APPENDIX 2.   STUDY ON WASTE EDUCATION

2.1   Current Environmental Education in Schools

1)   School Education System

Existing school education system in Romania can be summarized as in the following chart. Children enter primary schools at the age of 6 years. New school term begins on 15th of September. There are 980 schools of all kinds in Bucharest.

1. Compulsory Education
   Primary School   4 years from 1st to 4th grade
   Secondary School   4 years from 5th to 8th grade
2. Non-Compulsory School
   High School   4 years from 9th to 12th grade
   or Vocational school 4 years
   After high school
   University   4, 5 or 6 years depending on faculties and specialties
   or College   2 years

2)   Administration in charge of Education

Ministry of Education is a responsible organization for school education. The Ministry prepares General Education Plan which defines all the contents of curriculum and revises it every year. The plan is composed of two parts. The first part is the general plan of each subject with a necessary number of classes a year. In the second part, each curriculum is allocated to an appropriate grades. Department of Compulsory Education in the ministry manages and controls a curriculum for compulsory schools.

As local delegation of the ministry, Education Inspector Office is allocated in each prefecture. In Bucharest, Inspector Office of Bucharest controls school education in Bucharest. The Inspector Office has each sector office in each 6 sector of Bucharest, and give necessary instructions to each schools through these sector offices.

3)   Current Curriculum concerning Ecology

A classroom coordinator is assigned for each classroom among teachers. Each classroom coordinator prepares general schedule of the curriculum for whole year, and also prepares detailed schedule every 3 months. This schedule containing numbers of

classes for each subject must comply with general guidelines of education provided by the Ministry of Education. Methodological Commission of each school examines this schedule which is responsible for the arrangement and control of the curriculum.

At present, neither Inspector Office nor the Ministry of Education do not have a special department for environmental education. In compulsory school, the environmental education is basically included in the general education classes which is for moral, culture and sports.

General civic education starts at 2nd grade and continues until 8th grade in a compulsory school. In the primary school (1-4 grade), knowledge of environment and the importance "to keep cleanliness" is taught.

In the secondary school (5-8 grade), each classroom coordinator has a class for general education once a week, and environmental topics are also dealt with in the class. In 8th grade, ecology class is held in current curriculum. Besides, technical education classes for each grade has began from this year, which contains both theoretical and practical classes, also includes a part of environmental education. New curriculum for environmental education for 5th grade of compulsory school is being prepared under the reform of the school curriculum to be mentioned below.

Apart from school classes, collection of recyclable material has been promoted as a part of school education.

In the high school (Lice, 9-12 grade) also there is a general education class once a week, in which environmental education is conducted. Optional class for environmental education is also held, as the curriculum of high school is composed of three categories, compulsory, selective and optional classes.

4)   Reform of Educational Curriculum

At present, reform of school education curriculum is in progress. New law on education has just been approved by the Senator's House. This was announced on "Monitorul Oficial" dated 31 July, as "Education Law (Legea Invatamantului)" which will be in force on 4 September. New curriculum for school education is now under preparation, in which ecological and environmental education will be more emphasized than ever. Each school's discretion on the curriculum is enhanced by the law. For example, each school can adopt two alternative textbooks by its selection.

2.2 Pilot Study for the Promotion of Waste Education for Children

1) Purposes of Waste Education

A main purpose of waste education is to strengthen the citizens' awareness of the importance of the clean and sanitary environment and necessity of the citizens' cooperation for it. The cooperation required on the part of the citizens include the following:

1. Improvement of waste discharging manner
2. Prevention of scattering waste
3. Active participation in recycling activity

Although Sanitary Norm of Bucharest defines the citizens' obligation to keep environment clean, no concrete measure is defined under this article. Waste education, as a part of environmental education, contributes to the enhancement of the citizens' awareness to keep environment clean.

2) Selection of the Method for Waste Education

The Study Team considered two possible ways of waste education, school education and public relation to citizens. Each way has its advantages and disadvantages. The Study Team chose school education in compulsory education as a way of waste education in this study, considering the advantages of school education. It is very important to teach children the importance of public sanitation in school classes.

3) Cooperation by Educational Administration

Approval and cooperation by administrative organizations on school education are indispensable to incorporate waste education program into school education. The Study Team and the municipality of Bucharest had discussion with Department of Compulsory Education of the Ministry of Education. The Study Team proposed the preparation of waste education material and implementation of waste education class as a pilot study in some schools in Bucharest. The department approved the proposal and advised the Study Team to discuss the program with Bucharest School Inspector Office, the local delegation of the Ministry of Education, which is in charge of administration of school education in Bucharest. The Study Team's proposal was accepted by this Inspector Office. Unfortunately, schools are in summer vacation until the midst of September. The waste education class as a pilot study will be held after

October in cooperation with the Inspector Office by using waste education material prepared by the Study Team.

