeding totally 400 thousands from the Baku area of Azerbaijan, the Gyanja area, other areas, and the Nagorno-Kalabakh area as well. There was also a movement of population from border adjacent areas to Azerbaijan to other areas. In addition 10~15 thousands refugees from Abkhazia, a separate region of Georgia were counted (most of the refugees have not yet obtained the Armenian nationality, and according to the Minister of Social Security the number of the registered refugees as of April 1994 was 313 thousands).

On the other hand there was an outflow of many Azerbaijan people residing in Armenia.

Table 2.3.1.2 Migration (Unit: Person)

	Inflow	Outflow	Migration
1989	87,207	69,390	17,817
1990	71,605	30,377	41,228
1991	44,172	21,158	23,014
1992	14,385	20,514	-6,129
1993	9,874	30,691	-20,817
1994	5,009	24,152	-19,143
1995	4,278	12,043	-7,765
1996	2,706	9,094	-6,388
1997	2,672	11,149	-8,477
1998	2,215	10,412	-8,197

(Source: Same as Table 2.3.1.1)



(Source: Same as Fig. 2.3.1.1)

Fig. 2.3.1.2 Dynamics of Migration (Unit: Person)

- There was a return home of Armenians from other republics and an outflow of some people of other ethnic groups from Armenia accompanied by the collapse of the Soviet Union and the independence of Armenia.

- There was an outflow of many Armenians mainly males in the prime of life to Russia, the USA and the EU because of the difficulty of living since the independence, and this tendency still persists today.

There exist such big change factors of population as above. However, the data by which to know exactly such population movements does not exist. Table 2.3.1.2 is the only data announced by the Ministry of Statistics concerning the population movements during 1989~1998. Even the official statistics of Table 2.3.1.2 and Fig. 2.3.1.2 (graph made of Table 2.3.1.2) also showed that the inflow largely exceeded the outflow during the 3 years of 1989~1991, and it is possible to observe the tendency that the outflow has consistently exceeded the inflow since 1992.

However, it is thought that the above data reflects only a part of the population movement that actually took place. The reason is that the real state of the population movement has not been exactly grasped statistically because a considerable portion of the population movement inside the country and to foreign countries has been made without the alteration of resident registrations.

It is recognized for the first time in Statistical Yearbook 1998 (issued by the Ministry of Statistics, State Register and Analysis) that approximately 600 thousand Armenians had flown out abroad during the period of 1992~1998. This figure of 600 thousands is the figure of deducting the total number of the Armenians entering the country from the total number of the Armenians leaving the country during the above-mentioned period at Yelevan airport.

Armenian people know that their families, relatives, friends and acquaintances emigrated to other countries such as Russia, the USA, Germany and France. About 80% of them emigrated to Russia, then followed by the USA and France, however, it is said that recently the emigration to Germany tends to increase.

In addition to the above-mentioned difference of about 600 thousands between the number of come in and out people via Yelevan airport, there was movement by land via Georgia and

Table 2.3.1.3 An Estimated Emigration (Break-Down)

Age	Male	Female
0- 4	-6	-6
5- 9	-14	-14
10-14	-21	-16
15-19	-30	-16
20-24	-65	-15
25-29	-85	-20
30-34	-85	-25
35-39	-75	-25
40-44	-60	-19
45-49	-50	-10
50-54	-20	-3
55-59	-6	-2
60-64	-4	-1
65-69	-2	-1
70-74	-1	-1
75-79	-1	-1
Over 80	0	0
Total	-525	-175

(Source: writer's estimation)

Iran, though this movement was limited. Assuming the total of the land movement was about 100 thousands, the number of Armenian population outflow is estimated at around 700 thousands. Such premise leads to the estimation that the population of Armenia in the beginning of 1999 was around 3 million (plus 313 thousand refugees who had not yet got their nationality).

The problem is that the males aged 20~49 years old in the prime of their life (bachelors, business bachelors, and persons with family) are estimated to account for most of this approximately 700 thousand people who flew out abroad.

If the main reason for leaving the country is supposed to be jobless, low wage despite having job, mismatch between ability and pay particularly for intellectual workers, existence of people who thought they could not find prospects for their future, and so forth, it is not difficult to imagine that many males in the prime of their life left the country in search of a greater income and a better life.

Now, if it is supposed that 75% (525 thousands) of these 700 thousand people who left the country are males and 25% (175 thousands) are females (both includes their families) – besides their age distribution focuses on 20~39 years old as shown in Table 2.3.1.3, then the population structure of Armenia by sex and age would be much different from the situation shown in Fig. 2.3.1.1. And it will change to a rather abnormal situation as a structure of one country by population, sex and age as seen on Table 2.3.1.4 and Fig. 2.3.1.3.

Table 2.3.1.4 Estimated Population

	Male	Female	Total
0- 4	111.2	123.2	234.4
5- 9	165.0	175.2	340.2
10-14	174.3	178.0	352.3
15-19	152.9	146.9	299.8
20-24	135.2	89.3	224.5
25-29	116.7	56.1	172.8
30-34	129.9	54.9	184.8
35-39	153.1	83.8	236.9
40-44	129.8	68.5	198.3
45-49	99.2	44.3	143.5
50-54	60.4	33.5	93.9
55-59	83.1	65.2	148.3
60-64	83	65.1	148.1
65-69	77.1	61.0	138.1
70-74	55.6	40.8	96.4
75-79	22.2	11.8	34.0
Over 80	28.8	16.1	44.9
	1,777.5	1,313.7	3091.2

(Source: writer's estimation)

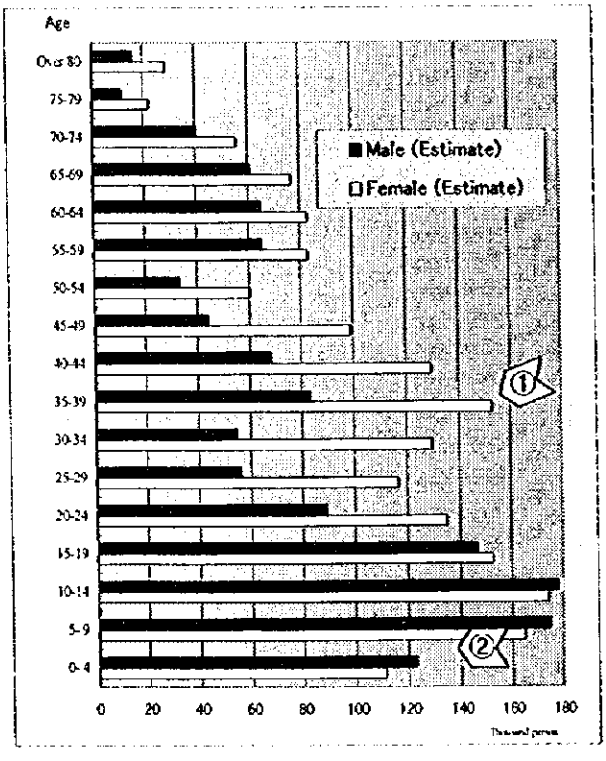


Fig. 2.3.1.3 Estimated Population Structure

Although the distribution by sex and age of Table 2.3.1.4 is definitely only a trial calculation based on an estimate, it is thought that it shows a situation nearer to the reality than the official figures.

It is possible to get the estimated population as of January 1, 1998 by deducting the estimated number of the population which flew out abroad from the population as of January 1, 1998 announced by the official statistics. Table 2.3.1.3 shows it, and Fig. 2.3.1.3 was the one in which Table 2.3.1.4 was put into graph form.

Detailed explanation is omitted, because the analysis of population is not the object of the Study, which, however, will examine only the portion thought important for the development of the private sector of Armenia.

(2) Meaning of the Population Outflow

A large quantity of the estimated outflow of population in Armenia is generating various problems for the present and future of Armenia.

1) First, it is necessary to examine the reason why people leave their country for inhabiting in foreign countries or for working there.

Detailed investigation and analysis by specialists are necessary for getting an exact answer, however, the followings are somehow reasons based on a quite ordinary common sense:

- Non-existence of job
- Even though there are jobs, the domestic salary level is too low (US$30~80 per month) to live a normal life.
- For excellent intellectual workers there are not places to exhibit their ability at suitable salaries.
- There is an anxiety about the future.
- In foreign countries even in Russia, which is in an extreme economic confusion, there are places for Armenians to exhibit their ability and to expect a much higher income.

In order for the outflow of population to stop, solutions to the above-mentioned problems ought to be offered to the Armenian people or at least there must be created atmosphere where hope and trust of people for solution of the problems are formed.

Namely it is necessary that the number of jobs increases. Venues must be created where intellectual workers can work and exhibit their ability, and the level of the salaries must rise. At the same time, it is crucial to create a national atmosphere where people can be confident of future prospects and the development of the country.

2) Because of historical circumstances, there are more Armenians residing outside of Armenia than in the country itself, and they have been forming Diaspora all over the world including Russia (about 1.7 millions), the USA (about 1.2 millions) and France (about 0.5 million). These Diaspora have been getting excellent results in all the fields such as study, culture, art and business, and have been producing internationally renowned people.

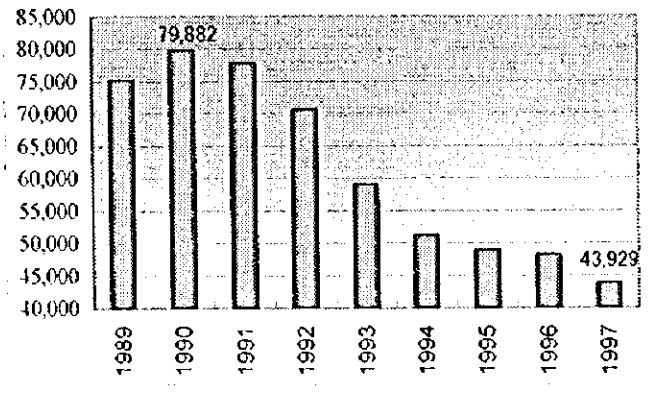
The continuing present emigration of Armenians, since the collapse of the Soviet Union and the independence of Armenia, will produce more valuable results which will be remembered in many countries of the world as the contribution of Armenians.

It can be said that the outflow in a large quantity of the population from inside the country was caused directly by the aforesaid difficult economic situation of Armenia, but concurrently it can also be regarded as an externality proving the entrepreneurial spirit and superior faculty of adaptability inherent to the Armenian people.

3) Fig. 2.3.1.3 [estimated population (structure by sex and age)] shows that the number of males aged 25~49 years old is quite scarce, and the male-female ratio is roughly 1 to 2 (1 male versus 2 females). Naturally this data is based on the estimation of the writer and is not an endorsed one, but during interviews, many people answered that among the generation of marriageable ages the actual male-female ratio was 1 to 5 ~ 1 to 7. This even allowing for exaggeration tells that the number of 25~39 years old males is far less than the writer's estimation, namely a considerable portion of the flown-out population is composed by males of this generation.

The above comment is also backed up by the data of the Ministry of Statistics that the number of marriages per 1,000 people declined from 8 in 1990 (the number of marriages throughout the year was 28,233) to 3.3 in 1997 (the number of marriages throughout the year was 12,521).

This marriage decline, from 8 to 3.3, equals 44% from 1990 to 1997.



(Source: Same as Fig. 2.3.1.1)

Fig. 2.3.1.4 Dynamics of Number of Childbirth

The number of childbirth declined from 79,882 in 1990 to 43,929 in 1997. Fig. 2.3.1.4 shows that the number of childbirth has declined every year since 1990.

It is also possible to observe from Figure 2.3.1.1 that the numbers of children aged 5~9 years old is about 20 thousand fewer than that of the children aged 10~14 years old, and the number of 0~4 year-old children is as many as 143 thousand fewer than that of 10~14 years old children.

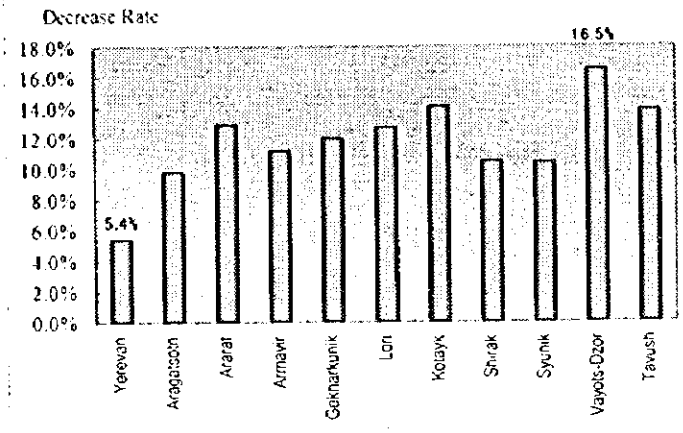
It tells that the rapid decrease in recent years of the number of males of marriageable age has resulted in the decrease of the marriages and the number of births.

4) The present situation of Armenia has substantially improved in comparison with the difficulties which the people had experienced until 1994, but it has not yet reached the situation in which the out-flow of the population in the prime of life stops.

If the present tendency of population outflow continues with the generation of 5~19 years old, when they become adults, and emigrates similarly and the male-female ratio of marriageable ages exceeding 1 to 2 continues, then the number of young women flowing out abroad will also accelerate in time. As a result it is highly possible that the birthrate of child in Armenia will further decline, bringing about a rapid decrease of the population.

5) In Armenia the age structure distribution of male by population of different areas (Marz-prefecture) is not officially announced in view of national security. (The JICA Study team has repeatedly asked the government of Armenia to supply official data from the viewpoint of a grasp of the situation of the local economy and examination of the policy for regional development, but could not obtain such data).

The area population distribution in Table 2.3.1.1 is based on the official total population of 3,791.2 thousands as of January 1, 1998, but as it has already been seen, the population in real terms (excluding refugees) is possibly in smaller by 700 thousands. Considering the fact that the population of Yelevan has not changed so much, this population shortage in real terms is supposed to mainly affect the regions with economic difficulties.



(Source: same as Fig. 2.3.1.1, Processed by the Study Team)

Fig. 2.3.1.5 Decrease of Birth Rate in 1997 against 1995

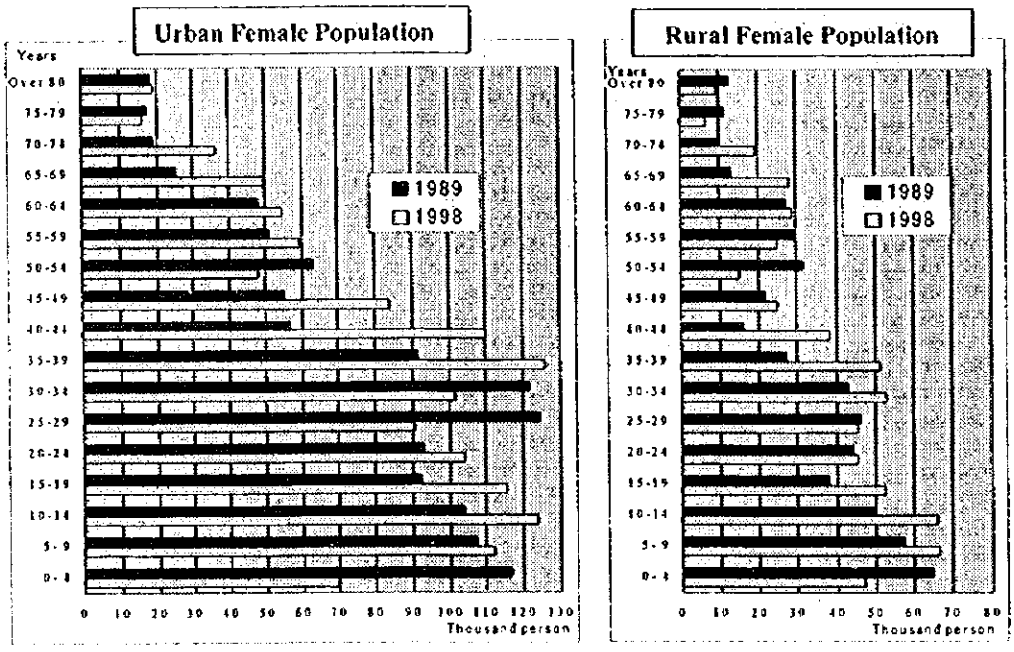
Fig. 2.3.1.5 shows the decrease rate of childbirth calculated by comparing the number of childbirth in Marz in 1997 with that of 1995 was put into the form of a graph.

The decrease of childbirth numbers had been arising drastically from 1990 through 1995 as Fig. 2.3.1.3 shows. The comparison with 1990 can only give an exact result of analysis, but the data before 1995, based on the present area division, unfortunately could not be obtained.

Fig. 2.3.1.5 shows that in all regions including in the capital of Yelevan the number of births is decreasing.

