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Marketing Compost in Nepal

Field Testing of Sandec's Compost Marketing Handbook

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1 Introduction

1.1. Background

Composting schemes often face problems in marketing their products as marketing was not appropriately considered from the starting point of venture. Given this situation Sandec has developed a Handbook on Compost Marketing with the (working) title: *Marketing Compost - A Handbook for Compost Producers in Low and Middle-Income Countries*. The handbook aims at guiding compost producers in low- and middle-income countries through the process of market research, product design and marketing as well as promotion. This handbook focuses on the marketing approach of viewing composting what means that composting should be looked at as a way of producing a high-quality product whose sales is driven by customer demand. This approach achieves also the objectives of the traditional solid waste management approach. Sandec's Compost Marketing Handbook provides information and guidance on improving a composting business by introducing key principles and basics of marketing. As Sandec always intends to publish literature which combines latest research outcomes and the needs of practitioners, it wants to test the approaches and tools provided in their publications prior to final print. In this particular case, Sandec decided to set up an internship in Nepal in collaboration with ENPHO (Environmental and Public Health Organisation), a local NGO. Kathmandu Valley was chosen as testing field since ENPHO had already been a good and reliable partner in several projects and was again interested in this study. A further reason to select Kathmandu Valley is the fact that it faces the problem of marketing compost as for most composting plants a proper marketing strategy is lacking.
After a first composting plant survey in Kathmandu, Patan and Bhaktapur, two organisations for which the marketing study should be undertaken were chosen: KMC (Kathmandu Metropolitan City), a governmental institution, and NEPCEMAC (Nepal Pollution Control and Environment Management Centre), a local NGO which focuses on waste collection, but they also run two small composting plants. The underlying idea of this choice is the fact that KMC intends to scale up its pilot vermi composting project which is very interesting to accompany and NEPCEMAC was selected because the responsible person was very interested in the project and is also open-minded towards new approaches. Furthermore, NEPCEMAC is operating two composting plants and the comparison of a governmental and a non-governmental organisation is very interesting.

1.2. Solid Waste Management in Kathmandu

This chapter outlines roughly the solid waste management situation in Kathmandu. Kathmandu is the capital of Nepal and it is not only far the largest city of the country, but also the economic and political centre of Nepal.

Table 1: Facts about Kathmandu [2] [3]

Name	**Kathmandu Metropolitan City**
Total Area	49.45 sq km (CBS Data) [7.5 % of Kathmandu Valley]
Altitude	1'350 meters above sea level
Total Road length	794.13 km
Population (2003)	738'173
No. of Households (2001)	152'155 (CBS Data)

The waste generation in Kathmandu amounted to 245 and 260 tons per day in the years 2005 and 2006 respectively [3]. Waste collection services are provided by the municipality and by non-governmental solid waste management organisations (NGSWMO). Nowadays, a lot of NGSWMOs, such as private limited companies, NGOs and CBOs (community based organisations) are involved in Kathmandu's solid waste management since Kathmandu Metropolitan City has adopted private sector participation as a key strategy for its solid waste management and resource mobilisation [3]. Residents deposit their waste to a designated location at the roadside or bring it to a waste collection vehicle or public container. From there the waste is taken to Teku Transfer Station or directly to the landfill site. At the transfer station, the waste is sorted by scavengers and then loaded on larger haulage vehicles which transfer the waste to Balkhu where it is dumped finally along the banks of the Bagmati River [2]. NGOs having formal agreements with KMC are allowed to bring the collected waste to Teku Transfer Station, whereas organisations without agreements dump the waste directly at Balkhu [3]. After the closure of the landfill site at Gokarna in 2000, sanitary landfill sites are planned in Okharpauwa and Sisdole [2]. But so far, these plans have not been realised yet.
In order to promote recycling, several Community Recycling Centres (CRC) have been established and the municipality also collaborates with scrap dealers.
Even though one ton of hazardous medical waste is produced per day, Kathmandu has no medical waste management system. However, some hospitals have their own incinerators [2].