4)   Selection and Production of Materials for Waste Education

The Study Team proposed the Inspector Office the following four types of materials, posters, video movies, slides with text and textbook, and examined which is suitable for the waste education class, considering the educational situation in Bucharest. In conclusion, **posters and a video movie** were chosen. According to the Inspector Office, video decks are available in schools in Bucharest for this video movie. Posters will be put on the wall in schools.

The Study Team proposed the following three messages to be presented in the video movies.

1. Let's know the life cycle of waste
2. Let's keep our environment clean
3. Let's participate in the recycling activity

These messages are examined and approved by the Inspector Office. Then, a scenario of the video movie was prepared in Romanian by a Romanian writer to present these messages. The scenario was prepared to be attractive to Romanian children. The Inspector Office reviewed the scenario and gave useful advises to the Study Team. The scenario is attached to the Appendix. Shooting of the video movies was conducted in the second week of August under cooperation by a high school "Liceul Gheorghe Lazar", and editing process proceeds at present.

Some sketches are prepared by a Romanian painter based on the above messages, from which the best two were selected through the discussion between the Study Team and the Inspector Office. Original drawings of these selected sketches were prepared. More than 1,000 copies of the posters will be printed after completion of the drawings.

5)   Usage of these Movies and Posters

Several copies of the video movie are made and it will be presented to school children in the school assigned by the Inspector Office as a model school for a pilot program.

The posters are distributed all the compulsory schools and are put on the wall. These poster also can be utilized as an educational material when waste education class is held.

The material preparation in this study only initiate waste education in a long term. It is desired that such waste education program is incorporated to other environmental education program efficiently.

VIDEO SCREENPLAY
(JICA STUDY TEAM - BUCHAREST 1995)

Created by: Eugen Ciocan
Dialogues: Radu Ionescu
and
Cristina Tautu

I.   Exterior. Noon.

Afar we see a school. We hear a bell ringing.

II.   Generic.

III. Exterior. Street. Noon.

A street. Waste, litter. We see a man approaching accompanied by a boy who unwraps a chocolate. On coming closer, the boy litters the wrapper. He eats the chocolate continuing to walk. Behind, blocks of flats.

IV. Interior - Exterior. House of the child. After-noon.

The child sits at the window. He launches a paper plane. He follows it with his eyes, happily, as it flies. The plane lands on a green space. It is not the only one.

V. Interior. Kitchen. Evening -sunset

The child, Adrian, sits at the table with his mother and father. He has just finished eating.
      ADRIAN: Thank you for dinner. I'm going out.
      MOTHER: Adrian, please throw away the garbage.

VI.   Exterior. In front of the house. Evening - sunset.

Adrian comes out with a bucket in his hand. Some children play with a ball that strays towards Adrian. The child abandons the bucket and runs towards the ball, kicking it hard. He then takes the bucket and tips it in the street unto a pile of waste. In the waste we can observe bottles, papers and metallic soft drink cans.

VII.   Interior. Adrian's room. Night time.

Adrian is in bed. He sleeps. His mother kisses him. She then switches off the bed lamp. Closer frame on Adrian's face.

VIII. Interior. Morning.

The blind is raised and a bright light comes into the room. Someone dresses smartly, but we cannot see who it is.

IX. Exterior. Morning.

We are coming slowly towards the school. We hear the bell ringing. Through a fondue scene we get to..............

X. Interior. School, morning.

.... the interior of the school, on one of the corridors. The doors of the classrooms are hurriedly closed. The camera moves through the deserted corridor. From around a corner, we see the feet of a teacher. The camera follows him, still setting the feet of the teacher as a detail, until he enters a classroom. He lays the register on the table. Up to now, the only visible things were details: hands, legs. From the register, the camera moves up to the teacher's face. Its Andrei, very serious, dressed neatly. The child looks at the class, which itself has not been seen so far. The class is made out of women and men, over 40 years of age. On the whole sequence, all will behave very seriously, without trying to imitate children. "The teacher" will move along through the classroom.

Teacher: What have you prepared for today ?

Andrei looks at the class. They all look preoccupied, as though they haven't heard the question.

Teacher: Mureşan ?

The pupil stands up, trying to gain time.

Teacher: Okay. Leave it. Sit down. (He turns to the rest of the class.) Tautu!

Tautu: The waste.

Teacher: That's right... Let's see! What products does waste contain ?

Tautu and other voices: Paper, textiles,........plastic materials,...metals...

Teacher: And ? Anything else ? (Silence) This table (he shows it); what will it become? Waste! My clothes, yours, what will we do with them when they won't be good to us anymore ? We throw them away ! What will they be ?

Adult chorus: Waste!

Teacher: All objects that surround us will sooner or later become waste.
Good...Now tell me, what happens to the quantity of waste?

A man: It falls.

A woman : (looking at someone who eats) It grows!

Teacher: Why ?

A voice: Because we eat more. (laughs)

Teacher: Something like that.... Actually, we use more and more objects, we
throw them away, we buy others. And so we generate more waste. In
addition we are more and more; the population of the Planet grows so
the quantity of waste grows. ....

In the class, there enter three children: two boys and a girl. They have a video camera
and a microphone.