7 among 10 prefectures other than Yelevan have the decreasing rate of more than twice than that of Yelevan. In particular Vayots-Dzor prefecture has a rate of 16.5%, more than 3 times than the rate of Yelevan.

About more than two thirds of the population of Armenia is concentrated in the urban areas. Looking at the announced female data (statistical data on male is not announced), the urban female population, as of January 1, 1998, was 1,326 thousands and it increased by 115 thousands versus 1989.



(Source: Same as Fig. 2.3.1.1)

Fig. 2.3.1.6 Change of Female Age Structure in Urban/Rural Region (Unit: Thousand)

The rural female population increased by 78 thousands versus 1989 and it was 627 thousands. The change of the age structure of urban and rural female population in 1989 and 1998 are shown in Fig. 2.3.1.6.

It is possible to observe from the graphs that the rather abnormal age structure in both urban and rural areas seen in 1989 was succeeded almost as it was. As it can be easily seen that the

two peaks of 25~34 years old in urban areas in 1989 are succeeded by two peaks of 35~44 years old in 1998, both the urban and rural areas do not show any major change. It is remarkable that the generation, which was 30~34 years old in 1989 decreased by about 17 thousands. It is thought that this generation included many females who migrated abroad with their husbands.

The data shows that the outflow of population mainly exists in among males in the prime of their life, and that the outflow mainly arises in rural areas. There must be a considerable outflow abroad of residents from rural areas. However, the outflow results in a small numerically change in the number of the residents in Yelevan due to internal migrations toward the capital city from the rural areas.

6) The economic situation and above-mentioned movement of population in Armenia results in offering good investment opportunities as far as the labor force is concerned from the viewpoint of investment of foreign capital.

Thus, both the urban and rural areas are equipped with conditions under which a high-quality and low-price labor force, especially a young female labor force, is steadily supplied.

(3) Measures to Be Taken by the Government

It is necessary to point out that the state of population movements observed in Armenia in the preceding clause bears many serious problems for the future development of the nation.

It is a serious matter for the country that the outflow abroad in a large quantity continues among the young generations, which bears the present and future of the country despite the current non-existence of either war or internal conflict. In addition it is thought that there exists a considerable number of those who potentially hope to leave the country regardless of age.

An extreme imbalance between the number of male and female of marriageable age generation makes the vitality of the country lost and brings about various social problems. A certain specialist indicated that Armenian males (married) who went to Russia for work tended to get married to Russian women (remarriage) and settle down.

First, the government must quickly grasp this state of population outflow. The government must concurrently take all possible measures for the creation of employment in every area.

Second, the government must take concrete and careful measures for matters such as the nurture of small businesses, the introduction of small and medium-size foreign capital, and the enhancement of productivity and added value of the agricultural production. The government must create the adequate conditions under which people can get income, get married, give birth to children, and live in their native region.

Third, the government must know that among the emigrants there are those who leave the homeland not only because of economic but also for other reasons.

The government must seriously think what to do in order that such people can stay in the country and contribute to its development.

The exact data on population movements is decisively necessary. Movements of the population are the basis for all social matters and all economic plans, and without it, accurate analysis and realistic planning cannot exist.

Lastly, Armenia has not done a census since 1989, which was during the FSU era.

The census expected in 1999 was postponed to 2001 owing to budget shortage. Considering the present financial state of the government there is not a prospect for a solution to the large budgetary deficit even by 2001, and the census may be postponed once more in 2001.

As publicly known, there has been a complicated and large-scale population movement in Armenia for the past decade, and a considerable amount of expenditure is needed in terms of hardware, software, and personnel to implement a high-quality census.

A complicated and special survey is necessary for those, among emigrants, who did not make movement procedures in resident registration. It is necessary to clearly divide those who temporarily left the country and permanent emigrants, and exclude the latter from the population of the country.

In order to execute a census in 2001, the government must immediately make an execution plan, and make preparations for the execution details such as checking how many staffs and specialists are necessary and how many computers and other hardware are needed. Furthermore, the government must be equipped with enough equipment and software to execute this complicated census, what kind of computer programs to develop, and at what cost!.

Particularly as for the execution method, the introduction of computers, and the development of the software, it is clear that the present national budget cannot cover these expenses, and it is necessary to ask ahead of time international organizations and donor countries for the assistance.

Chapter 3

Target Sub-Sectors and Model Enterprises

3. Target Sub-Sectors and Model Enterprises

3.1. Purpose of the Survey

→ The Study Team conducted Quick Survey of the 36 candidate enterprises including research institutes to select one Model Enterprise for each Target Sub-Sector. The result of the Survey constitutes the basic information of the comprehensive management improvement program for each Model Enterprise and of the Development Plan of Target Sub-Sectors.

→ For the selection of Model Enterprise, weighted evaluation of the prescribed criteria was applied, i.e. (1) competitiveness of products, (2) technology level including performability of equipment, (3) growth potential, (4) talents and ability of the management, (5) worker's skill and willingness to work, (6) compliance with environmental protection and (7) global and integrated evaluation.

→ As the result of Quick Survey Sirius from Electric and Electronics Industry and Hi Team from Machinery Industry were selected as the Model Industries respectively. As for Chemical (Pharmacy) Industry, there was no enterprise to qualify it as the Model Enterprise under the selection criteria. The Study Team, instead proposes a scheme for pharmaceutical amino acid production.

→ General Features of the Target Sub-Sectors
- Utilizable industrial data and information succeeded from FSU
- Existence of high educational level of human resources and technological institutions

→ Common problems
- Many enterprises cannot get rid of the ex-Soviet management style
- Lack of Funds (undeveloped banking/other financial sector, high interest rate)
- High cost and vulnerable infrastructure (power, gas, water supply, communications and transportation systems)
- Incomplete systems (e.g. unclear tax regulations and double imposition of VAT on imported materials from Russia, etc.)
- Loss of markets and difficulty in the procurement of raw materials due to the breakdown of FSU
- The production of enterprises depending on Russian market decreased sharply or stopped due to the Russian economic crisis of August, 1998.
- Lack of the Government support to the private industrial sector

3.1.1. Quick Survey

(1) Purpose of Quick Survey and Focal Points of Execution

1) The Study Team conducted a simplified survey (the "Quick Survey") of the 36 candidate enterprises including research institutes as agreed upon with the Armenian side to select one model enterprise (the Model Enterprise) for each Target Sub-Sector. The results of Quick Survey

constitute the basic information of the comprehensive management improvement program for each Model Enterprise and of the Development Plan of Target Sub-Sectors.

The Quick Survey of enterprises was conducted focusing on the following points:

a) Market/ Sales
- How were the sales activities and results?
- Have their products had positive demand and possible export market?

b) Production
- How was the factory's operating level to its capacity?
- Were the conditions of facilities and equipment suitable for efficient production?

c) Technology
- Level of technology applied to the enterprise activity (development and production).
- Technical standard: Conversion of ex-Soviet standard (GOST) to ISO.

d) Management
- Could the corporate governance be converted to suit a market-oriented economy?
- Has the mind of the management been changed, or was it being changed to suit the market-oriented economy?
- Necessity of introducing three typical control tools, Quality, Cost and Delivery

e) Accounting
- Could the accounting system be changed to suit the market-oriented economy under internationally accepted standards?

f) Organization/ Human resources
- Are the organization and human resources suitably composed for the market-oriented economy?

2) Evaluation Criteria for Selection of Model Enterprise

For the selection of Model Enterprise, weighted evaluation of the prescribed criteria was applied (See Annex 2).

Table 3.1.1.1 Selection Criteria of Model Enterprise

	Weight
(1) competitiveness of products (demand, procurement of materials, quality of products)	20
(2) technology level including performability of equipment	20
(3) growth potential	10
(4) talents and ability of the management	20
(5) worker's skill and willingness to work	10
(6) compliance with environmental protection	5
(7) global and integrated evaluation	15
Total	100

(2) Execution Steps of Quick Survey

Actual survey of enterprises was conducted by the Study Team in accordance with the following steps.

1) Visit of the Study Team to the candidate enterprises

a) Hearing from the top management on management philosophy, history and current condition, vision for the future, organization and human resources, technical bases and main problem

b) Factory observation

2) Analysis of filled in Questionnaire

Questionnaire of the prescribed format in Russian, which language is commonly used in business sphere in Armenia, is given to each enterprise to respond (See Annex 4).

3) Selection of Model Enterprise

The Model Enterprises were selected in accordance with the criteria stated in the above Subsection (1), based on the data and information secured through the steps of above 1)-a) and b).

3.1.2. Selected Model Enterprise

Sirius and Hi Team were selected as Model Enterprises for E-E and Machinery Sub-Sectors respectively, through the Quick Survey. However, for Chemical (Pharmacy) Sub-Sector there was no enterprise qualified for Model Enterprise. The Study Team, instead, proposes a scheme for pharmaceutical amino acid production.

3.1.3. General Features and Common Problems of Target Sub-Sectors

(1) General Features

1)There is a number of industrial data, information and production facilities which have been succeeded from FSU and can be utilized for new development activities.

a) Accumulated manufacturers' basic knowledge and experience

Knowledge and experience in the production including materials, processing, finishing, assembling, adjustment, inspection, QC, and so on.

b) Manufacturing facilities

Under FSU system, the factories were normally built on a large scale having facilities that covered all processes of their respective production. Many of such facilities are currently idle or at a minimum level of operations. This means that part of those facilities (despite

their ages) can offer various production opportunities to newly starting businesses (including re-starters) having smaller scale but specialized operations.

2) Existence of high educational level of human resources and technological institutions

a) Integration of theory and practice in production

It is necessary to integrate theory and practice to achieve high quality and high efficiency in manufacturing. Human resources with high educational level are readily available in Armenia for the enterprises of the Target Sub-Sectors.

b) Experience of research and development of advanced technology

Research and development is the most highly developed intellectual work, which needs an excellent brain, precise effort, and sharp perceptivity. The fact that during FSU days Armenia played an important role in research and development through the activities of technological institutions in the various fields of advanced technology and there are still a number of specialists in the country endorses that Armenia can provide suitable stages for certain field(s) of research and development activities for the industrial sphere.

(2) Common Problems

1) Many enterprises cannot get rid of the ex-Soviet management style.

The business in many enterprises is still executed in accordance with the old Soviet standards, i.e. accounting and industrial standards. The enterprise organization is based on proprietorship under personal command. Such enterprises cannot continue to be winners in the competition for a long-term sustainable growth.

2) Lack of Funds (undeveloped banking/other financial sector, high interest rate to borrowers, etc.)

3) High cost and vulnerable infrastructure (power, gas, water supply, communications and transportation systems)

4) Incomplete systems

Tax legislation lacks clear regulations for implementation and frequent changes of the regulations hinders the business activities of enterprises. Double taxation of VAT between Russia and Armenia has not been corrected due to the difference in tax policies.

5) Loss of markets and difficulty in the procurement of raw materials due to the breakdown of FSU.

6) The production of enterprises depending on Russian market decreased sharply or stopped due to the Russian economic crisis of August, 1998.

7) Lack of the government support to the private industrial sector

a) For the recovery from falling behind of technology in past 10 years, an appropriate and substantial amount of capital investment is needed. For the capital investment the Government support is indispensable. However, so far there is no support from the Government, except for case by case approach such as a plan for construction of the industrial zone as explained in item (3) below.

b) There is a limitation in the self-help.

While enterprises are tackling the difficult reality facing them, most enterprises are start-ups or equivalent re-starters of operations through privatization, and accordingly, there is a limitation in the self-help.

(3) Plan for Industrial Zone under Study

There is a plan to construct an industrial zone in Yerevan, which is initiated by the Ministry of Industry and Trade, envisaging restoration of industry and promotion of export as well as investment. The site of ex-Industrial Exposition of 35 ha is to be utilized with renovation of infrastructure and buildings to be upgraded to international levels. The lots within the zone are to be leased to viable enterprises with an attractive low rent. SMEs will be centered among the tenants of the industrial zone.

Table 3.1.3.1 Estimated Outline of Industrial Zone

Location	Within City of Yerevan, To: Down Town 7.5Km, Zvartnots Air Port 10Km, Truck Container Yard 1Km
Premises, Building	Premises 35 ha, Building 16 ha
Owner of the Zone	1) Industrial Zone Open JSC or 2) Business consignment to a private company
Shareholders	In the case of 1): Armenian Government 0-20%, Private Sector 80-100% Equal treatment of foreign and domestic investments
Lease Period	5-10 years (extendible to 30 years or shortening period)
Legal/ Customs Offices	Both offices are to be opened in the Zone.
Implementing Agency	State Investment Company

(4) Summarized Result of Questionnaire

The common problems stated in item (2) above are also indicated in the summarized results of questionnaire to the management of enterprises of the 3 Target Sub-Sectors (27 replies out of 34

enterprises except for institutes of Chemical (Pharmacy)). Analyzed summary is in Attachment 5 of this Report. Major items are as follows:

a) Biggest Problems from Enterprises Views

- Lack of Working Capital
- Outdated Technology
- Loss of Markets
- Transportation Blockade

b) Request to the Government

- Reform of Taxation
- Betterment of Investment Environment
- Formulation and Implementation of Industrial Policy (Development Plan, Legislation, Export/ Investment Promotion)
- Long -Term Credit with Low Interest Rate

c) Enterprise's Own Theme

- Marketing (Foreign Partner, Organization)
- Tie-up with other firm
- Training of Human Resources, etc.
- Improvement of Technology
- Enhanced Competitiveness (New Product)

(5) Latest Developments of the Pending Government's Joint Programs with International Firms

The following is the information obtained through the international media with respect to the latest developments of the pending Armenian government's joint programs with international firms:

Electronics industry: Sale to Interfoundry, USA of 51% of state company Transistor's shares for semiconductors production, initial investment US$2.5 mln

Automobile industry: Creation by General Motors of the assembly plant for minibuses, trucks, small tractors for Russia, CIS & domestic markets, initial invest. US$2 mln

3.2. T/A and Comprehensive Management Improvement Program to Model Enterprise

➔ T/A to the respective Model Enterprises of Electric/Electronics Industry and Machinery Industry were made focusing on the management and technological advice for the reopening/continuation of production activities for the former, and on the setting up management target and the execution of medium term business plan simulation for the latter, based on the analysis of situation of each enterprise.

➔ Said T/A rendered by the Study Team were accepted by the respective enterprises as pertinent and effective assistance for resolution of the issues they are facing.

3.2.1. Electric and Electronics Industry

(1) Overview of the Enterprises Surveyed

1) The Study Team conducted the Quick Survey of the 10 enterprises and 4 scientific research institutes (SRI) to select one Model Enterprise for the Electric/Electronics Industry Sub-Sector (EE Sub-Sector) in accordance with the criteria specified in Subsection 3.1.1.(1). The results of Quick Survey constitute the basic information of comprehensive management improvement program for the Model Enterprise and of the Development Plan of the Sub-Sector.

Table3.2.1.1 List of Enterprises of Electric/Electronics Industry Surveyed

	Name of Enterprises	Location	Field of business
Electric/Electronics:			
1	Armelectromash	Yerevan	Generator, Transformer
2	Mars	Yerevan	PCB
3	Transistor	Yerevan Ashtarak	Semiconductor diode Semiconductor integrated circuit
4	Armenmotor	Yerevan	Motor, Generator, Fan
5	Sirius	Abovian	Resistor, PCB
6	Electron Enterprise	Yerevan	Car batteries, Cooker for home use
7	Armrelay	Yerevan	Relay for car
8	Luis	Yerevan	Ordinary lamp, Fluorescent lamp
9	Impuls	Dilijan	Communication system for pipe line
10	Martin	Yerevan	Equipment for military and space system
High Technology (Institute of Research and Development):			
11	Institute of Physics	Yerevan	Research on accelerator
12	Andron, Institute of complex electromechanical equipment	Yerevan	Generator, Transformer, Converter, Hydro-generator
13	SRI Electromash	Yerevan	Motor, Servo-motor
14	Radiophysics Measurement Institute	Yerevan	Research on parabola-antenna, Solar system

SRIs are eliminated from the candidates of Model Enterprise because of their basic nature of activities. Sirius having gained the highest score as shown in Fig.3.2.1.1 was selected as the Model Enterprise of EE Sub-Sector.