1.3. Composting Plant of Kathmandu Metropolitan City (KMC)

The composting plant of KMC was established in 2005 and is located at Teku Transfer Station, what can lead to problems with scavengers and straying animals [8]. The initial setup of the plant was a joint project of Kathmandu Metropolitan City, Pesticide Monitoring Nepal (PEMON) and Clean Energy Nepal (CEN) with the support of Clean Kathmandu Valley Study, a joint initiative of His Majesty's Government (HMG) and Japan International Cooperation Agency (JICA) [4].
Waste from Kalimati Vegetable Market, which is the biggest vegetable and fruit market for wholesalers in Kathmandu, is used as raw material. Therefore, the feedstock already consists more or less of pure biodegradable waste. Compost is produced in so called honey comb boxes (3 boxes à 1 x 1.5 x 1 m), in a chamber house, in bins, piles and in vermi composting tanks. Initially, it was intended to degrade the raw material aerobically using EM (Efficient Microorganisms) as activator in the chamber house, in bins, in open piles and in honey comb boxes for two to four weeks before feeding the partially decomposed material to the worms (the flowchart is illustrated in Figure 1). However, this scheme was not satisfactory [6] [7]. KMC switched to feeding directly fresh vegetable waste to the worms (the flowchart can be seen in Figure 2)
On the bottom of the vermi composting tanks (20 beds at 3 x 1 x 0.6 m), cow dung is spread over coconut husks which are used as bedding materials. After chopping the raw material and adding saw

dust as the waste from the vegetable market is rich in nitrogen, it is placed in the vermi composting tanks and the worms are released [5].
The composting plant has been designed to handle 500 kg/d input and to produce an output of 200 kg/d [4] [5] [6] [7] [8]. But the plant has never been running at full capacity as interpersonal discrepancy led to the closure of the plant in autumn 2006. During the pilot project phase, the average output was 16 kg/d [6] [7] and the present customers were households, nurseries and a few vegetable farmers [8]. Today, KMC is running the plant at pilot project level again and has the intention to scale up at full capacity in the near future [8].

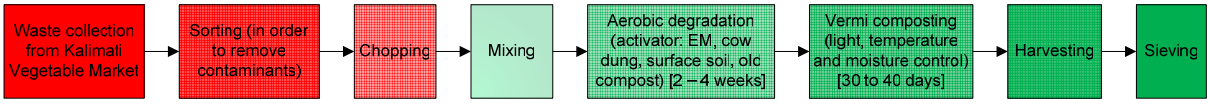

Figure 1: Flowchart of the formerly intended production process of KMC

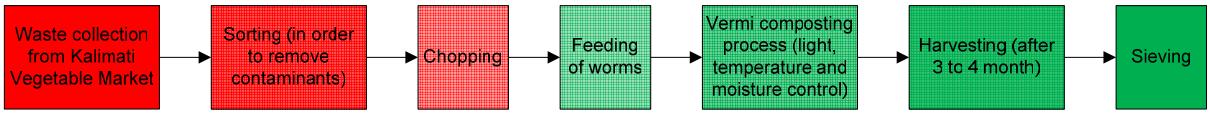

Figure 2: Flowchart of the present production process of KMC

1.4. Composting Plants of Nepal Pollution Control and Environment Management Centre (NEPCEMAC)

NEPCEMAC is involved in street sweeping, waste collection, transportation and composting within the municipality. In 2004, 10 km street was swept once a week and the waste was collected in rickshaws. In that year, NEPCEMAC collected totally 9 tons of waste per day from 4000 households [2]. Nowadays, the total collected waste has increased up to about 33 tons per day [8].

1.4.1. Plant in Patan (located inside the Zoo) [8]

This plant was established in 2004 in loose collaboration with the Zoo. The raw material consists of canteen and garden waste as well as of animal excrements and is collected by NEPCEMAC inside the Zoo. Compost is produced exclusively in piles without aeration and is turned only once after three months. The formerly used perforated pipes collapsed due to the weight of the compost piles. Just as KMC, NEPCEMAC uses EM as activator.
The plant was constructed to create an output of 0.13 t/d and to deal with an input of 0.6 t/d. NEPCEMAC can sell around 4 tons of compost produced in the Zoo plant per month to nurseries and households, but in spite of that, the plant is mainly funded by the waste collection fee of NEPCEMAC (NEPCEMAC charges monthly 125 NRs. per household).

1.4.2. Plant in Handigau (Kathmandu) [8]

Contrary to the plant in the Zoo, this plant, which was established in 2004/05, receives its raw material from house-to-house collection. As the households do not segregate their waste, the feedstock for composting has to be sorted. Recyclables are sold by the staff. The total waste collected by NEPCEMAC amounts to 33 tons per day, but the plant can handle only 1.65 tons which results in a compost output of around 0.23 tons per day. The sales volume per month is 3 to 4 tons, but just as the plant in the Zoo, this one is also largely run by the waste collection fee of NEPCEMAC. The main customers are nurseries and households, but sometimes also small vegetable farmers.