Teacher: How has it been going ?

The children do not have time to answer because they have begun to install the TV. The
girl comes and whispers something to the teacher.

Teacher: We will see some pictures filmed by Elena and her friends.

Andrei goes back to his table. Elena remains alone in front.

Elena: Myself and my friends have filmed some example of negligence and
scattering. As you will see, more of them can be quite dangerous. Is it
ready ?

A boy: Ready ! (He turns on the TV)

Elena sits down at one of the tables with the remote control. The pictures are those of an
amateur. Between frames, we can see, sometimes, the children preparing to film or
joking in front of the camera. We see different people littering packages and papers in
different places: streets, markets, parks. After they film them, the children ask them why
they litter; some become embarrassed and pick them up, others act us if they haven't
heard, others grow angry. The sound of the film is accompanied by whispering and
laughter from the class. Some of them, see themselves on the screen.

Elena: I think we have seen enough of littering !

Elena pushes a button on the remote control and the picture will flow quickly. The
picture is set back to normal when there appears waste thrown on streets or other places.
We see the mountains of waste which are crowded by stray dogs and scroungers. People

come and throw waste without even thinking that they are doing something wrong. The picture is accompanied by Elena's voice.

Elena: (from off) Its more serious when waste is throw anywhere, even on the street. Its not only bad, but it can be very unhealthy. People are not conscious that when they perform this illegal action they also hurt their own health. That they are not conscious, its very clear, because they throw waste next to their gardens. This waste can represent infections points, and can help to develop many diseases. Even their children play in the waste.

There is a moment of silence. There is worry on the children's faces showing that they have followed the picture and Elena's words. The silence is broken by the voice of the "teacher".

Elena: Furthermore, waste has made its appearance next to hospitals, so in places where hygiene has to be kept at utmost respect.

Teacher: The situation is grave and it must no suffer any delays. But this doesn't have to scare us. The avoiding of these dangers depends only on us. To be have civilized with our generated waste is a responsibility of each member of the society. This problem of waste can be solved: by recycling . Let's see for example what happens with a used notebook. Muresan, come to the blackboard and draw a used notebook.

The man, very bolded, draws awkward something that books like a notebook (laughter). The "teacher" continues the drawing with the sketch of waste management.

Teacher: This a used notebook. Must of us throw it away. From there is taken to a landfill. Thus, the book is lost because it will remain somewhere where no one will be able to use it. (at the same time, Andrei sits at the computer at the teacher's desk. He starts it, and from here we will see the monitor screen of the computer. We see what happens on the monitor. Initially, we see written with big characters: "Recycling". Then a little man. He will communicate of by the use of teacher's voice)...We shouldn't do this. Its better if we take the book to a place where al the used papers are collected. From here, the book is taken to a factory where its again turned into paper. The paper s then made again into a notebook and so we have a new one. This means that it looks as though its life is finished, but it can leave a new one. This means...

Adult chorus: Recycling !

Teacher: ...to recycle a material that apparently is of no use. Muresan receives a caress on his bald head and returns to his table. On the monitor we see "Flow chart of...". The little man walks down the chart and explains.

Teacher: (from off): Apart from recycling there is also another way of recuperating waste: REUSE. Reuse means to continuously use a waste, without changing its form or use purpose. Let's take at an example the mineral water (on the screen, there appears a little man with a bottle). If we throw away the bottle (we see a pile of bottles) we will create waste which will need to be deposited somewhere. What's more, when we buy a new bottle (the little man is standing in a shop; he hands in a lot of money to get a bottle of water) we will need to buy the bottle as well. If we return the bottle (the little man hands in an empty bottle) we will not create waste (the pile of waste drops) and when we buy mineral water we will not pay the bottle anymore, but (we see the little man handing one bill) we buy only the contents. Why? Because the bottle we bring (we see as the bottle moves through the flow chart), is taken to the factory and reused. The recuperation of materials (the little man comes forward on the screen) means to extract usable materials out of waste. If we do this, waste quantity will be smaller (we see how the waste diminishes from around a block of flats) and we economize materials. The metals, paper, cartons from waste, are only a few materials from waste that can be recycled. (we see the little man again who drinks). Think that by recycling you reduce the quantity of waste, you save the money you spend for disposal and you can be happy of a clean and healthy environment. Before we throw anything away, think if we can reuse anything, and if not, we throw it only at the special designed places. In this way we can become...

Adult's chorus: Civilized.

III. Outside. Noon.
In detail, a hand turns off the monitor. In the created black picture we see colored words: "waste", "recycling", "recuperate", "reuse", "civilized".

XI.   Interior, Andrei's room morning.
        From the dark, mother's hand appears and lifts the blind. The light flows in the room, same as the beginning of the dream. Andrei wakes up.

XII.   Exterior. Moon.
        Like the beginning of the movie, we see the school we hear the bell that announces the finishing of courses. Like n the first frame, Andrei litters the chocolate wrapper. After a few moments, he stops eating, he hurries to the wrapper, he picks it up and throws it n a bin. We see in detail how the hand throws the wrapper in the bin. Stop frame.