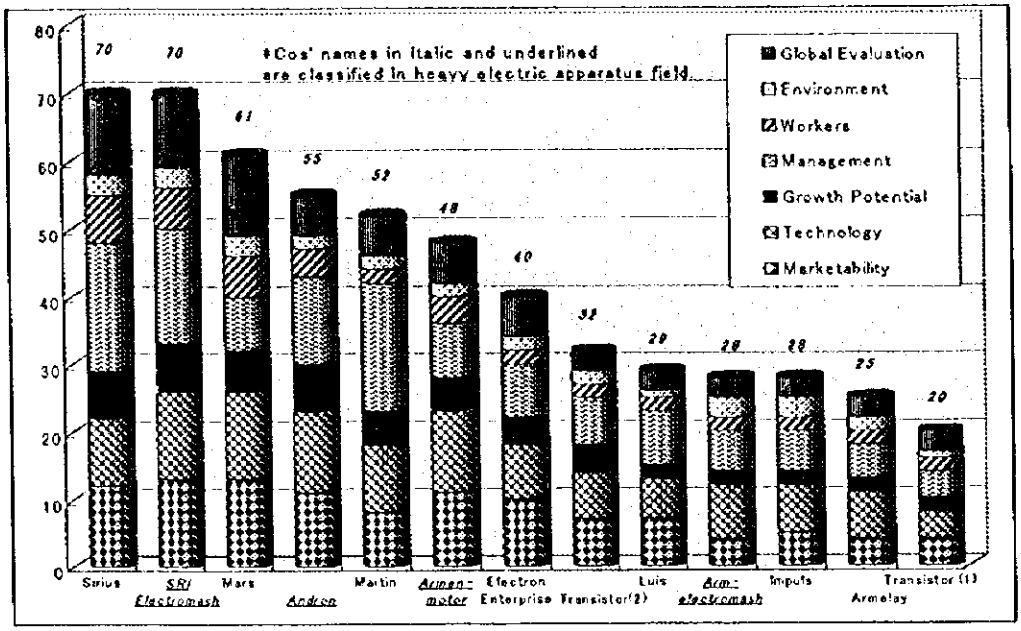


Fig.3.2.1.1 Enterprise Evaluation Results of Electric/Electronics Industry

2) Sirius, the Model Enterprise

Sirius was ultimately selected as the Model Enterprise in the Sub-Sector. The president of Sirius, 30 years of age and learned computer as well as marketing in college, has flexible attitude to adapt the company to market economy. He has shown remarkable entrepreneurship to reconstruct the company. Sirius used to be a major company in the field of electronics industry in Armenia, located in the city of Abovian having 8,000 employees, producing high-tech devices such as integrated circuit chips for computers. Sirius is the only manufacturer of resistors in the neighboring markets of Caucasus and Middle East, though the production has been stopping since 1993. The company maintains the capability to produce the resistors. There is constant order , but on a small scale, from Georgia for PCB pattern printing. With prospective orders these products are to become the base for the company to revive. The company has recently started to produce audiocassette for the domestic market. Sirius made reasonable decision and on marketing method selection of raw material suppliers as to the fresh start of audiocassette business. In addition to the foregoing, the Study Team considered the factors stated below.

- The company's financial soundness of no debt management
- Salable products for the markets of western countries with minor modification

- Export potentiality if the company's marketing is successful.
- Eagerness of the company to accept the assistance by the Study Team for management improvement

3) Situation of Other Enterprises

The current situation of other enterprises of EE Sub-Sector was as follows:

a) Electric Industry

There were many enterprises producing so-called heavy electric equipment, such as electric motors, generators and transformers, etc. **Armelectromash, Armenmotor, Andron institute of complex electro-technical equipment,** and **SRI Electromash** are classified into this category.

After the collapse of FSU, their products lost their market. Domestic market is too small to accept their production capacity. So they had to change their direction of business. Although some of them are trying to develop new products and to enter new market, only a few companies are successful in continuing their operations. Production lines of many companies have ceased operations.

Armrelay had been manufacturing relays for cars including Soviet military vehicles. Their relays were very reliable for low-temperature use. However after the collapse of FSU they could not find new markets and stopped production.

Luis was a manufacturer of all kinds of bulbs. They used to supply 17 % of the total demand in FSU. Even after the collapse of the Soviet Union they could supply products to the domestic market. But they also stopped production in 1997 because of the difficulty to obtain raw materials from Russia and huge energy costs.

SRI Electromash possesses capability to develop high level technology in the field of electric motor related products. They have developed technology to produce one of important casing parts in electric motors. The system can stamp electro-magnetic steel sheet continuously and produce casing parts for motors. This technology enhanced yield rate of expensive electro-magnetic steel sheets from 58% to 85%. They have developed a production machine using this technology. They have another proprietary product. That is a servo- motor. This motor will be used as a core part in NC machines and industrial robots. They have been trying to sell their servo-motor to Mshak. Mshak is presently using Siemens made servo-motors. If successful SRI Electromash could show the Armenian technology as being on par with German technology. However SRI Electromash was not keen to be selected as Model Enterprise. Instead they want the Study Team to convey their message to Armenian government to consider exemption of VAT. They hope that VAT is exempted for at least for a few years in order to turn around their operation to be profitable.

b) Electornics Industry

Mars was equipped with world class production facility. Mars has potential to produce competitive products in the international market. However when we visited the factory we were told that Mars was on the list for international tender and under negotiation with a foreign investor. There was no point to choose Mars, if the company is purchased by a foreign company. However in March 1999 the Study Team was told the negotiation with that foreign company eventually broke. The government decided in January 1999 not to sell Mars. The government decision is agreeable to the Study Team since Mars could be used for other purposes such as a training facility equipped with modern production systems.

Transistor - Ashtarak never started their operation. Just as they were about to start operation Soviet Union collapsed and the project was suspended. Recently Transistor - Ashtarak has set up a joint venture company named Armensemi with a US company, Interfoundry. This joint venture is aimed to produce middle class technology semiconductors. The semiconductor will be used in automobile control and for some other purpose. The products will be distributed through Interfoundry. We understand one of the main customers will be Motorola. However the production facilities had been designed for 5 inches wafer semiconductor production. Nowadays 5 inches is already obsolete technology in the international semiconductor industry. If the factory is to be activated the facilities need to be upgraded to process at least 6 inches wafers. IC print processing technology should be also upgraded from 1.5 micron level to 0.8 micron level. Upgrading production facilities would cost more than US$100 million. The Study Team came to know that the US partner asked the Armenian partner to raise these funds and the negotiation resulted in a dead locked. Under these situations there was no room to select Transistor - Ashtarak to be a Model Company.

Latest development since July 1999 of the Armenian government's negotiation with the U.S. firm for the sale of a stake in Transistor for semiconductor production is described in section 3.1.3.(5).

4) Common Issues

- Glorious days as those under the FSU will never return. Go for new horizon in new markets with new products.
- Huge FSU market is lost and current CIS markets cannot be relied upon due to their economic problems.
- Automatic supply of raw material cannot be secured any more.
- Outdated production facilities
- Transportation difficulty because of border blockades

- Most of the enterprises have been shut down or operated less than 10% of the production capacity.
- Many qualified researchers and engineers left SRIs. However if jobs can be created for them they would come back and contribute to reconstruct the EE industry.
- Workers skill level has been deteriorated. Engineers do not have latest production technology.
- R&D activities are not carried out in the factories. Research Institutes have been conducting R&D activities in limited fields not aiming at commercial production but mainly for military use.
- In order to compete in market oriented countries, manufacturers need to meet the international standard, in terms of industrial standard, quality, price, delivery and marketing methodology.

(2) T/A to Model Enterprise

Sirius has the following 3 strategic business units (SBU):

- Metal Film Resistor Production
- PCB Production
- Audiocassette Production

1) Common Issues among the 3 SBUs

- Formulating a Business Plan
- Very Small Share of Production in Income
- Employment of Technology Specialists
- Improvement of Environment in the Workshop
- Establishment of Facility Maintenance
- Grasp of Demand in the region they want to enter
- Conversion of Products to International Standards
- Cooperation between Production and Sales Departments
- Modernization of Production Equipment
- Development of New Products Oriented to the Market
- Reliability Assurance

a) Formulating the Business Plan

In order to clarify the future development direction within the company's operations, a long-term business plan must be formulated. Sirius has never discussed this issue nor had such a plan. They have only taken measures to meet immediate situations. **The president's philosophy is very important for establishing the company's target.** The philosophy need not necessarily be concrete, however, they must be confident about the process and field they want to pursue. This

should be a simple and common target for all Sirius employees. After setting the target, the operation of the company will become clear. Recruiting of well-qualified technical staff can be done successfully because they will think Sirius is a very promising company. For the establishment of this target all administrative staff in all sections should take part in planning of the business plan. Those, who take part in the making of the target, will feel responsible for its realization.

b) Re-opening of Production Activities

It is imperatively important for Sirius that the company re-opens production of resistors and PCBs, that are virtually stopping, even at the level of the least amount, as to resistors in particular being under the stoppage since 1993. Initial costs of the re-opening are the required ones. The company can obtain through such test production as stated above the necessary information for the re-construction of production lines. The workable production facilities, that can appropriately answer to the orders to be eventually received by the company, must be constructed. Then, the company should strive to continue its production activities. Though the management attributes the stoppage of production to lack of orders, it should accumulate efforts to increase the company's clientele through positive marketing activities (shifting from the current waiting posture for customer's order) in parallel with the re-opening of production line.

Sirius is able to stabilize its business operations with the increased customers and continuation of production activities. Then, the company can modernize its equipment for improved productivity within limitation of necessity and doability. The Study Team suggested that the company takes a step-by-step approach to conquer the difficulties facing them. When Sirius successfully acquires international competitiveness in the future, there can be a pretty good chance for collaboration with renowned foreign manufacturing firm(s).

c) Very Small Share of the Current Year Products in 1999 Revenue Plan

Sirius has several types of plans, i.e., total sales plan, production plan and cost plan.

In the 1999 sales plan only about 50 % in the company's revenues represents newly produced products. This is nearly equal to planned sum of old inventory and assets sales (Table 3.2.1.2).

Table 3.2.1.2 Sirius Business Plan for 1999

Revenues	Sum (%)	Expenses	Sum (%)
New Products	49.2	Production Cost	40.9
Lease	10.7	Fixed Expenses	4.5
Old Products	40.1	Salary, Pension	18.3
		Depreciation	31.8
		Energy, Communication	4.5

In manufacturing company small new-production share in the revenues is fatal. The plan is an expression of the company's will to attain the total target. Sirius can be more aggressive in planning its budget because they may have more customers to receive their resistors and PCBs. They are probably too moderate in estimating demand. This originates from reflection of their passive sales activities. We think that if they go and talk to potential customers about their products, they will be able to get more orders.

In usual operation of the company the differences between plans and results should be discussed periodically. It is important to clarify the reason for discrepancy if any. Through these discussions, management will be improved gradually.

d) Employment of Technology Specialists

Sirius is a manufacturer of electronic parts. An important stance for a manufacturing company is the continuous operation of their product line. In order to operate the line continuously and to improve productivity, qualified technical staff are necessary. **Technology experts must be urgently employed for the respective departments.** They will be able to explain and discuss specifications of their products with customers. They will come back to the factory with demand information about related products. They will be helpful in gaining the confidence of customers, and consequently expanding their customer base.

e) Improvement of the Environment in the Workshops

Both the production lines of resistors and PCBs have remained unchanged since construction. Large buildings are located, scattered in the vast grounds. Even if the facilities are operated, the products and man movement will not be done efficiently because of long distances between the buildings. At present the production equipment for PCBs and resistors is set up in very bad environmental conditions, i.e., under leaky roofs, on dirty floors and in a dusty atmosphere. Present conditions are not at all appropriate for producing fine electronic components. Under such conditions the quality and characteristics of the products are unable to reach expected levels. **Improvement of surroundings of resistor and PCB workshops should be conducted urgently.** Compact clean - rooms (about class 10^4) can be constructed within the large buildings without much expense. Improvement of buildings is also essential to decrease expenses for winter heating and summer cooling. **This can be achieved simply by making rooms with partitions within the present buildings.**

f) Establishment of the Facility Maintenance

Facilities for the resistors and PCBs have been installed at least 15 years ago and have remained without sufficient maintenance. Under such circumstances the productivity of resistor and PCB lines cannot reach the expected potential of the machinery. In a limited market with moderate

competitiveness for these products, even from deteriorated production lines, might not be fatal although have a disadvantage. However, as the market expands more and more, products from these deteriorated facilities cannot compete with those produced by modernized equipment.

Sirius plans to invest profits gained from current products, into modernization and updating of its technological equipment, so that the traditional product line is supported and improved. However such profit is too small to strengthen the line sufficiently for modernization. **Therefore maintenance of the existing facilities is essential to preserve the productivity of the line and to strengthen competitiveness of the products.**

g) Grasp of Demand in the Markets the Company wants to enter

In Sirius the importance of marketing is well understood. A Market Research division was established several months ago. This is excellent in comparison to other manufacturing companies in Armenia. Their comprehensive marketing system has been operated to obtain data for related products. Their activities are being done according to several target regions of markets.

However, these marketing activities alone are insufficient to enter into a new market. Information about demand for resistors on a (global) worldwide basis has been obtained only from magazines. They don't have **information on concrete demands for their products in the regions, i.e., Russia, CIS, Iran and Turkey** where they first want to enter. Although they know the names of their competitors, a comparative analysis of their advantages and disadvantages with their competitors has not been carried out.

They don't have much experience about the sales of PCBs. But they have a few channels to customers. This can be an opportunity to expand their market.

Marketing strategies are necessary to get more customers.

h) Conversion of the Products to the International Standard

During the Soviet era resistors were produced according to the GOST. In western countries resistors are produced in accordance with MIL standards. In order to penetrate into markets outside the CIS, Sirius should adopt **MIL standards for production of resistors.**

They are converting the markings of their previously produced resistors to international standard by using color-coding. For resistor production this is the first problem to be solved. The conversion should be done urgently by solving technological problems in the color marking. If it is very difficult to establish the technology for color-coding using the present marking machine and paint, there may be another possibility to introduce machines, which are widely used for the standard technique.

Besides color-coding it is necessary to examine all production processes and to convert them to MIL standards.

For PCB's reliability assurance is desirable to be done in accordance with **international standards (ICP).**

i) Cooperation between the Production and the Sales

This may have originated from Japanese thinking. In manufacturing companies whether the product line can be fully operated or not depends upon the activities of those engaged in the sales section. **Therefore cooperation between the production and the sales sections is important for making progress in the company. It is desirable to bring about such a spirit of enterprise.**

j) Modernization of Production Equipment

At present financial support cannot be expected, and loan interest rates are high. So manufacturing companies hesitate to invest. However, to improve production efficiencies and to maintain competitiveness, **a minimum investment in production facilities will be necessary.**

Sirius's production lines for PCBs and resistors have not been renewed for about 15 years. For the improvement of the productivity and competitiveness some facilities should be renewed. We would like to say that it is preferable to invest for the further development of enterprise rather than steady operation at present. Sirius aims at operation without debt. However necessary debt is necessary.

k) Development of New Products Oriented to Market

Sirius's products are limited only to PCBs, resisters, and audiocassettes. Furthermore, they don't produce the complete line of resistors covering the main power range of nominals. This is a dangerous situation. Because their operation is very sensitive to the demand fluctuation of a small number of products. Therefore it is very important to develop new products and to supply them to the market.

Sirius is now developing new products: battery-chargers and panel heaters. Added value in audio cassettes is limited to the outside case structure. For panel heaters they don't intend to market final products, but to supply OEM material. The limited activities regarding new product development are due to the lack of research and development staff and available funding.

Our advice on the development of new products is as follows: 1) under the limited human resource environment, it is desirable **to expand the variety of products produced in the present line**, such as 0.125 W and 0.25W resistors in addition to 0.5W, 2) development of multi layer PCBs, for example 2 and 4 layers. **In the vicinity of their own field, they can be more successful than in a new field. After such a process as a stepping-stone they will be able to enter new market.**

I) Reliability Assurance

Sirius's quality control is carried out according to the those specified during the Soviet era. For resistor production, current QC system is summarized as follows:

- Well established method of specification assurance of the products
- Data obtained at main stages of production process are not used to prove fluctuation of process condition.

Here we will discuss the resistor production as an example and suggest some improvements about the reliability assurance system. Production quality control has being carried out for all major stages and for all main parameters, such as resistance, accuracy, TCR (Temperature Coefficient of Resistance), etc. At several stages appearance rejection has also been done by visual inspection.

About 80% of all resistors have resistance value within ±20 % of the target value. This is acceptable for resistor production. These are divided into groups with tolerances of ±5% and ± 10% from the target value and then delivered to thee appropriate customers. Those with a value less than target-minus -20% are further brought into the acceptable segments by appropriate cutting and consequently realizing higher resistance. Those with values more than "target plus 20%" are being marked as resistors with higher resistance, thus forming another group of resistors for different customers.

These procedures are definitely defined and indicated to workers on documents. As a result of these procedures, average yield of 95% is obtained. So products deviated from specification is scarcely ever delivered to customers.