XIII   Final Generic

                                        End

APPENDIX 3.   STUDY ON WASTE BIN SUPPLY

3.1   Estimation of Maximum Demand for Waste Bins in Bucharest

1)   Major Assumptions:

An attempt was made to estimate possible prices of Romanian plastic bins (240 liter and 120 liter) based on the following assumption.

1. Future population of Bucharest: 2,100,000 persons

2. 16 % of the population (336,000 persons) live in individual houses, and would use 120 liter bins. The remaining 1,764,000 persons would live in apartment buildings.

3. Use period of new bins: 8 years
   Note: An offer submitted jointly by Canadian and Austrian companies says that useful period new bin produced in Romania may be 8 - 10 years, and the guarantee period would be 5 years.

4. Numbers of persons sharing 1 bin are assumed as follows:

	240 liter bins	120 liter bins
1. Number (n) of persons sharing 1 bin used by Apartment dwellers n = a + b = where a: Total population b: Number of bins used by households only	25 persons/bin	12.5 persons/bin
2. Number of bins used by individual houses	0	3.5 person/bin
3. Number (n) of persons sharing 1 bin used for commercial establishments	131.25 persons/bin	65.625 persons/bin

Note 1)
RGR sold 13,600 units of 240 liter bins to 343,000 apartment dwellers in Sector 6 where 351,000 persons are covered by RGR's collection service contracts. (343,000 persons ÷ 13,600 bins = 25 persons/bin)

Remark:
This assumption agrees with a theoretical estimation that is shown below:

$$\frac{q + (r \times s \times t)}{25 \text{ persons/bin}} = \frac{240 \text{ liter/bin} + (2 \text{ liter/capita/day} \times 4 \text{ days} \times 1.2)}{25 \text{ persons/bin}}$$

q: Bin capacity = 240 liter/bin

r: average per capita household waste generation = 2 liter/capita/day

s: maximum interval between 2 collection service = 4 days

t: household waste generation quantity variation factor = 1.2

This rate is considered reasonable in view of the following calculation;

a ÷ (b x c x d) = 240 liter/bin ÷ (2 liter/capita/day x 4 days x 1.2)
= 25 persons/bin
where,

a: capacity of bin = 240 liter/bin

b: future average per capita municipal waste generation rate: 2 liter/bin

c: Maximum interval between 2 collection services: 4 days

d: Waste discharge quantity variation factor: 1.2

Note 2)

It is assumed that there are 96,000 individual houses where 336,000 persons live, and each individual house will need one 120 liter bin. (One bin is needed for every 3.5 persons: 336,000 persons ÷ 96,000 houses = 3.5 persons/house

Note 3)

For estimation of demand for bins for commercial enterprises, it is assumed that commercial waste shares 16 % of the total municipal waste excluding waste generated from markets and streets. The ratio of pure household waste collection quantity (84 %) to commercial waste collection quantity (16 %) is:
84 : 16 = 5.25

By using this assumption, it is estimated that commercial waste bins are needed at the following rate: 25 persons/bin x 5.25 = 131.25 persons/bin

2)   Demand Estimation

Case 1:   240 liter bins are used for apartment buildings and commercial enterprises and 120 liter bins are used for individual houses

1) Number of 240 liter bins needed

A. Number of 240 liter bins need for apartment dwellers

a ÷ b = 1,764,000 persons ÷ 25 persons/bin = 70,560 bins

where,

    a: Future population living in apartment buildings: 1,764,000 persons

    b. Number of household persons that share 1 unit of 240 liter waste bin:
        25 persons/bin

B. Number of 240 liter bins needed for commercial enterprises

c + d = 2,100,000 persons ÷ 131.25 persons/bin = 16,000 bins
where,

    c: Future population living in Bucharest: 2,100,000 persons

    d. Number of household persons that share 1 unit of 240 liter waste bin:
        131.25persons/bin

C. Number of 240 liter bins needed for Bucharest (A + B)

70,560 bins + 16,000 bins = 86,560 bins

Annual average demand: e + f = 86,560 bins ÷ 8 years = 10,820 bins/year
where,

    e. Total demand: 86,560 bins

    f. Average use period: 8 years

<u>2) Number of 120 liter bins needed</u>

Demand = number of individual houses = 96,000 bins

Annual average demand = 96,000 bins ÷ 8 years = 12,000 bins/year

Case 2: 120 liter bins are used for all households and commercial enterprises

A. Number of 120 liter bins needed for apartment dwellers:

a + b = 1,764,000 persons ÷ 12.5 persons/bin = 141,120 bins
where,

    a: Future population living in apartment buildings: 1,764,000 persons

    b. Number of persons that share 1 unit of 120 liter waste bin: 12.5 persons/bin
        Note: 25 persons/bin x 120 liter/240 liter = 12.5 persons/bin