Is this sufficient for the production quality control? They process necessary items for quality control, but not sufficient items. In general there are two purposes for quality control:

- Elimination of defective products
- Improvement of yield

Sirius is carrying out the elimination of defect products well. However it may not be sufficient to improve the yield of resistor production.

Yield can deteriorate due to the following issues:

- Design with small margin sensitive to process fluctuation
- Defective raw materials
- Defect in production process.

Therefore they should have a measure to evaluate raw materials. In order to detect defects in production process, it is desirable to assess various properties at main stages. In the case of resistor production quantitative measurements may be difficult in the halfway stages. In such a case

fluctuation of data should be monitored for all production lots. In the mass production of electronic parts there are possibilities of lots with implicit imperfections. Nominal value that deviates from the one designed initially is thought to show imperfections inherently involved in the process. The data obtained at the respective stages must be used to improve process. It is important to think well about the production process.

Imperfect design is most probable reason for decreasing the yield of products. Most important thing is design in the QC activities in the production of electronic parts. Means to watch main process are necessary to detect defects originating from imperfect design. In order to improve design quality, it is desirable to collect data about characteristic sensitivity to the fluctuation of process condition. Such data can be obtained by introducing intentional variations of process conditions and estimating their effects on the characteristics of products. Taking these data into consideration, they will be able to design products resistant to the process fluctuation and having higher margin.

2) Propositions and Guidance to each SBU

2)-1 Metal Film Resistor

a) Reconstruction of Compact and Clean Production Line

Since 1993, resistors have not been produced. In order to recover productivity, all the facilities must be checked. Tests should be carried out for volume production. **Some of the facilities may require renewal.** Currently facilities for resistor fabrication can be available at very reasonable prices. For example, cutting machines at about US$10 thousand are available from Taiwan. Such information must be collected. In the present deteriorated line, without proper maintenance it seems very difficult to produce resistors with high quality. Also high productivity can not be expected. Will they be able to produce resistors having only the same performance as during the FSU days? In addition to quality, it is suspected if productivity can be restored to the operational level of 10 years ago.

In order to preserve quality of products such as small electronic parts, **it is essential to maintain cleanness.** For the case of production of metal film resistor, requirement for cleanness is only about class 10^4 for a limited area. It is not expensive to realize such circumstances as explained in section 3.2.1.(2) 1) e). For preparation method of metal film, sputtering technique is preferable to the present evaporation method because of the stability of its properties. **Renewing facilities and construction of clean production lines are essential for high quality resistors.** These investments may be cause for the unit cost increasing. In order to avoid cost increase due to these investments, as much as possible, it is important to enlarge production volume and sales. Consequently, cooperation between sales and production departments will become very important.

b) Production Cost of Resistor

The production capacity of the present line is not clear. In the following discussions, we assume production facilities worked well during the FSU.

Break-even point is AMD1.75 million a month (about 440 thousand pieces production per month). This is not as high a level when compared to the past production ability (15 million pieces per month). Relatively low break-even points are due to the unique system. If there is no work the workers are expected to stay at home and are invited back to the factory when there are new orders. So worker's salary can be classified into variable expenses.

Anyway **it is necessary to test the productivity of the present line.** After establishment of the renewed line, a production level higher than the above mentioned one can easily be attained. **Additional investment for the line refreshment will increase depreciation expenses,** and consequently the break-even point. **But this refreshment is necessary for the rebuilding of the line** and it will become profitable by increasing production and sales.

Variable expenses are estimated to be equal to 85 % in total expenses. The high expenses may be ascribed to **high cost of raw materials which amount to nearly 65 % of production cost** (Fig. 3.2.1.2). As a result profit is limited to a small percent of value. This is a very dangerous situation because it will easily suffer from market price fluctuation.

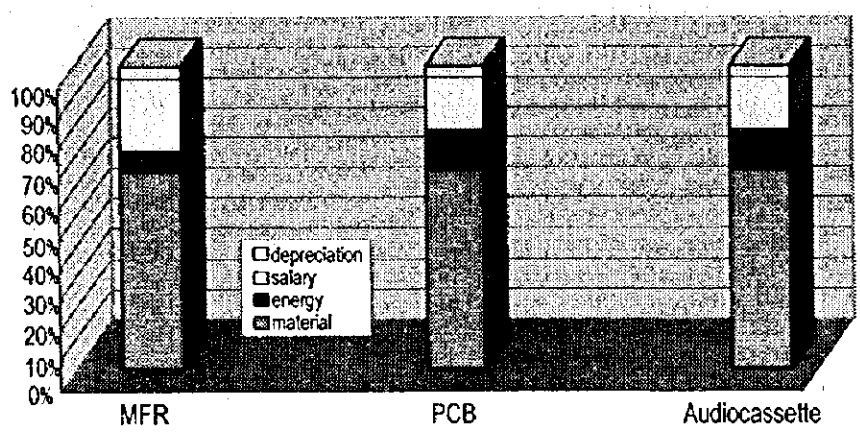


Fig.3.2.1.2 Sirius Production Cost by SBU

In order to overcome these difficulties most important and simple means are to search for a way to reduce raw material cost. The company is looking for suppliers other than the ones it traditionally purchased from. Although at present this trial is not successful, they will have to continue searching for lower price suppliers.

Another solution for gaining more profit is to enlarge production volume. It depends on demand. How big is the demand for their resistors? Sirius management doesn't have concrete data about this, but indicated they have distributors in Holland and UK who are willing to sell Sirius resistors despite the company's modest sales activities relying on the demand from customers within the range of own production capacity. If the company would pursue more positive sales prospects, **5 million pieces a month** can be produced and sold. This volume corresponds to the ordinary minimal quantity of a manufacturer in the present resistor manufacturing industry of the world. If Sirius can continue this production level, renewal of the facilities within a limited range becomes possible without giving heavy burden on the production cost of resistor.

c) Pattern of Production

Resistor is a common commodity item in the Electronics Industry. Accordingly production is usually made on a forecast basis. However in the case of production using high cost raw materials as being done in Sirius, it would be better to start production after receiving orders rather than do it based on the forecast. In that case the order production would minimize increase in material stock. In such production pattern, **short TAT** (Turn Around Time, which is the time required from the initial design to finish fabrication of first sample.) **becomes a decisive factor for winning business together with price and quality.** Sirius can manifest strength in the neighboring markets such as Russia, CIS, Iran, and Turkey, as compared with the competitors from outside of the region. Those competitors would need a longer time to make access to customers in the region. For Sirius required TAT would be within 3 days, although it depends on the competitors' ability for it.

In addition to TAT, a wide variety of characteristics such as resistor-value specification and power rating becomes key to get orders.

Especially on power rating, the demand data of the region is in the company's hand. So they should expand their resistor nominal utilizing the market survey results in hand. It is convenient for customers to be able to procure all kinds of resistors in need from one manufacturer. Sirius must not sell only the products which can be manufactured, but makes those which can be sold.

2)-2 PCB

a) Improvement of Production Line

Situation to renew the PCB production line is the same as for the resistor production line.

b) Cost of PCB

Price of Sirius's single layer PCB is not any cheaper when compared to the Japanese products. Also in PCB production, the weight of raw material costs is very high. This is mainly due to the epoxyglass (FR-4) price. This standard material is widely used by the manufacturers of the world.

As there are many suppliers of epoxyglass, it is possible for Sirius to acquire it at lower price. In 1998 the company produced 50~55 m^2 single layer PCB. This experience contributed to the company's collection of information regarding mass production. However, that production volume was too small to realize profit, because the break even-point is at AMD11.6 million a year (260 m^2) by our calculation. The company has the experience to have had an annual output of 22 thousand m^2. In order to gain profit, they should aim at least 1 thousand m^2 output per year. Although exact calculations are necessary, the above production volume would be sufficient to recover the additional investment, which is required to increase production capacity of PCB.

c) PCB Pattern Designing

In the PCB manufacturing business there are mainly two types of interfaces between customers and manufacturers. The most popular type of developing new PCBs is being done as follows: **Customer designs circuit patterns** to be formed on PCB according to the circuit previously designed. Then the pattern information is passed to the manufacturer.

Another type of interface is: **Circuit patterns on PCB are designed by the manufacturer** in accordance with circuit diagrams provided by customers. After the customer tests the designed results, test production starts.

Which type of business is preferable for the manufacturer? It depends on designing ability: TAT and designing cost. There are many customers that lack ability to design PCB and are hesitant to adopt PCB. If customers think Sirius's designing is obtainable in shorter delivery time and at lower cost, they would ask Sirius to design. PCB pattern-designing business itself is not so profitable. But it should be considered to be strategic means to expand clientele. If Sirius can incorporate pattern designing into their business, **they can expand their market and consequently acquire more customers.** Exchange of information about design with customers will become easier by the development of communications infrastructure. With competent human resources, expansion of the company's business in this direction is rewarding.

2)-3 Audiocassette Assembling

a) Raw Material Cost

Raw material cost amounts to 66 % production cost. This situation is the same as in the production of resistors and PCBs. However **there would be less possibility to reduce raw material cost rather than resistors and PCBs.** Main raw materials for audiocassette production are magnetic tape and plastics. Plastics are being procured in Yerevan at reasonable prices. Magnetic tapes are supplied by a single magnetic-tape manufacturer. There is little possibility to reduce the price unless the quantity the company buys is significantly larger.

According to the Study Team's calculation, break-even point is at 10 thousands pieces per month in audiocassette production (AMD1.6 million). This is nearly equal to present production capacity. Therefore even in full production with the present line it is difficult to gain any profit. Another possibility to reduce costs is to increase throughput of existing manufacturing equipment. From such point of view, it is necessary to check the production process.

Sirius intends to enter into a new business of recording and sales of music on tapes. Their current customers for audiocassette assembling are those in music studios in Armenia. Out of the whole music tape business the most profitable part is said to be music recording on tapes and sales. If Sirius can engage in the entire music tape business as stated above, they may be able to make money in a short period of time. However, adding high value to products in audiocassette assembling would be difficult compared to resistors and PCBs, as the company's audiocassette assembling is only a part of music tape business. As seen in many countries CDs will be taking over audiocassettes. In addition MDs will become rapidly popular. Therefore audiocassette assembling may not become a main business for Sirius.

(3) Business Domain and Target Market that shall be envisaged by Sirius

1) Resistors

Since this item is commodity items if the products meet the international standard such as MIL, Sirius can sell their resistors to any market in the world (e.g. recent inquiry from a business partner of Holland) provided price is competitive enough. In addition we understand there are no other resistor manufactures in the region, Sirius is in a better position to capture customers from the neighboring markets such as CIS countries, Iran, Turkey, Pakistan and others.

2) PCB

A regular customer is in Georgia from whom Sirius can expect repeat orders. In general, the customers prefer the PCB suppliers being located closer to them to be able to respond to their frequent modification requirement. Accordingly the targeted markets are CIS countries, Iran, Turkey etc.

3) Audiocassette

The first shipment by Sirius to the domestic market was successful. The main customers are the recording studios in the country. Sirius has obtained good reputation from them. Though the profit from this product is not impressive, audiocassettes are useful to sustain the level of the company's operations. Presently the market is limited to domestic one, however the market can be expanded to neighboring countries. For more profitable operations Sirius may consider to enter into music

tape recording business that is the most profitable in the music tape industry. In the long run Sirius may consider entering the production of videocassettes.

(4) Effect of T/A to Sirius

It is difficult to evaluate the quantitative effect of the short-term T/A extended by the Study Team to improve the management of Sirius. If there are some effects, it would take a long time before those could actualize. In Armenia most of electric/electronics manufacturers have been collapsed and have not been able to carry out their regular production activities. Under such situation it is difficult to evaluate the quantitative effect, because concrete data of production, such as yield, productivity, quality improvement, cost reduction, etc., are not available.

However, there may be a prescription for management improvement to adapt to such situation. T/A to Sirius was done by investigating and by discussing the individual problems, confronting Sirius in various management phases. Concrete suggestions and proposals have been given to respective individual problems. And finally total proposals have been done on documents. They are concrete and detailed rather than the proposals from global and integrated viewpoints. We intended to propose solutions for important and daily problems the company was confronted with.

It was stressed that formulating the business plan was very important. However, the company doesn't have any systematically prepared management plan except for some measures to counteract technical problems. Sirius should have strategic middle and long-term plan. Our suggestions occur to their mind in preparing the application documents for a loan with MIT. The management of the company fully realized importance of our point-outs, which they had not noticed or they had not grasped accurately since they had been dependent only on rough estimate.

Their organization is pretty well established. Marketing division is newly established. However average age of all employees is 46. There are few well-qualified young specialists in each position except for the marketing division. They are of the same opinion as us on the necessity for recruitment of technology specialists within the current obtaining environment.

Weakest point in their organization is their marketing division. Important thing is getting orders in order not to stop line operation. This can be done not by waiting for customers to come with orders, but only by going themselves to customers. Then they should establish processing information system about the related market. The above was pointed out by us, and has been understood, although they can not execute this at once due to financial constraints.

Detailed data has not been collected and analyzed on production, such as capacity, facility maintenance, process ability, yield, TAT, etc. Data collection remains at a rough estimation. This may be due to the situation that production lines have not been continuously operated, and they are

not conscious of production management technology. They will refer to our suggestions and proposals, after their production activities get on the right track.

Opinion of Sirius President about the Study Team's activities is as follows:

OPINION ABOUT THE STUDIES AND CONSULTATION ACTIVITIES CONDUCTED BY THE JICA GROUP JAPAN

1. I consider these studies to be very productive. I would like to mention the high professionalism of the specialists involved in this group. I highly appreciate the detail analyses which the group made in the financial, technological and marketing departments of our enterprise. The consulting assistance of the group confirmed with us that we are right in our determination of the development programs, we also noticed problems we had never suspected and took into consideration all our shortcomings.
2. It would be desirable if during the studies the group showed their own approach towards the solution of analogous problems.
3. The continuation of the JICA study team activities would be helpful.
4. Together with the JICA study team we would like to bring out our potential business-partners in South-Eastern Asia and establish joint activities together with them.
5. I consider that the seminars held by the JICA team were very helpful and I would like to take part in the like again and again.

I would like to express my gratitude to the JICA study team for their valuable consulting assistance and concrete suggestions made in the reproduction of the main items of our production.

"SIRIUS" OJC, President H. Mezhlumyan

As a result of T/A the whole organization of Sirius was activated and the company succeeded in obtaining fresh orders. The production of resistors has been resumed since July 1999.

The profitability of audiocassette has improved with increased orders and lowering of procurement cost of raw materials.

3.2.2. Machinery Industry

(1) Overview of the Enterprises Surveyed

1) The Study Team conducted the Quick Survey of the 12 candidate enterprises to select one Model Enterprise for the Sub-Sector in accordance with the criteria specified in Subsection 3.1.1. (1). The results of Quick Survey constitute the basic information of the comprehensive management improvement program for the Model Enterprise and of the Development Plan of the Sub-Sector.

Table 3.2.2.1 List of Enterprises of Machinery Industry Surveyed

	Name of Enterprises	Location	Field of Business
1	Mshak	Yerevan	CNC System
2	Electron	Vanadzor	Production of consumer goods
3	Autogenmash	Vanadzor	Welding & cutting apparatus
4	Chapich No.1 (*1)	Abovian	Radio electric measuring apparatus
5	Chapich No.2 (*1)	Abovian	Radio electric measuring apparatus
6	Charentsavan Tool Plant	Charentsavan	Machine tool production
7	Charentsavan Machinery Building	Charentsavan	Metal cutting machine tool
8	Yerfrez	Yerevan	Milling machine production
9	Hrazdanmash	Hrazdan	Generator, pump, Mini-tractor, etc.
10	Yervan Factory of Techno Equipment (*2)	Yerevan	Steel bench, hanging ceiling, shutter, etc.
11	Technoimpex (*2)	Yerevan	Engineering of steel/aluminum products
12	Alcon (*2)	Yerevan	Aluminum doors, windows, shop windows

(*1) These enterprises are registered in the Sub-Sector of electric and radio electronics, but machine building groups visited and analyzed them.
(*2) Three companies are the subsidiaries of Hi Team as its parent company.