<u>B. Number of 120 liter bins needed for individual houses</u>

Demand = number of individual houses = 96,000 bins

C. Number of 120 liter bins needed for commercial enterprises:

c + d = 2,100,000 persons ÷ 65.625 persons/bin = 32,000 bins
where,
c: Future population living in Bucharest: 2,100,000 persons
d. Number of household persons that share 1 unit of 120 liter waste bin used
for commercial enterprises: 65.625 persons/bin

D. Total 120 liter bins needed for both households and commercial enterprises
A + B + C = 141,120 bins + 96,000 bins + 32,000 bins = 269,120 bins

Annual demand = 269,120 bins ÷ 8 years = 33,640 bins/year

3.2   Estimation of Romanian Bin Prices

1)   Cases on Sales Quantity Assumed

In general, price of a bin set by a bin supplier depend on various factors including:

1) Quantity of bins to be sold
2) Costs of production factors such as materials, labor, initial investment, interest, transport, sales and profit, etc.
3) Supplier' marketing strategy
4) Market conditions (demand condition and existence of competitors)

Because quantity of bin sales is a determinant factor of price level, bin prices are estimated for 4 level of sales quantity for each of 240 liter bins and 120 liter bins.

<u>Cases A1 - A4 for 240 liter bins under CASE I</u>

Case A1:   A Romanian factory will produce and sell 2,000,000 bins for 10 years, which is 18.5 times larger than the Bucharest demand of 108,200 units for 10 years.

Case A2: A Romanian factory will produce and sell 500,000 bins for 10 years, which is 4.6 times larger than the Bucharest demand.

Case A3: A Romanian factory will produce 250,000 bins for 10 years, which is 2.3 times larger than the Bucharest demand.

Case A4: A Romanian factory will produce 108,200 bins for 10 years, which is equivalent to the Bucharest demand.

Cases B1 - B4 for 120 liter bins

Case B1: Under CASE 2, a Romanian factory will produce and sell 2,000,000 bins for 10 years, which is 6.1 times larger than the Bucharest demand of 330,000 bin for 10 years.

Case B2: Under CASE 2, a Romanian factory will produce and sell 500,000 bins for 10 years, which is 1.5 times larger than the Bucharest demand.

Case B3: Under CASE 2, a Romanian factory will produce 330,000 bins for 10 years equivalent to the Bucharest demand.

Case B4: Under CASE 1, a Romanian factory will produce 120,000 bins for 10 years equivalent to the Bucharest demand.

2)   Estimation of Locally Manufactured Bin Prices

Summary of prices estimated for 8 different cases are shown in the following table. Assumptions used for the estimation and estimation details for each case are explained in table of each case.

Table 3.2-1   Summary of Estimation of Romanian Waste Bin Prices and Cost of Bins to Citizens

Cases (assumed quantities of bins produced & sold for 10 years)	Price (a)	Useful Period (b)	Cost per Year (a)/(b) = (c)	Monthly Cost Per Capita for Household (See Table A2.2 for details) (d)
Case A1: 240 liter bin (Sales: 2,000,000)	82,765 lei/bin	8 years	10,346 lei/bin/year	34 lei/capita/month (Index: 103)
Case A2: 240 liter bin (Sales: 500,000)	121,250 lei/bin	8 years	15,156 lei/bin/year	51 lei/capita/month (Index: 152)
Case A3: 240 liter bin (Sales: 250,000)	172,603 lei/bin	8 years	21,575 lei/bin/year	72 lei/capita/month (Index: 216)
Case A4: 240 liter bin (Sales: 108,200)	307,204 lei/bin	8 years	38,401 lei/bin/year	128 lei/capita/month (Index: 384)
Case B1: 120 liter bin (Sales: 2,000,000)	58,930 lei/bin	8 years	7,366 lei/bin/year	49 lei/capita/month (Index: 147)
Case B2: 120 liter bin (Sales: 500,000)	85,410 lei/bin	8 years	10,676 lei/bin/year	71 lei/capita/month (Index: 214)
Case B3: 120 liter bin (Sales: 330,000)	103,597 lei/bin	8 years	12,950 lei/bin/year	86 lei/capita/month (Index: 259)
Case B4: 120 liter bin (Sales: 120,000)	197,211 lei/bin	8 years	24,651 lei/bin/year	164 lei/capita/month (Index: 493)

Details of price estimation for each of 8 cases are shown in the following 8 tables.

Table 3.2-2   Case A1: Estimated 240 liter Bin Price
(Total sales during 10 years: 2,000,000 units)

Cost Components	Unit Cost	
1. Initial investment	8,000 lei	See the note below.
2. Interest cost	2,880 lei	36% of Item 1 - See Note 2.
3. Material cost	22,174 lei	assumed to be 90 % of the 240 liter bin German case
4. Utilities & maintenance	8,623 lei	assumed to be 70 % of the 240 liter German case
5. Salary	6,160 lei	assumed to 20 % of the 240 liter bin German case
6. Transport, Sales cost & Profit	22,277 lei	assumed to be 50 % of the 240 liter bin German case
7. Sub-total	70,144 lei	
8. Value Added Tax (18 % of Item 7)	12,621 lei	
9. Total (7 + 8)	82,765 lei	

Note:

1) Use of German Bin Price as a Base

Possible Romanian bin prices for Case A1, A2, A3, and A4 were estimated based on the price (170,000 lei/bin) of a new German plastic bin available in Bucharest. Price composition was assumed as shown in the following table. Those assumed price composition was then used to estimate Romanian bin price.

Table 3.2-3 Assumed Price Composition of a New German Bln that are Available for 170,000 lei in Romania

Price Components	German Price Composition	
	Cost	%
1. Initial investment	8,000 lei	6.5 %
2. Interest cost (36% of Item 1 - See note 2)	2,880 lei	2.3 %
3. Material cost	24,638 lei	20.0 %
4. Utilities & maintenance	12,319 lei	10.0 %
5. Salary	30,797 lei	25.0 %
6. Transport, Sales cost & Profit	44,554 lei	36.2 %
7. Sub-total	123,188 lei	100.0 %
8. Import tax (20 % of & Item 7)	24,638 lei	
9. Value Added Tax (18 % of Item 7)	22,174 lei	
10. Total	170,000 lei	

Note:

Initial investment is assumed to be $ 8 million (16,000,000,000 lei) according to RGR's information. Unit investment cost is estimated to be 8,889 lei/unit assuming that the total sales is 2,000,000 units during 10 years during which investment cost is assumed to be recovered. (16,000,000,000 lei ÷ 2,000,000 units = 8,000 lei)

2) Assumption on Interest
- Repayment period: 8 years
- Interest 8 %/year in real term
- Total interest to be paid

Year	Remaining Principle to be Paid [% to Initial Investment] (a)	Interest Payment [% of Initial Investment] (a) x 8 % = (b)
1st Year	100.0 %	8 %
2nd Year	87.5 %	7 %
3rd Year	75.0 %	6 %
4th Year	62.5 %	5 %
5th Year	50.0 %	4 %
6th Year	37.5 %	3 %
7th Year	25.0 %	2 %
8th Year	12.5 %	1 %
Total		36 %

Table 3.2-4   Case A2: Estimated 240 liter Bin Price
(Total sales during 10 years: 500,000 units)

Cost Components	Unit Cost	
1. Initial investment	32,000 lei	See the note below.
2. Interest cost	11,520 lei	36% of Item 1 (See Note 2 of Case A1)
3. Material cost	22,174 lei	assumed to be 90 % of the 240 liter bin German case
4. Utilities & maintenance	8,623 lei	assumed to be 70 % of the 240 liter German case
5. Salary	6,160 lei	assumed to 20 % of the 240 liter bin German case
6. Transport, Sales cost & Profit	22,277 lei	assumed to be 50 % of the 240 liter bin German case
7. Sub-total	102,754 lei	
8. Value Added Tax (18 % of Item 7)	18,496 lei	
9. Total (7 + 8)	121,250 lei	

Note:

Initial investment cost per unit:

16,000,000,000 lei ÷ 500,000 units = 32,000 lei/unit

Table 3.2-5   Case A3: Estimated 240 liter Bin Price
(Total sales during 10 years: 250,000 units)

Cost Components	Unit Cost	
1. Initial investment	64,000 lei	See the note below.
2. Interest cost	23,040 lei	36% of Item 1 (See Note 2 Case A1)
3. Material cost	22,174 lei	assumed to be 90 % of the 240 liter bin German case
4. Utilities & maintenance	8,623 lei	assumed to be 70 % of the 240 liter German case
5. Salary	6,160 lei	assumed to 20 % of the 240 liter bin German case
6. Transport, Sales cost & Profit	22,277 lei	assumed to be 50 % of the 240 liter bin German case
7. Sub-total	146,274 lei	
8. Value Added Tax (18 % of Item 7)	26,329 lei	
9. Total (7 + 8)	172,603 lei	

Note:

Initial investment cost per unit:

16,000,000,000 lei ÷ 250,000 units = 64,000 lei/unit

Table 3.2-6   Case A4: Estimated 240 liter Bin Price
(Total sales during 10 years: 108,200 units)

Cost Components	Unit Cost	
1. Initial investment	147,874 lei	See the note below.
2. Interest cost	53,235 lei	36% of Item 1 (See Note 2 Case A1)
3. Material cost	22,174 lei	assumed to be 90 % of the 240 liter bin German case
4. Utilities & maintenance	8,623 lei	assumed to be 70 % of the 240 liter German case
5. Salary	6,160 lei	assumed to 20 % of the 240 liter bin German case
6. Transport, Sales cost & Profit	22,277 lei	assumed to be 50 % of the 240 liter bin German case
7. Sub-total	260,343 lei	
8. Value Added Tax (18 % of Item 7)	46,861 lei	
9. Total (7 + 8)	307,204 lei	

Note:

Initial investment cost per unit:

16,000,000,000 lei ÷ 108,200 units = 147,874 lei/unit

Table 3.2-7   Case B1: Estimated 120 liter Bin Price
(Total sales: 2,000,000 units for 10 years)

Cost Components	Unit Cost	
1. Initial investment	5,500 lei	See the note below.
2. Interest cost	1,980 lei	36% of Item 1 (See Note 2 of Case A1.)
3. Material cost	12,319 lei	assumed to be 50 % of the German 240 liter bin case
4. Utilities & maintenance	6,160 lei	assumed to be 50 % of the German 240 liter bin case
5. Salary	6,160 lei	assumed to 20 % of the German 240 liter bin case
6. Transport, Sales cost & Profit	17,822 lei	assumed to be 40 % of the German 240 liter bin case
7. Sub-total	49,941 lei	
8. Value Added Tax (18 % of Item 7)	8,989 lei	
9. Total (7 + 8)	58,930 lei	

Note: Initial Investment

a. Cost of Injection Machine: $ 3,000,000   (6,000,000,000 lei)

b. Cost of mold: $ 2,000,000   (4,000,000,000 lei)

c. Cost of other equipment and building:$ 500,000   (1,000,000,000 lei)

Total (a + b + c): $ 5,500,000 (11,000,000,000 lei)

Note: The source of information on the cost items a and b is an offer made by a foreign group.

Initial investment cost per unit:
11,000,000,000 lei ÷ 2,000,000 units = 5,500 lei/unit

Table 3.2-8   Case B2: Estimated 120 liter Bin Price
(Total sales: 500,000 units)

Cost Components	Unit Cost	
1. Initial investment	22,000 lei	See the note below.
2. Interest cost	7,920 lei	36% of Item 1 (See Note 2 of Case A1.)
3. Material cost	12,319 lei	assumed to be 50 % of the German 240 liter bin case
4. Utilities & maintenance	6,160 lei	assumed to be 50 % of the German 240 liter bin case
5. Salary	6,160 lei	assumed to 20 % of the German 240 liter bin case
6. Transport, Sales cost & Profit	17,822 lei	assumed to be 40 % of the German 240 liter bin case
7. Sub-total	72,381 lei	
8. Value Added Tax (18 % of Item 7)	13,029 lei	
9. Total (7 + 8)	85,410 lei	

Note:

Total investment: $ 5,500,000 (11,000,000,000 lei)

Initial investment cost per unit:
11,000,000,000 lei ÷ 500,000 units = 22,000 lei/unit

Table 3.2-9 Case B3: Estimated 120 liter Bin Price

(Total sales during 10 years: 330,000 units)

Cost Components	Unit Cost	
1. Initial investment	33,333 lei	See the note below.
2. Interest cost	12,000 lei	36 % of Item 1 (See note 2 of Case A1)
3. Material cost	12,319 lei	assumed to be 50 % of the German 240 liter bin case
4. Utilities & maintenance	6,160 lei	assumed to be 50 % of the German case
5. Salary	6,160 lei	assumed to 20 % of the German case
6. Transport, Sales cost & Profit	17,822 lei	assumed to be 50 % of the German case
7. Sub-total	87,794 lei	
8. Value Added Tax (18 % of Item 7)	15,803 lei	
9. Total (7 + 8)	103,597 lei	

Notes

Total investment: $ 5,500,000 (11,000,000,000 lei)

Initial investment cost per unit:

11,000,000,000 lei ÷ 330,000 units = 33,333 lei/unit

Table 3.2-10 Case B4: Estimated 120 liter Bin Price

(Total sales during 10 years: 120,000 units)

Cost Components	Unit Cost	
1. Initial investment	91,667 lei	See the note below.
2. Interest cost	33,000 lei	36 % of Item 1 (See note 2 of Case A1)
3. Material cost	12,319 lei	assumed to be 50 % of the German 240 liter bin case
4. Utilities & maintenance	6,160 lei	assumed to be 50 % of the German case
5. Salary	6,160 lei	assumed to 20 % of the German case
6. Transport, Sales cost & Profit	17,822 lei	assumed to be 50 % of the German case
7. Sub-total	167,128 lei	
8. Value Added Tax (18 % of Item 7)	30,083 lei	
9. Total (7 + 8)	197,211 lei	

Notes

Total investment: $ 5,500,000 (11,000,000,000 lei)

Initial investment cost per unit:

11,000,000,000 lei ÷ 120,000 units = 91,667 lei/unit

3.3 Estimation of Monthly Bin Cost to Users

Table 3.3-1 Monthly Per Capita Bin Cost for Apartment Building Dwellers

Cases (assumed quantities of bins produced & sold for 10 years)	Monthly Per Capita Cost for Apartment Building Dwellers [25 (12.5) persons share one 240 (120) liter bin]	Calculations (Bin price ÷ number of useful months ÷ number of household persons sharing 1 bin)
1. 240 liter Used German bin	33 lei/capita/month (Index: 100)	50,000 lei/bin/year ÷ 60 months/year ÷ 25 persons = 33 lei/capita/month
2. 240 liter New Italian bin	46 lei/capita/month (Index: 133)	106,200 lei/bin/year ÷ 96 months/year ÷ 25 persons = 51 lei/capita/month
3. 240 liter New Greek bin	56 lei/capita/month (Index: 169)	135,000 lei/bin/year ÷ 96 months/year ÷ 25 persons = 72 lei/capita/month
4. 120 liter Used German bin	33 lei/capita/month (Index: 200)	50,000 lei/bin/year ÷ 60 months/year ÷ 12.5 persons = 66 lei/capita/month
5. 240 liter New German bin	71 lei/capita/month (Index: 213)	170,000 lei/bin/year ÷ 96 months/year ÷ 25 persons = 128 lei/capita/month
Case A1: 240 liter bin (Sales: 2,000,000)	34 lei/capita/month (Index: 103)	82,765 lei/bin/year ÷ 96 months/year ÷ 25 persons = 34 lei/capita/month
Case A2: 240 liter bin (Sales: 500,000)	51 lei/capita/month (Index: 152)	121,250 lei/bin/year ÷ 96 months/year ÷ 25 persons = 51 lei/capita/month
Case A3: 240 liter bin (Sales: 250,000)	72 lei/capita/month (Index: 216)	172,603 lei/bin/year ÷ 96 months/year ÷ 25 persons = 72 lei/capita/month
Case A4: 240 liter bin (Sales: 108,200)	128 lei/capita/month (Index: 384)	307,204 lei/bin/year ÷ 96 months/year ÷ 25 persons = 128 lei/capita/month
Case B1: 120 liter bin (Sales:2,000,000)	49 lei/capita/month (Index: 147)	58,930 lei/bin/year ÷ 96 months/year ÷ 12.5 persons = 49 lei/capita/month
Case B2: 120 liter bin (Sales: 500,000)	71 lei/capita/month (Index: 214)	85,410 lei/bin/year ÷ 96 months/year ÷ 12.5 persons = 71 lei/capita/month
Case B3: 120 liter bin (Sales: 330,000)	86 lei/capita/month (Index: 259)	103,597 lei/bin/year ÷ 96 months/year ÷ 12.5 persons = 86 lei/capita/month
Case B4: 120 liter bin (Sales: 120,000)	164 lei/capita/month (Index: 493)	197,211 lei/bin/year ÷ 96 months/year ÷ 12.5 persons = 164 lei/capita/month

Note:

Use period of the German used bins is assumed to be 5 years (60 months). In general, use period of used bins varies according to conditions of used bins. It is reasonably be

assumed that suppliers of the 240 liter German used bins would select used bins that are relatively in good conditions as the supply of the used bins are more than the demand.

Table 3.3-2   Monthly Per Capita Bin Cost for Dwellers of Individual Houses

Cases (assumed quantities of bins produced & sold for 10 years)	Monthly Per Capita Cost for Those Living in Individual House [1 house (3.5 persons) share 1 bin]	Calculations (Bin price ÷ number of useful months ÷ number of household persons sharing 1 bin)
1. 240 liter Used German bin	**238 lei/capita/month (Index: 100)**	50,000 lei/bin/year ÷ 60 months/year ÷ 3.5 persons = 238 lei/capita/month
2. 240 liter New Italian bin	**316 lei/capita/month (Index: 133)**	106,200 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 316 lei/capita/month
3. 240 liter New Greek bin	**402 lei/capita/month (Index: 169)**	135,000 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 402 lei/capita/month
4. 120 liter Used German bin	**238 lei/capita/month (Index: 100)**	50,000 lei/bin/year ÷ 60 months/year ÷ 3.5 persons = 238 lei/capita/month
5. 240 liter New German bin	**506 lei/capita/month (Index: 213)**	170,000 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 506 lei/capita/month
Case A1: 240 liter bin (Sales: 2,000,000)	**246 lei/capita/month (Index:103)**	82,765 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 246 lei/capita/month
Case A2: 240 liter bin (Sales: 500,000)	**361 lei/capita/month (Index: 152)**	121,250 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 361 lei/capita/month
Case A3: 240 liter bin (Sales: 250,000)	**514 lei/capita/month (Index: 216)**	172,603 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 514 lei/capita/month
Case A4: 240 liter bin (Sales: 108,200)	**914 lei/capita/month (Index: 384)**	307,204 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 914 lei/capita/month
Case B1: 120 liter bin (Sales:2,000,000)	**175 lei/capita/month (Index: 74)**	58,930 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 175 lei/capita/month
Case B2: 120 liter bin (Sales: 500,000)	**254 lei/capita/month (Index: 107)**	85,410 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 254 lei/capita/month
Case B3: 120 liter bin (Sales: 330,000)	**308 lei/capita/month (Index: 129)**	103,597 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 308 lei/capita/month
Case B4: 120 liter bin (Sales: 120,000)	**587 lei/capita/month (Index: 247)**	197,211 lei/bin/year ÷ 96 months/year ÷ 3.5 persons = 587 lei/capita/month

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