The Study Team also applied the 3 additional criteria indicated in Table 3.2.2.2., based on the current situation of Machinery Industry.

a) Management situation-whether pursuing the same kind of business as in the past or stating new kind of business

b) Development direction-clear or vague

c) Technology level-new kind in application field of Machine Building or own technology possessing form the past

Table 3.2.2.2 Categorized Criteria Applied for the Selection of the Model Enterprise

1. Management situation

A. Basically the same kind of business as in the past

Active	Failed
Autogenmash Yerfrez	Charentsavan Machine Building Charentsavan Tool Plant

B. Started new kind of business

Active	Inactive
Hi Team Mshak	Electron Hrazdanmash

C. Seeking sale of enterprise — Chapich No.1 & No.2

2. Envisaging development direction

Clear	Vague
Hi Team Mshak Autogenmash	Yerfrez
Not decided	
Electron Hrazdanmash	Charentsavan Tool Plant Charentsavan Machine Building

3. Technology level

A. A new kind of technology in the applied field of machine building

Adopted
Hi Team Mshak

B. Own technology possessing from the past

Improving	Stay behind
Autogenmash Yerfrez Hrazdanmash	Electron Charentsavan Tool Plant Charentsavan Machine Building

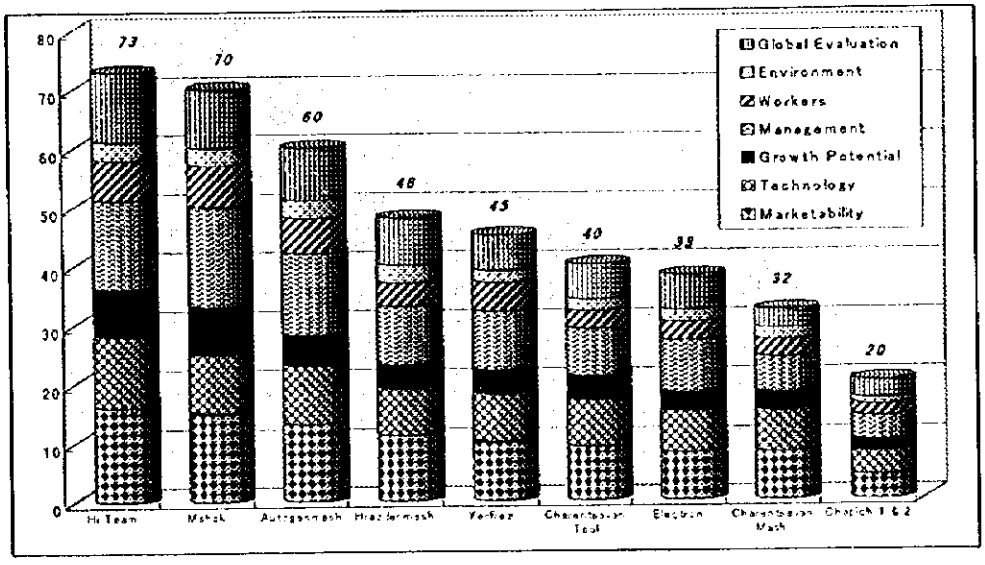


Fig. 3.2.2.1 Enterprises Evaluation Results

2) Model Enterprise, Hi Team Group

Hi Team Group, the Model Enterprise, are engaging in the manufacture of steel furniture (such as airport/park benches), rolling shutters, kiosks, aluminum profiles, etc., shifting their main line of business from machine building to metal processing related to construction works. The company commenced investment for its new production facilities and equipment in 1997 and started real production activities in 1998. Hi Team is aiming at a higher level of manufacturers' culture and expressed its readiness to accept the assistance of the JICA Study Team.

3) Other enterprises

The situations of other enterprises are as follows:

-Mshak (Private company, Employee 90, Evaluation point 70)

Despite the crisis in Russia and the economic difficulties in Iran, Mshak is conducting particularly good operations in 1998 with its unique products (CNC and Motion Control systems) under the outstanding capability of its management with its international business network for marketing/sales and procurement of materials/components as well. The company achieved sales of AMD410mln (US$812,000) , 2.7 times to 1997. Mshak knows how to live/grow by itself with the markets of such countries as Iran, Russia and Ukraine as well as the domestic market. The company's weakness is that they do not have own production facilities and the fact hinders Mshak from its required capital investment financing for expansion of business due to insufficient collateral.

-Autogenmash (Stakes of State 73.8%, Evaluation point 60)

While the company has been developed supported by its unique technology in welding devices, they were adversely affected by the economic crisis of Russia where they have major market. Sales in 1998 dropped by 55% to AMD285 mln (US$565,000). The company is facing an immediate need to develop Middle East markets.

-Hrazdanmash (Stakes of State 80%, Evaluation point 48)

The company explored possibility of new business in diversified field of products from portable generator to mini tractor with which the factor of tie-up with foreign firm (Japanese firm is involved) is included. However, so far the result did not rise. In 1998 the company only registered sales of AMD2.7 mln (US$5,352) with registered 2,300 employees. The company's operations had been stopped for 7 months since September 1, 1998, due to its disability to provide heating system. This is attributable to the vagueness of development direction. Electron (Stakes of State 49%) is in the similar situation with Hrazdanmash. So is privately owned Charentsavan Tool Plant (1998 Sales AMD77 mln (US$153,000), employee 660).

State company (80% stakes), Charentsavan Machine Building (1998 Sales AMD194 mln (US$ 385,000, Employee 1,099) went bankrupt in September, 1998. Major creditors are the budget commission and the Government employees pension funds. While surviving plan is being studied by the company's management, so far no effective results were obtained.

Hrazdanmash, Electron, Charentsavan Machinery Building, and Charentsavan Tool Plant are closely connected with regional societies, surviving issue of these companies also has the phase of regional development.

4) Common Issues

a) It is almost impossible for the Machine Building Industry to restore its former position.

- It is realized that the machine building industry has been in a totally depressed condition, especially the heavy machinery, due to such causes as loss of market, outdated technology and worn-out equipment and facilities. It would be almost impossible to make the industry, in the narrow terms of machine building, regain its former position.
- A limited demand for light machine tools at competitive a price in the CIS region exists, but it cannot really be expected for Armenian manufacturers to grow under the current market conditions that require rapid technological innovation and counter globalization measures of the world economy.

b) The blank of the past ten years caused enterprises to fall behind in the technology

Equipment, facilities and workers' skills of the machinery Sub-Sector have become outdated due to the long blank in operations over the past 10 years. Especially, most of its equipment was installed 15 to 30 years ago. This was caused by the transition of the social system, and should be accepted positively. It is important to speak about how to recover this delay by initially recognizing this fact.

c) Transportation problem

The transportation problem (for imports and exports) cannot be solved solely by the effort of enterprises. This problem is particularly serious to the machine building industry, compared to the other industries, because materials and products are normally large and heavy.

d) Inefficient in-house integrated processing system

During the days of the FSU, the production policy made it necessary for enterprises to possess an in-house integrated processing system from the raw materials to the final assembling stage. This system is extremely inefficient for flexible production, particularly on an SME scale.

e) Strong influential nature of machine processing technology on all industrial products

The machine processing technology is fundamental for all industries in giving a decisive influence on performance, quality and cost of the products. It is the most critical issue for both the

government and the private sector to relieve this Sub-Sector from its difficulties. As a result of the enterprises survey, the Study Team would urge the government to initiate measures for the promotion of Research and Development of new processing technologies, which would eventually benefit and enhance the private sector's performance.

(2) T/A to Model Enterprise

T/A to Hi Team was executed focusing on improvement of management skills rather than engineering technology based on the findings of the enterprises survey. In order to carry out the formulation of a comprehensive management improvement program, a detailed survey was further executed, taking the following steps:

- Hearings with the Management and Staff
- SWOT Analysis
- Establishing a Future Vision
- Apprehension of the Enterprise Responsibility
- Setting up Management Targets
- Formulation of Action Programs
- Setting up Target Figures

1) Hearings with the Management and Staff

The Study Team conducted intensive hearings with the management and all staff members from Sales, Accounting, Production, Engineering, Personnel and Information System sections in order to grasp its management realities. Eighty-five specific items were carefully analyzed through a joint effort from the Study Team and the Hi Team's management to reach a common understanding on the current situation of the company.

2) SWOT Analysis

There are two kinds of environment surrounding enterprise management, i.e. external environment which comprises Opportunities (O) and Threats (T) to the activities of the enterprise, and the internal environment which stands for Strengths (S) and Weaknesses (W) of the enterprise's ability. A single enterprise cannot control the external environment by itself, and must adapt itself to external changes. Adapting the enterprise to the change of external environment requires the highest level of management strategy. On the other hand, internal environment can be managed by the enterprise itself. The understanding of the enterprise's current situation, under the SWOT Analysis, leads to a proper process for the formulation of workable management strategies. From that viewpoint, the main points out of the eighty-five items have been extracted and compiled in Fig. 3.2.2.2. SWOT Analysis Chart.

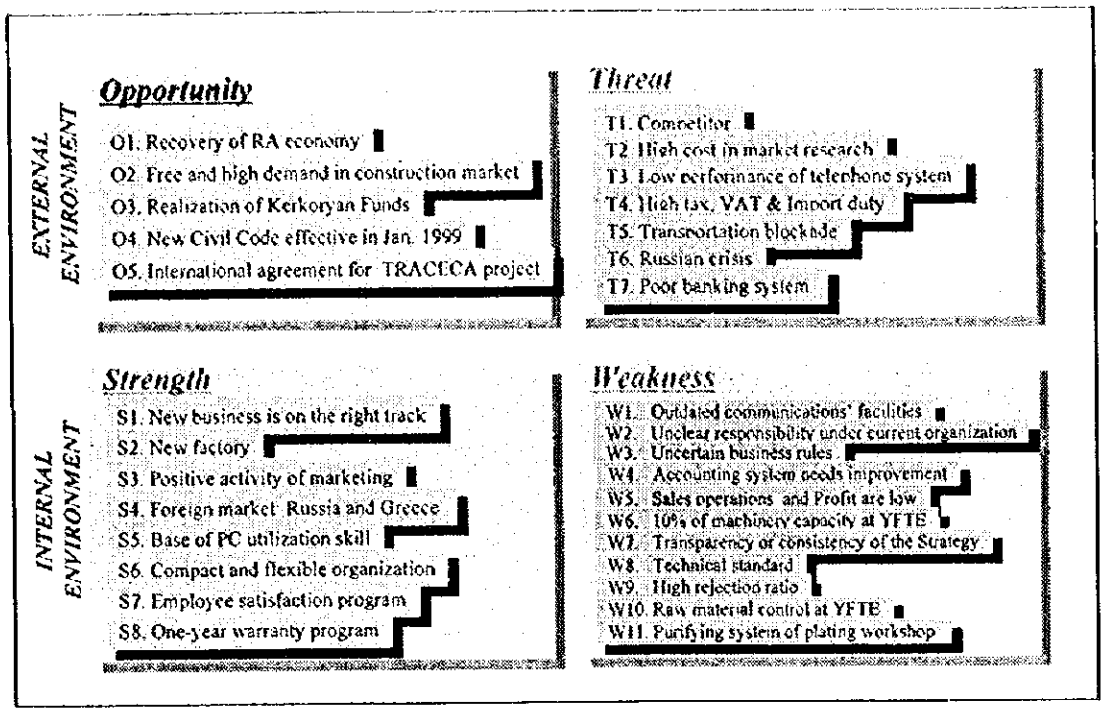


Fig. 3.2.2.2 SWOT Analysis Chart

3) Establishing a Future Vision

A future vision for envisaging markets and business domain is shown as Fig.3.2.2.3.

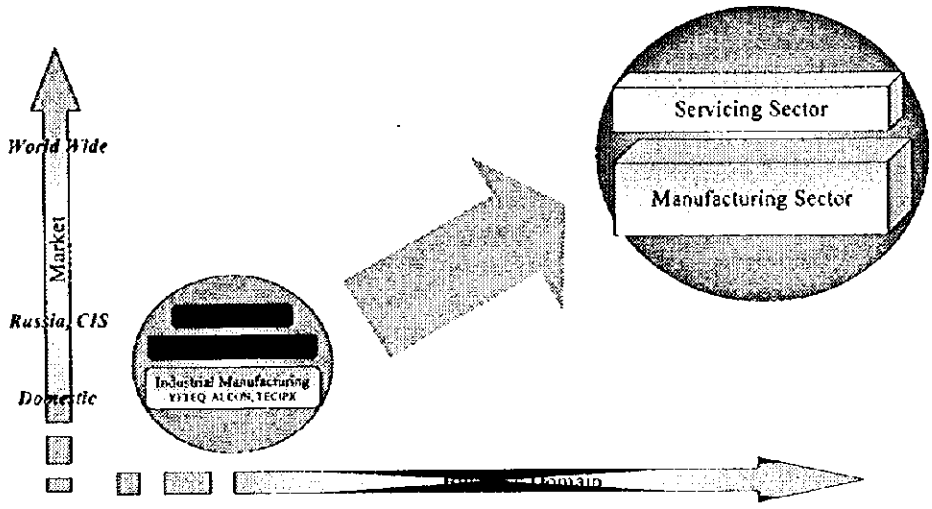


Fig. 3.2.2.3 Future Vision

4) Apprehension of the Enterprise Responsibility

The Study Team stressed the importance of management's apprehension of the enterprise responsibility. This comprises:

(1) The realization of the enterprise's proper distribution of the total profit among shareholders, employees, customers, suppliers, etc.

(2) The consciousness of social responsibility of the enterprise as a corporate citizen.

(3) The positive contribution to the development of society to which the enterprise belongs.

Hi Team's Management concurred the above enterprise responsibilities.

5) Setting up Management Targets

In order to realize the future vision of the enterprise with the above-mentioned responsibilities, management targets were set up as shown in Fig. 3.2.2.4.

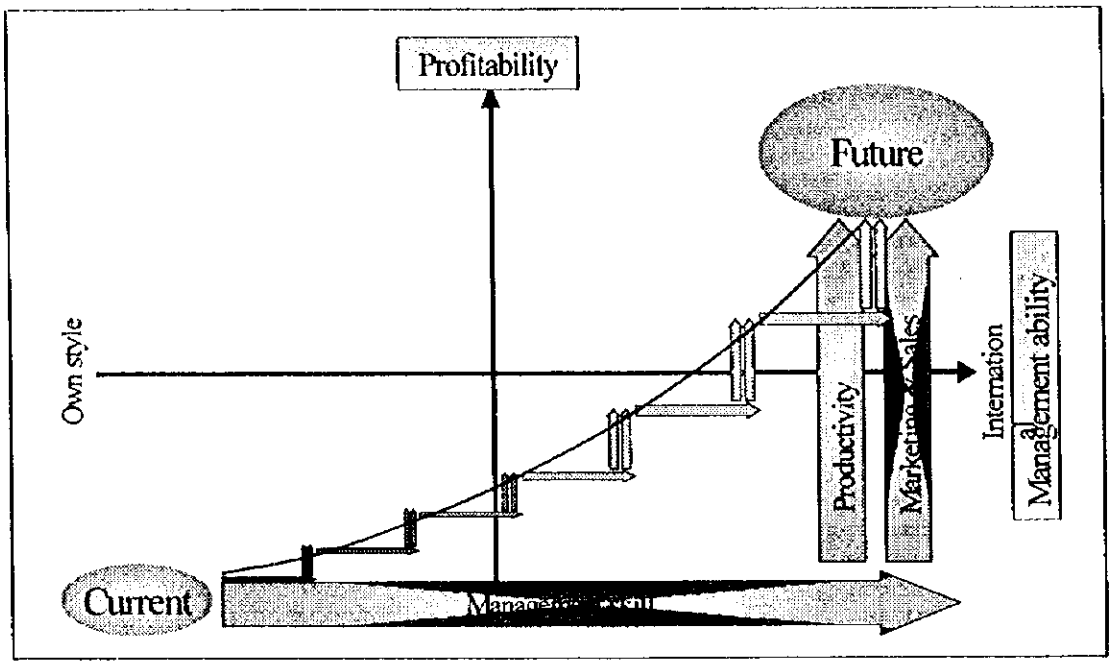


Fig. 3.2.2.4 Management Target

6) Formulation of Action Programs

For the implementation of Management Targets, the significance of relevant Action Programs has been explained and advised by the Study Team. The Action Programs to be formulated for implementation by Hi Team management are (1) Establishment of Management Rules & Organizational Reforms and Improvement of Management Supporting System, (2) Enhancement of Marketing and Sales, and (3) Improvement of Productivity and Cost reduction of materials.

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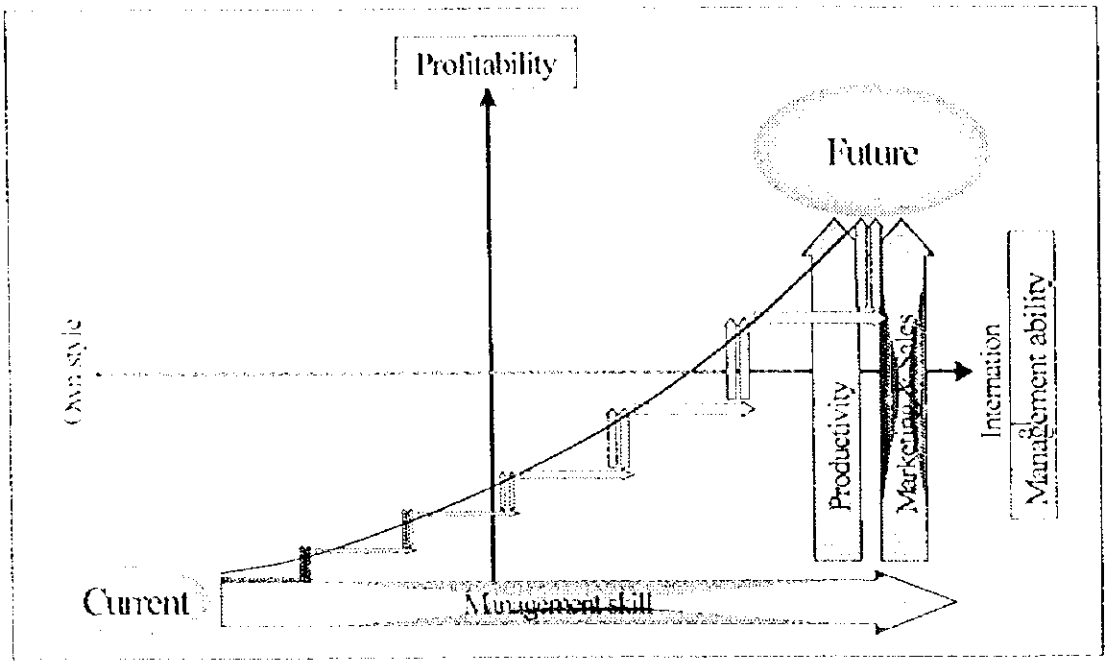

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Table 3.2.2.3 Action Program for the Improvement of Management Skills

1. Establishment of Management Rules and Organizational Reform:

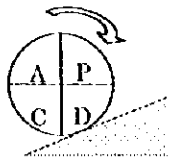
1) Rotation of the Management Cycle

⇒PLAN (P) : Long-term vision ⇒ Mid-term plan ⇒ Short-term plan ⇒ Monthly plan

⇒DO (D) : Execution of the plan

⇒CHECK (C) : Analyze the difference between plan & record

⇒ACTION (A): Work to minimize the difference

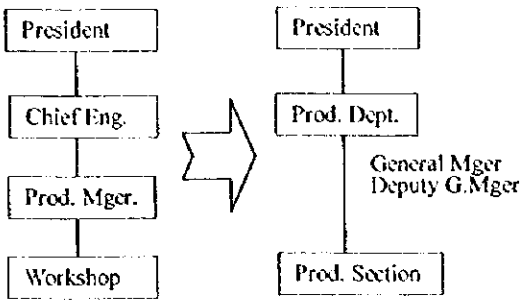


2) Organizational Reform

⇒From a personal command system to a systematic organization

⇒Clear definition of the role of each Department & Section

⇒Separation of individual status and position in the organization



2. Logical and Speedy Management Supporting System:

1) Accounting

⇒Logical

	Financial Accounting	Managerial Accounting
Purpose	For shareholders/creditors	For management decision
Character	Financial position/results	Management data
Rule	Accounting standard	Internal rule
Period	Past	Past & Future
Object	Facts	Facts & Hypotheses
Accuracy	Exact	Forecast/Estimate

2) Information System (Computer)

⇒Speedy

⇒Consistency

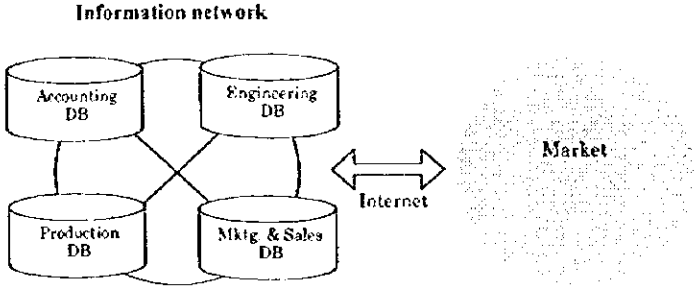


Table3.2.2.4 Action Program of Marketing & Sales

1. Reinforcement of Sales:

1) Creation of a Sales Department
⇒Responsible for the creation of a sales plan
⇒Buildup of a sales force

2) Clear Sales Plan
⇒By market, product and period
⇒In quantity and amount

2. Enhancement of Marketing Activity:

1) Logical Approach: "T + 4P"
⇒T for Target: Define target customer by product
⇒P for Products: Clear concept
(Customer benefit, differentiation from competitors)
⇒P for Place (Sales channel): Direct or through intermediary
⇒P for Promotion: Promotion plan by product, by market
⇒P for Price: Well balanced competitive price setting with profitability

2) Strategic Approach
⇒By management decision: Special promotion of advertisement, price discount etc.
⇒Exhibition

3) Market Research
⇒(1) Hypothesize
(2) Market investigation: Data collection, and
(3) Verification of the hypotheses

Table 3.2.2.5 Action Program of Productivity

1. Production cost improvement

1) Cost management system

⇒ Standardization of cost table
⇒ Cost standard / unit: materials, labor, other direct expenses
⇒ Cost standard by products

2) Balanced and efficient production plan

⇒ Production schedule corresponding to the sales plan
⇒ Production lead time
⇒ Operation ratio by factory, by workshop and by process

2. Cost down of materials

1) Setting of Material department

⇒ Responsible to all materials concerned such as procurement, stock, providing and inventory
⇒ Cost down plan of procurement and inventory

2) Direct cost down activity

⇒ Strategic purchasing with negotiation. Needed some logical approach
⇒ Second source
⇒ Design change, such as less material, change of material, less parts, easy to assemble

7) Setting up the Target Figures

Based on the actual records of 1998, the sales forecast and production cost composition secured through the hearing from its management, the Study Team demonstrated a sample case of simulation of the company's 5 year Business Plan. The main items of the simulation are shown in Table3.2.2.7.

Table 3.2.2.6 High-light of the Simulation (in AMD mln)

	1999	2003	2003/1999
Sales	550	1,237	225%
Net Profit after tax	-22	348	
Profit ratio	-4%	28%	
Break Even Point	496.2	301.5	
New Capital Investment	400	0	
3-Year Loan	300	0	Pay off in 2001
Employee	177	255	144%

(Note) Amount of Loan includes the initial procurement of materials in AMD44 mln.

The simulation indicates that in the case of New Capital Investment of AMD400 mln in 1999, in 2003 Sales would amount to AMD1,237 mln (225% of 1999) and Net Profit after tax would be AMD348 mln (Profit Ratio 28%). Productivity which is the sales amount of one employee would increase and reach AMD4,851 mln (156% of 1999). Break Even Point would be steadily bettered to AMD301.5 mln (Marginal Profit Ratio 49.9%) as compared with AMD496.2 mln (Marginal Profit Ratio 33.6%) in 1999.

Table 3.2.2.7 Hi Team Targeted Sales & Profit Simulation

in ADM mln

	1998 Jan-Dec	1999 Jan-Dec	2000 Jan-Dec	2001 Jan-Dec	2002 Jan-Dec	2003 Jan-Dec
Net Sales	**216.9**	**550.2**	**938.0**	**1037.2**	**1156.8**	**1237.4**
Production Cost	246.3	500.7	703.2	721.3	741.9	713.9
Direct Materials	123.0	288.4	445.3	446.6	455.9	452.4
Other Materials	21.4	43.3	66.8	67.0	68.4	67.9
Direct Labor	35.1	47.8	64.4	78.5	86.4	93.7
Production Indirect	8.6	11.9	14.7	15.6	16.2	16.9
R&D, Eng'g	8.1	10.6	13.3	14.9	16.3	17.7
Depreciation	50.1	98.7	98.7	98.7	98.7	65.3
Gross Profit	**-29.4**	**49.5**	**234.8**	**315.9**	**414.9**	**523.5**
Operating Expenses	21.1	32.9	42.5	47.6	52.4	56.7
Sales Profit	**-50.5**	**16.6**	**192.3**	**268.3**	**362.5**	**466.8**
Non-Operating Exp.-net	1.5	39.0	180.4	180.4	1.5	1.5
Profit Tax	0.0	0.0	7.3	25.1	92.2	117.0
Net Profit	**-52.0**	**-22.4**	**4.6**	**62.8**	**268.8**	**348.3**
Variable Costs	180.5	382.2	581.2	597.3	616.4	620.2
Fixed Costs	86.9	151.5	164.5	171.6	177.9	150.4
Marginal Profit	36.4	168.0	356.8	439.9	540.4	617.2
Break-Even Point	**517.8**	**496.2**	**432.5**	**404.6**	**380.8**	**301.5**

Note: The 1998 figures are actual record.

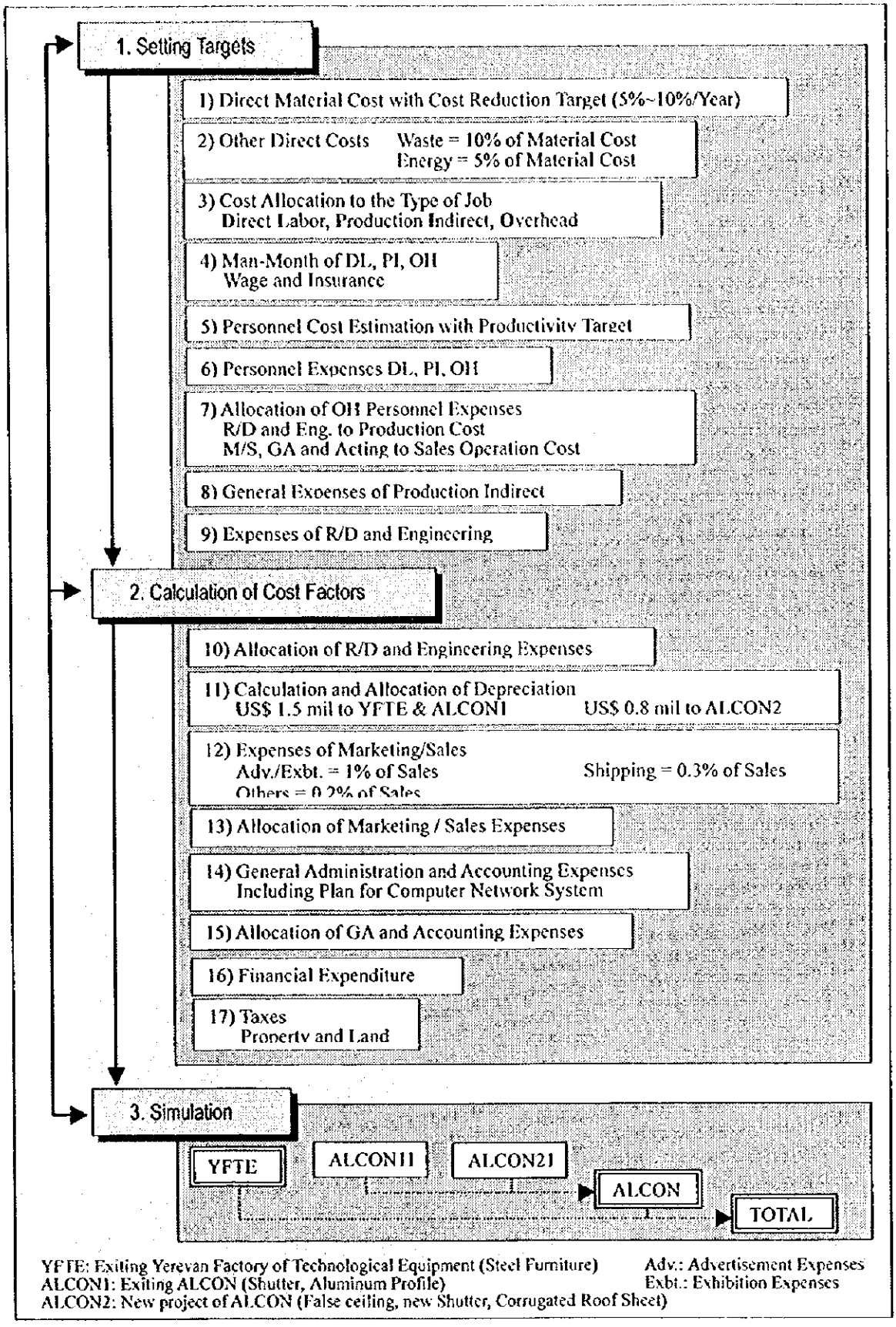
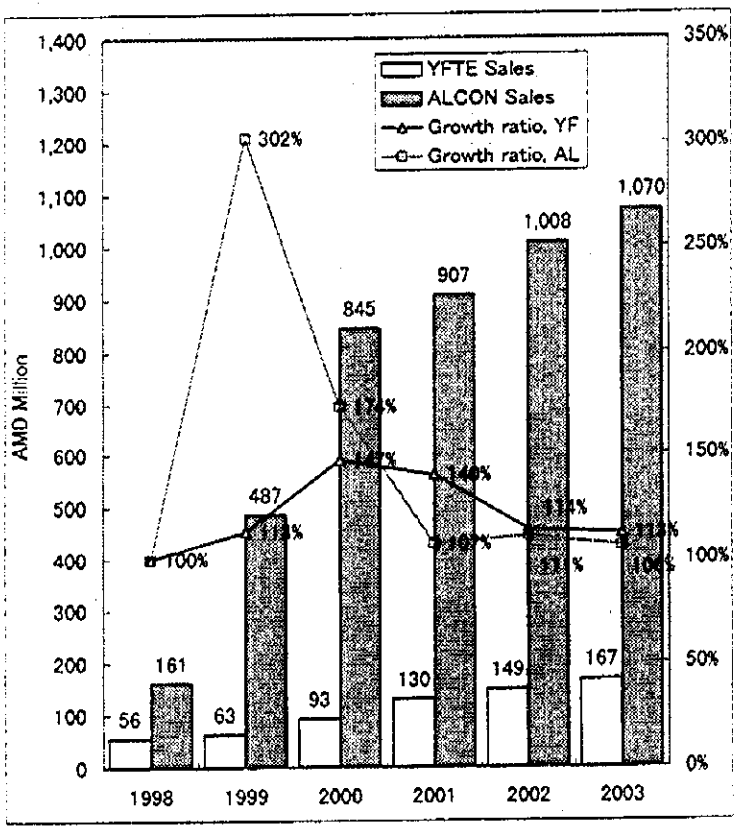


Fig. 3.2.2.5 Simulation Flow

Net Sales

in AMD mln

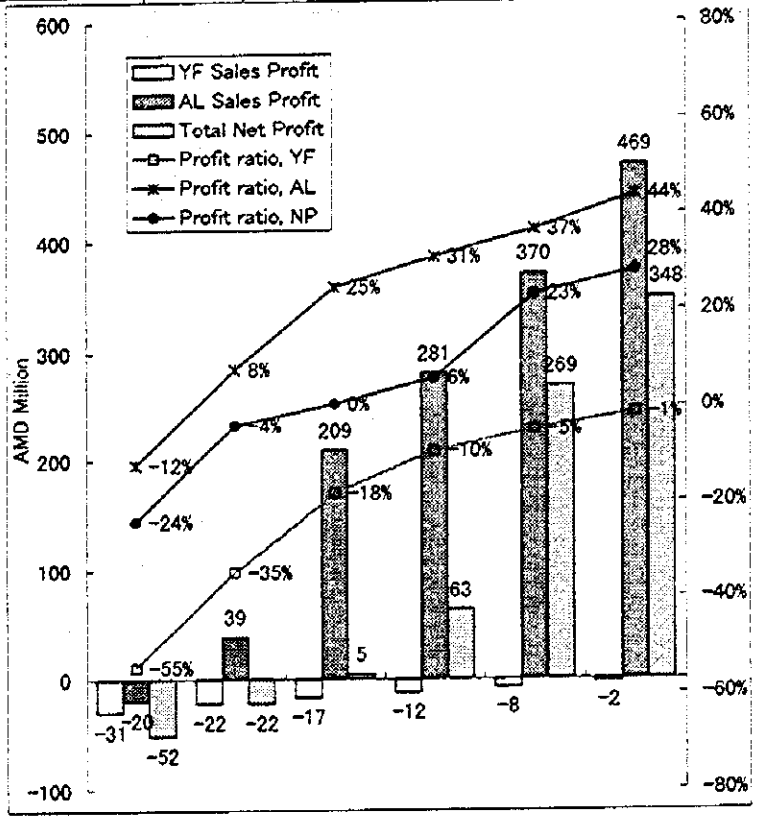
	1998	1999	2000	2001	2002	2003
YFTE Sales	55.8	63.2	93.0	130.2	148.8	167.4
ALCON Sales	161.1	487.0	845.0	907.0	1008.0	1070.0
Growth ratio, YF	100%	113%	147%	140%	114%	113%
Growthrratio, AL	100%	302%	174%	107%	111%	106%
Sales amount	216.9	550.2	938.0	1037.2	1156.8	1237.4



Sales Profit

in AMD mln

	1998	1999	2000	2001	2002	2003
YF Sales Profit	-31	-22	-17	-12	-8	-2
AL Sales Profit	-20	39	209	281	370	469
Total Net Profit	-52	-22	5	63	269	348
Profit ratio, YF	-55%	-35%	-18%	-10%	-5%	-1%
Profit ratio, AL	-12%	8%	25%	31%	37%	44%
Profit ratio, NP	-24%	-4%	0%	6%	23%	28%



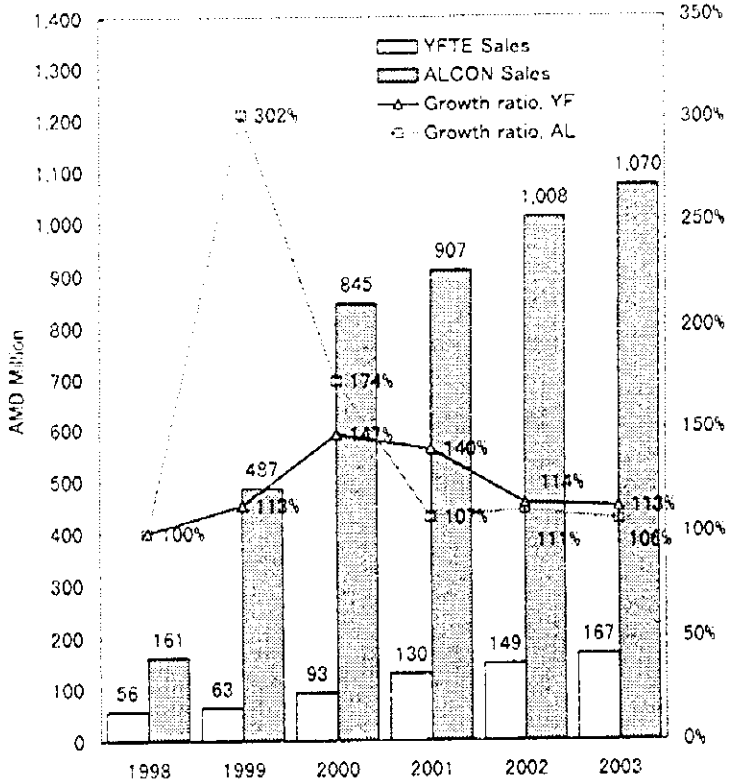
YFTE: Existing Yerevan Factory of Technological Equipment (Steel Furniture)
ALCON1: Existing ALCON (Shutter, Aluminum Profile)
ALCON2: New plant of ALCON (False Ceiling, New Shutter, Corrugated Roof Sheet)

Fig.3.2.2.6 Hi Team Targeted Sales & Profit Simulation

Net Sales

in AMD mln

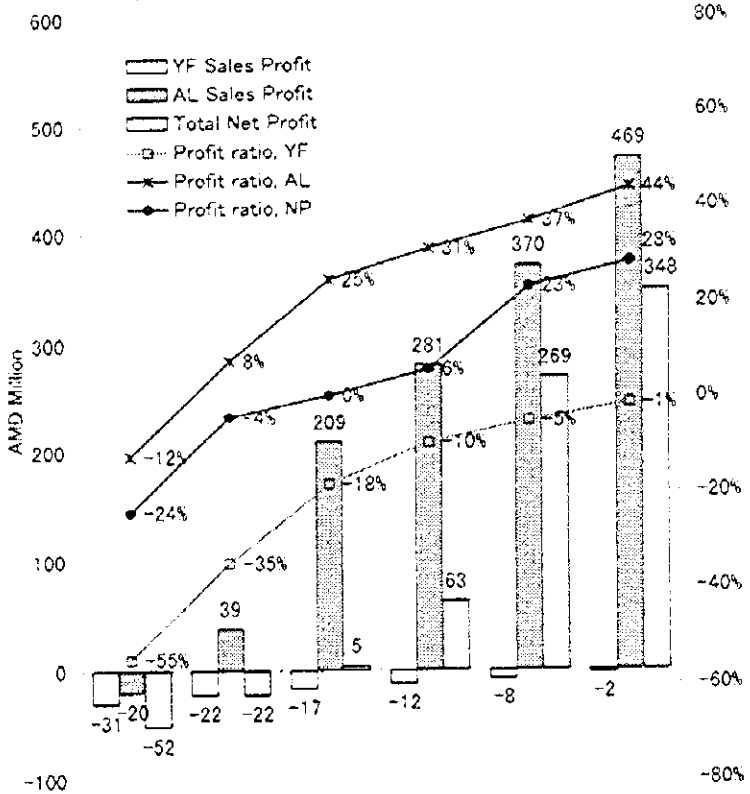
	1998	1999	2000	2001	2002	2003
YFTE Sales	55.8	63.2	93.0	130.2	148.8	167.4
ALCON Sales	161.1	487.0	845.0	907.0	1008.0	1070.0
Growth ratio, YF	100%	113%	147%	140%	114%	113%
Growthrratio, AL	100%	302%	174%	107%	111%	106%
Sales amount	216.9	550.2	938.0	1037.2	1156.8	1237.4



Sales Profit

in AMD mln

	1998	1999	2000	2001	2002	2003
YF Sales Profit	-31	-22	-17	-12	-8	-2
AL Sales Profit	-20	39	209	281	370	469
Total Net Profit	-52	-22	5	63	269	348
Profit ratio, YF	-55%	-35%	-18%	-10%	-5%	-1%
Profit ratio, AL	-12%	8%	25%	31%	37%	44%
Profit ratio, NP	-24%	-4%	0%	6%	23%	28%



YFTE: Existing Yerevan Factory of Technological Equipment (Steel Furniture)
ALCON1: Existing ALCON (Shutter, Aluminum Profile)
ALCON2: New plant of ALCON (False Ceiling, New Shutter, Corrugated Roof Sheet)

Fig.3.2.2.6 Hi Team Targeted Sales & Profit Simulation

(3) Recommendation to Hi Team

In order to achieve the management target, the Study Team guided the following key points to Hi Team management:

1) Monthly Management System:

- Process of management cycles
- Required management reports and data
- Rule to maintain monthly management meetings

2) Organization:

- Line-and-Staff Organization

3) Cost management:

- Purpose of costing
- Costing by product
  - -Process of job costing
  - -Process of process costing
  - -Process of standard costing
  - -Structure of direct costing

4) Marketing & Sales

- Differentiation in the marketing of industrial goods from consumer goods
- Key points of sales of industrial goods
- Power of market share

5) Information System by Computer

- Purpose of information system
- Real time management -- speed and consistency of data
- System development
  - -Current system: PC network
  - -Phase-1: internet
  - -Phase-2: intranet
  - -Phase-3: extranet

6) Time schedule for Action Programs: See Fig. 3.2.2.9.

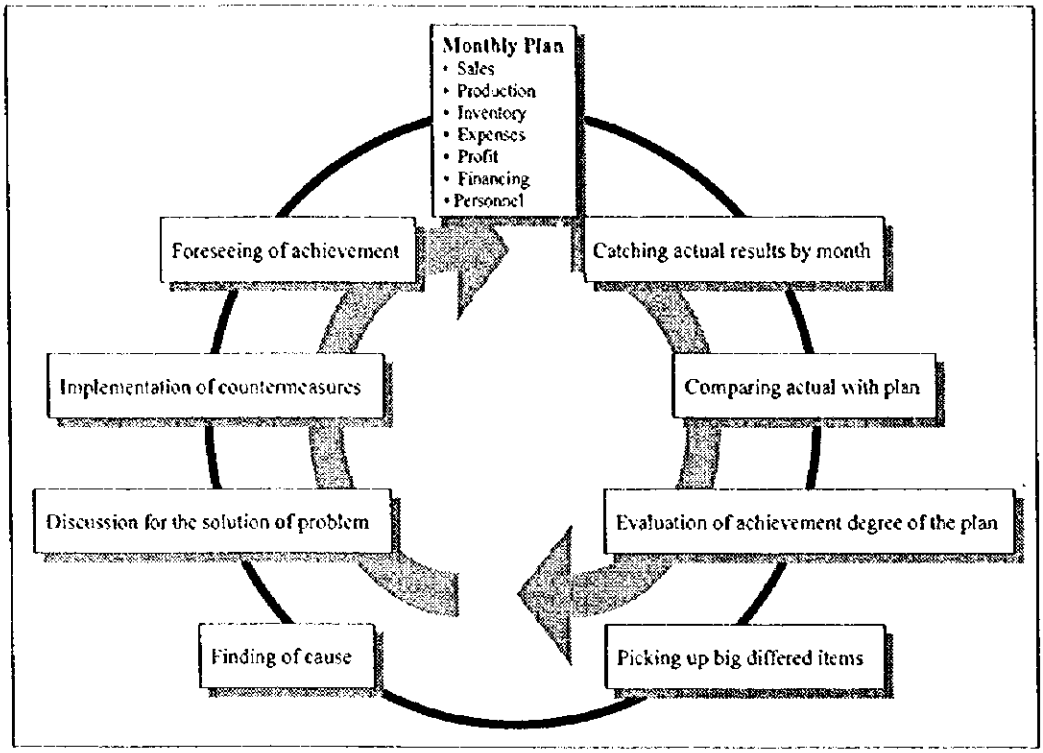


Fig. 3.2.2.7 Management Cycle of Monthly Management

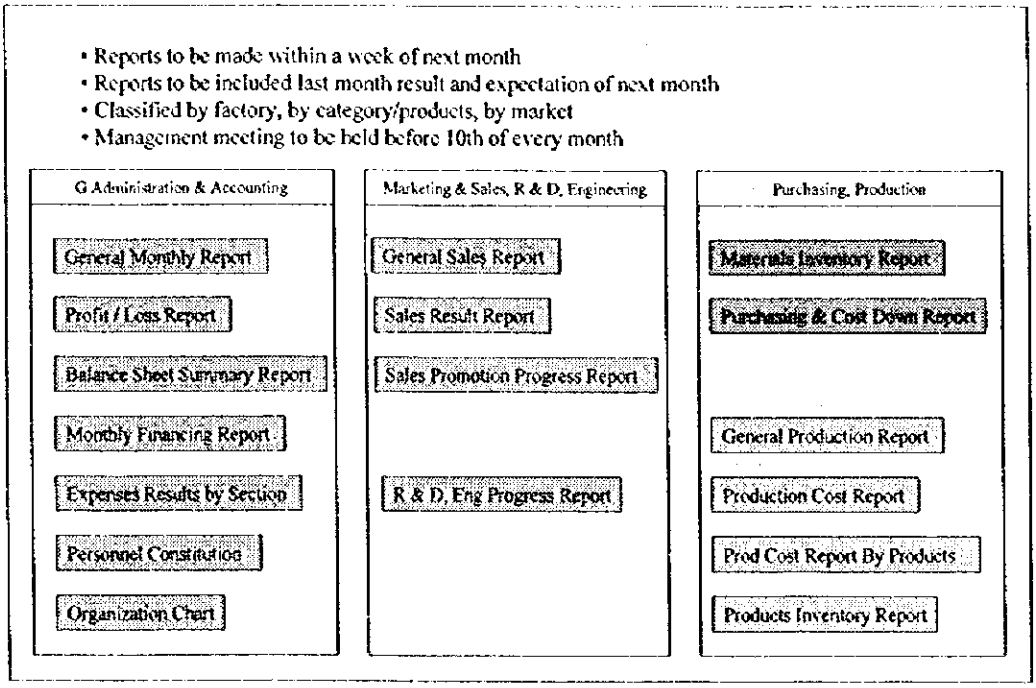


Fig. 3.2.2.8 Main Reports for Monthly Management

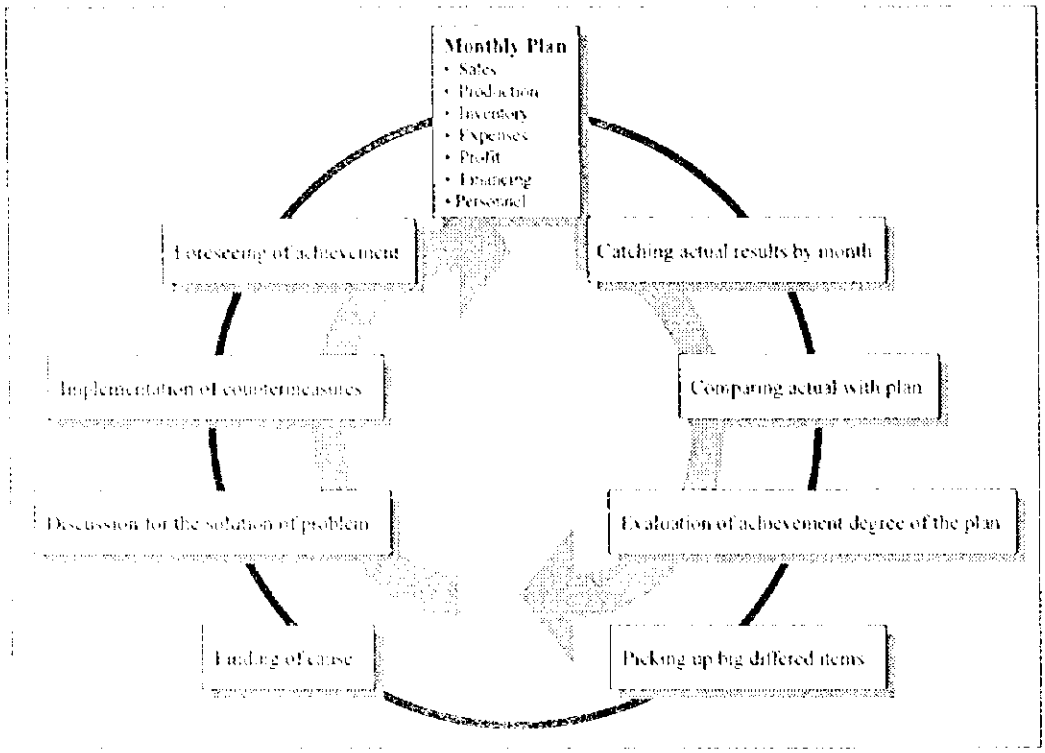


Fig. 3.2.2.7 Management Cycle of Monthly Management

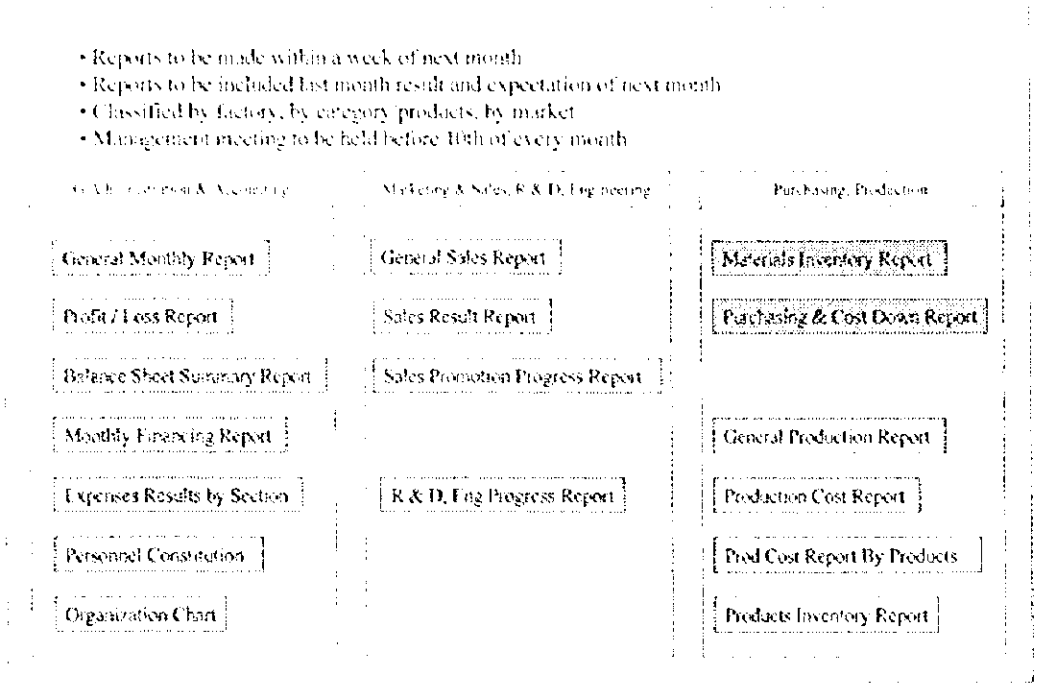


Fig. 3.2.2.8 Main Reports for Monthly Management

Subject	Action Item		1999 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2000 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Business Plan	Mid-term Target	Total			(1)							(2)												(3)		
		By Factory																								
		By Market																								
Monthly Management	Authorization of Business Plan	Current Year																								
	Execution of Monthly Management																									
Organization	Organizational Reform																									
	Manufacturing Sector Composition																									
Marketing & Sales	Mid-term Plan	Total, Market, Products																								
	1999 Sales Plan	Monthly by Market			(1)							(2)												(3)		
		Monthly by Products																								
		Monthly by Salesperson																								
	Current Year Promotion Plan	Monthly Plan																								
	Expense Budget Plan	Monthly Plan																								
Production	Production Plan	Total, Factory																								
	Production Schedule	Monthly Schedule by Factory																								
		Monthly Schedule by Products				(1)						(2)												(3)		
	Productivity Improvement	Target by Factory																								
		Target by Products																								
	Cost Reduction Plan	Total Target																								
		Cost Reduction Plan by Materials																								
		Cost Reduction Plan by Products																								
R & D and Engineering	Development Plan				(1)							(2)												(3)		
	Expenses Budget Plan																									
G. Administration	Personnel Plan					(1)								(2)												(3)
	1999 Expenses Budget Plan																									
Accounting	Managerial Accounting	Budget Plan of Total Operation				(1)								(2)												(3)
	Cost Management System	New Costing System Setting																								
		Cost Standard Setting																								
		New Costing System Execution																								
	Information System	Internet																								
		Intranet																								
		Extranet (2003~)																								
	Expenses Budget Plan				(1)							(2)												(3)		
Subject	Action Item		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			1999												2000											

Note: (1) 1999~2003 (2) Review for 2000 (3) Review for 2001

Fig.3.2.2.9 Time Schedule

(4) Effect of T/A to Hi Team

1) As the result of the T/A executed by the Study Team through the enterprises survey, the diagnosis supported by consultations with management and the JICA seminar, a number of management methods and relevant actions have been offered by the Study Team. This was done even under the limited period of time of the Study. Many managers of the enterprises including Hi Team showed eagerness to understand and utilize those management methods for exigent or upcoming business activities including the preparation of presentation documents to commercial banks for the financing of capital investments. The most remarkable points of the T/A's effect on the enterprises are as follows:

a) Acquirement of methods and viewpoints analyzing/evaluating the enterprises and their activities
b) Learning the significance of accounting as a management tool -- managerial accounting in particular
c) Recognition of the usefulness of information system by computer network

2) As Hi Team has thoroughly learned the analyzing method and technique for formulation of medium term business plan from the Study Team, the company were able to prepare by themselves the application documents for Kerkorian Fund consisting of the investment project outline, income statement and cash flow statement in English. Such documents were submitted through one of the 14 designated Armenian commercial banks of the Fund for the further screening in U.S.A.

3) As for International Accounting Standards (IAS), the Study Team assisted the Model Enterprises, Hi Team and Sirius to apply for the "Armenian Enterprise Accounting Reform" seminar of USAID program executed by SIBLEY INTERNATIONAL, U.S.A.

4) A quick enterprise diagnosis was conducted for Mshak, Autogenmash and Electron. Those enterprises that indicated their desire to be diagnosed by the Study Team, while other enterprises were not able to be reachable despite the repeated efforts of the Study Team. The Study Team offered them respective analytical services consisting of (1) evaluation results of the company in question, (2) general comments on the enterprise's activities, and (3) specific comments such as SWOT analysis, monthly management, managerial accounting, costing and marketing, etc. The following information for these 3 enterprises was obtained:

- **Mshak:** In 1998 the company achieved 173% increase from 1997 in net sales resulting in the amount of AMD410 million (US$812,000) with 90 registered employees. Though the company recently succeeded in having concluded a CNC supply contract for US$2.5 million with Sterlitamak Machine-Tool Enterprise of Russia for their GAZ automobile plant in Nizhnii Novgorod, it has to have a capital investment of approximately US$600,000 to fulfill the contract.

The company is looking for financing the investment tapping the opportunity for Liney Fund, however, its buildings and facilities are not sufficient as collateral. The company has also applied for the Enterprise Support Fund (for export promotion and implemented by ADA) under the assistance of the World Bank. The Study Team assisted the company for an expeditious implementation of the fund.

- **Autogenmash:** In 1998 the company registered the net sales of AMD285 million (US$565,000) showing a sharp decrease of 54% from 1997, directly affected by the crisis in Russia, its main market. Autogenmash comprises a total registered number of employees of 1,066 (the 'active' number of employees claimed by the company is 645). The privatization tender was closed on December 16, 1998. According to the management, though the company's bid (consisting of the purchase price of 74% of the company's stakes held by the state and future investment) was submitted, the government did not accept it. The management is still in the process of negotiation with the government. Since the company's technology and products are unique, more marketing strategy weight has to be destined to the Middle East.

- **Electron:** Though the company tried to develop various lines of products, so far it did not make any remarkable results. The results of the Quick Survey in autumn 1998 indicated that the main cause of the above failure in development was a lack of logical marketing. However, upon Quick Diagnosis in March 1999, the executive director of the company avowed to the Study Team that the company had decided to concentrate on mini tractors instead of many lines of products as previously. He emphasized that Electron's no debt/payment arrears position is a big advantage in comparison with its competitors. The company has a real contract with Chinese partners to import an initial batch of units to be assembled at the Electron plant. The company based on farmers' annual payment ability has deliberated a new (rental) method to farmer cooperatives.

(5) Business Domain and Target Market

1) Business Domain

At present Armenia does not have an excellent machine building technology leading the same sphere in the world, though its machine building industry used to have excellent records in production of diversified products including machine tools, automobile related machines, chemical equipment, agricultural equipment, and special processing machines, etc.

Because of the diversification of products, it is very difficult to specify the typical business domain for this Sub-sector. However, the facts in the past are evident proof of machine building industry's potentiality for future development. And, the machine processing technology is fundamental for all industries. This means that if the enterprises possess pretty good machine

processing technology, it can possibly develop their business relations towards any field of industries. Thus, their business domain can be enlarged. On the other hand, that nature casts to each management of enterprise difficulties for selection of own targeted business domain. Actually, many enterprises have not succeeded in deciding their targeted domain. It is important for the management to find out the strong points of own company and to put them in the business field where those can be made the best use, without shopping around various alternatives in groundless efforts.

2) Target Markets

As a target market of the machinery industry, the enterprises can deal with the needs of various domestic industries based on the Sub-sector's general features we reviewed so far. Efforts to find the business chances in the domestic market is necessary having wide view not only limited to cover manufacturing but also to look at the fields of agriculture, construction, transportation, and commerce.

Export to CIS and neighboring countries where Armenia is among principal players of industrial goods is and is continued to be important.

Continuing active conduct of business of the enterprises can only lead them to an advanced level and depth of technology, which would decisively affect marketing of the enterprises.

3.2.3. Chemical (Pharmacy) Industry

(1) Situation of Enterprises Visited

1) In order to understand current situation of Armenian chemical (Pharmacy) industry as well as to select a model enterprise, we performed the Quick Survey for enterprises described in Table 3.2.3.1. below, in accordance with evaluation method and procedures described in 3.1.1.

We also visited chemical and biotechnological institutes, which are not candidates for a model enterprise. (See 3) below)

In addition to visiting the above-mentioned enterprises, we also visited related enterprises listed in the Table 3.2.3.2. in order to investigate Armenian chemical / pharmaceutical sector as a whole.

As a result of our Quick Survey of these enterprises, we concluded that there was no enterprise qualified to be a model enterprise in the chemical (pharmaceutical) sub-sector. We propose formulation of an "Action Plan for Pharmaceutical Amino Acids (named tentatively)" together with related parties in Armenia, instead of providing technical assistance to the selected model enterprise. (See 3.3.3. (3))

Table 3.2.3.1 List of Enterprises of Chemical (Pharmacy) Industry Surveyed

	Name of Enterprises	Location	Field of business
Chemical:			
1	Nairit	Yerevan	Chloroprene rubber, caustic soda. Representative enterprise in Armenia. See 3.3.3. (2) 1) a) for detail.
2	Doghagorts	Yerevan	Production of tires for agricultural and customer vehicles. Low competitiveness due to non-radial tires. Trying to restart its operation through an Iranian enterprise
3	Polyvinyl Acetate	Yerevan	Used to produce polyvinyl acetate. Due to high production cost, currently change its business to petroleum refinery and fertilizer production.
4	Vanadzor Chemical Factory	Vanadzor	Calcium carbide, synthetic sapphire. Production level is less than 5 %
5	Chemical Fiber Factory	Vanadzor	Acetate yarn. Stop its operation.
6	Chemireaktiv	Yerevan	Chemical reagent. Stop its operation. There is a plan to convert a part of its facility to sugar refinery plant.
Pharmacy:			
7	Yerevan Chemical Pharmaceutical Firm	Yerevan	Ampule. At normal operation level. Old facility and non-compliance with GMP
8	Erefarm(*1)	Yerevan	A managing company of Yerevan Chemical Pharmaceutical Firm.
9	Lizin	Charentsavan	Crystallized feed lysine. Stop its operation.
10	Vitamin	Yerevan	Produce vitamin by organic synthesis method. Operation level is less than 5%

Table 3.2.3.2 List of Additional Enterprises Surveyed

	Name of Enterprises	Location	Field of business
Pharmacy:			
1	Liqvor Pharmacy	Yerevan	Production of intravenous solution. See (2) 2)
2	Pharma Tech	Yerevan	Production of intravenous solution. See (2) 2)
Food Processing			
3	Ashtarak-KAT	Ashtarak	Production of dairy. Actively operating with use of second-hand equipment.

2) Common issues relevant to Armenian chemical industry including pharmaceutical industry have been found through our Quick Survey. These issues and factors to have create them are analyzed as follows:

a) Deep Integration with Economy System with FSU

The chemical industry, including the pharmacy industry was one of the major industries in Armenia. It had numerous chemical factories. These factories were built under the division of work in the former Soviet Union and relied on other republics of the former Soviet Union for procurement of materials and as a market for their products. After independence, they lost both

materials and the market.

b) Big Scale

Most enterprises were established to provide certain products to the entire Soviet Union. Scale of the enterprises are very large compared to the scale of economy of Armenia. Therefore, demand at home and neighboring countries is not enough to maintain normal operation levels. They heavily rely on exports.

c) Low Level of Operation

As a result of collapse of Soviet Union and subsequent economic confusion, these enterprises are currently either shutdown or at low level of operation. Since most enterprises are extremely big scaled, operation levels of those enterprises are less than 10 % with only one exception.

d) Lack of Fund

Shut down or extremely low levels of operation result in bad financial conditions of enterprises. Most of them have a large amount of debt (mainly unpaid tax and salaries).

Most enterprise has suffered from obtaining even fund for procuring material as well as for replacing facility.

3) Regarding Chemical and Biotechnological Institutes

During the FSU, numerous chemical and biotechnological institutes existed in Armenia. Most of these institutes were run using the budget of the Soviet Union and operated in order to meet needs of the chemical industry all over the Soviet Union. Therefore, some of them are not related much with the chemical industry located in Armenia.

Level of study performed by those institutes was very high, next to Russia in the FSU.

Currently, most of them have substantially ceased their activities due to severe lack of funds. Most scientific workers are not paid well (average monthly salary is US $20-30), some bright scientists have been drained into foreign countries.

Table 3.2.3.3 Institutes under Armenian National Academy of Sciences

Name of Institutes	Field of Study	Visit
Chemical:		
Institute of fine organic chemistry	Drug	○
Institute of general and inorganic chemistry	Cement	
Institute of organic chemistry	Organic chemical synthesis, close related to Nairit	
Institute of biochemistry	Brian and other biochemical	○
Institute of chemical physics	Chemical physics	
Biotechnology:		
Institute of microbiology	Microbiology	○
Institute of molecular biology	Molecular	

Table 3.2.3.4 Number of Resources in Research and Budget of Institutes under our Survey

Name of Institutes	Number of Resources in Research	Annual Budget (US$)
Institute of fine organic chemistry	140-150	About US$80,000
Institute of biochemistry	About180	50,000 - 60,000
Institute of microbiology	About 50	80,000 - 90,000
Institute of biotechnology (*)	80-90	60,000 - 70,000

* This institute used to be named "Institute of amino acids" and was closely related to the establishment of a factory "Lizin". It is under the control of the Ministry of Industry and Trade.

(2) Common Issues

1) Chemical Industry

Common issues related to chemical industry are as follows:

a) Reliance on Imported Raw Material

Most enterprises engage in production by organic chemical synthesis. Since raw materials, such as crude oil and natural gas can not be produced in Armenia, raw materials have to be imported whether they use crude oil or natural gas, or its semi-product, such as butadiene.

b) Week Interrelation among Enterprises

Although numerous chemical factories are located in Armenia, those factories are not interrelated so much. They can not run themselves as a chemical complex. For example, products of an Armenian chemical factory were shipped to a chemical factory in the FSU as semi-finished products, while another Armenian chemical factory used these products produced by a chemical factory in FSU as a raw material.

c) Potential Environmental Issues

Four of the six chemical factories under our Quick Survey are located in City of Yerevan. Three excluding Dogagorts producing tires have high environmental risk at their normal production level, although they do not cause severe problems under their extremely low production levels at present. In 1989, Nairit stopped its production due to environmental issues.

d) Progress of Privatization

As for most enterprises in the chemical sub-sector (five of the six enterprises subject to our Quick survey), majority of the shares is still state-owned. Most chemical factories are sold through international bid but an ordinary privatization procedure since they are large in scale, and regarded as important factories for the country. Their financial situation was so bad that no buyer appeared under either an international bid or an ordinary procedure. However, a Russia-based enterprise has conditionally agreed to purchase two chemical enterprises, together with a thermal power plant

located in Vanadzor. (In this case, special treatment that waives past unpaid taxes of these two enterprises has been taken.)

e) Effect of Increase in Electricity Price

Business of most chemical enterprises is high electricity consumption based. In addition, their plants are not designed for electricity saving since in the FSU price of electricity was extremely low. Since 1999, price of electricity has raised sharply. It would cause increase in production cost for most chemical enterprises and then make it difficult to restart or raise the level of their operation.

2) Pharmacy Industry

Enterprises in the pharmacy industry are small in scale, and more privatized compared with chemical industry. Their technology is out of-date and their products are less competitive in both quality and cost. For example, "Vitamin" produces various vitamin through "organic synthesis method", and with this method, it cannot compete with enterprises in developed countries. It needs to convert its production method to "bio method" completely.

Most actively operating enterprises in Armenian pharmaceutical industry are enterprises that perform the final process (bottling, packing, etc.) of pharmaceutical production especially production of intravenous solution. This is because production cost becomes lower when importing pharmaceutical materials and packing or bottling them than importing of drugs to Armenia or other FSU countries due to the lower labor costs. They completely relies on imported raw material drug, therefore added value is very low.

In addition, concept of good manufacturing practice (GMP), which is required in production of pharmaceutical products, was not adopted in FSU. Pharmaceutical factories established under FSU were not designed according to GMP. Due to new drug laws, which introduced the concept of GMP, were enacted in 1998, pharmaceutical factories not in accordance with GMP will not expectedly obtain production license in the near future.

The following is a summary of quality control by three enterprises that produce pharmaceutical products in Armenia, and how they deal with GMP.

a) Pharma Tech

Latest equipment has been introduced with a USD 13 million investment. Design and operation of the factory is in accordance with the GMP concept. It aims to obtain a GMP certificate. It also aims to obtain ISO9000 in 1999. It conducts high level quality control.

b) Liqvor Pharmacy

It leases one area of a hospital and mainly uses second hand equipment. Concept of GMP was introduced in operation of its factory and it aims to obtain a GMP certificate.

c) Yerevan Pharmaceutical Firm

Factory constructed during the FSU still operating. It needs to almost be completely scrapped-and- built in order to be in accordance with GMP requirements.

The two enterprises in accordance with GMP sell their products in Armenia and CIS countries currently. Both of them aim exports to European countries after obtaining GMP certificates.

Note: Good Manufacturing Practice (GMP)

Standards, in producing pharmaceutical products, prescribing controls over whole production process from reception of raw material to shipment of finished products and location of building, machinery and equipment in order to produce products in accordance with pre-approved standards. In 1968, WHO make a resolution of necessity of GMP as a basic principle to ensure safety and effectiveness of pharmaceutical products and recommended member countries in next year. GMP generally requires restraining human errors, preventing pollution of medical products and change in quality and design ensuring high level of quality. It concretely regulates regulations of final medical products and production, standards for building, machinery, workers, raw material, production and control, batch production and control records, production and control standards, containers and material, packing and presentation, control over quality tests, shipping records, stability, establishment of effective period, claim management and so on.