This plant produces compost by pile composting with vertical perforated pipes providing aeration. While the raw material is piled, NEPCEMAC spreads a layer of ash and EM every 15 cm. However, the piles are not turned at all during the composting process since neighbours have complained about bad smells.
Right now, NEPCEMAC is thinking about changing to vermi composting and they have already launched a small demonstration project.

2 Methodology

In the scope of the field testing of Sandec's Compost Marketing Handbook several methods to obtain data and to analyse the gathered information were applied. The present study was conducted step by step according to the chapters of the Marketing Handbook.

In order to decide for which composting plant the marketing study should be carried out, a composting plant survey in Kathmandu, Patan and Bhaktapur was conducted. While the responsible persons of the respective plant were interviewed by prepared questionnaires as well as informally, it was not only possible to get insight into the plant in question but one was also enabled to understand very generally the problems and circumstances of producing compost in Kathmandu Valley. Therefore, this first survey was also a step forward to collect data for the market environment.

Market Environment The data for the market environment analysis were largely collected by discussions with several people. These interviews were carried out by small questionnaires which were adjusted to get the relevant information but also by spontaneous informal questions. Furthermore, literature and reports of earlier conducted studies were reviewed. As soon as all information had been gathered, the factors of each market environment were taken in turn and categorised according to the opportunities and threats analysis described in Sandec's Compost Marketing Handbook.

Market Assessment Similar to the procedure for the market environment analysis, literature and reports were reviewed to get the relevant data. Additionally, information collected in interviews for the market environment investigation contributed to the market assessment. Due to these gathered facts and due to customer lists of KMC and NEPCEMAC, it was possible to segment the market roughly and to prepare questionnaires for present and potential customers. The questionnaires were tailored according to the respective market segment. However, the questions were not pilot tested. The interviews were conducted by volunteers either by phone calls or visits. Potential customers such as some households, nurseries, agro-vets or hotels were chosen randomly.
This customer survey was analysed for each market segment separately. With the help of other studies it was possible to estimate the present and potential demand (see chapter 4.1). Finally, findings of this analysis enabled to develop market segment profiles.

Product, Positioning and Location The information for the analysis of product and place was drawn from all the foregoing findings of the market environment and market assessment as well as from literature and study review. Interviews with the composters and the customer survey also contributed a large part of the needed data. The analysis of product and place was conducted by taking the product itself and the production process in turn as well as by comparing the quality of the products with the standards of Switzerland, Great Britain and India.

Pricing The price calculations are described in chapter 7 and in chapter 8. And as mentioned there, these computations show a lot of uncertainties. The data about costs and expenditure was elicited from earlier studies and literature review as well as from interviews with the persons in charge of KMC and NEPCEMAC. Additionally, the customer survey provided information about willingness and ability to pay of the respective market segments.

Promotion Similar to the analyses of product, place and price, the analysis of promotion was mainly based on interviews with the responsible persons of KMC and NEPCEMAC as well as on the customer survey. Furthermore, for the promotion of KMC, literature and earlier studies were reviewed. However, the largest part of the information for the analysis of promotional efforts in the future was obtained by a brainstorming with the persons in charge of KMC and NEPCEMAC.

3 Market Environment - Conclusions of the Opportunities and Threats Assessment

3.1. Social Environment

Neither the use of organic matter in general nor the use of compost in particular has to be introduced in Nepal as composting and the production of farm yard manure, especially cow dung and chicken manure, is an old knowledge. In order to sell and market compost one can thus focus on pointing out the advantages of using compost. Furthermore touching waste and working in the waste business as well as the use of compost is nowadays even for higher castes not a problem anymore [23] [25].
Due to a faster response of the crop to chemical fertilisers besides other benefits and as they first think of their production to be as fast as possible and only then of healthy soils, young generation and not well educated farmers prefer mineral fertilisers over compost [25]. Moreover, it seems that within the scope of the Green Revolution the knowledge to produce an own proper fertiliser got lost. The farmers even lost the feeling for the soil and farming became more and more an industrial character [29]. All of the reasons above can lead – and have already led – to a dependency on chemical fertilisers and to very high production costs. Latter is even more significant in the view of the fact that simultaneously the standard of living has gotten more expensive whereas the vegetable prices have decreased so that loans have to be taken. Obviously a change in mind is needed, but this is very difficult to obtain. To tackle this situation there are two possibilities: training and education programmes for farmers. The instructor should point out that by applying compost, farmers can become self-helping and therefore independent of chemical fertilisers. Programmes like that should increase awareness of compost and its use.
However, the low spending capacity of farmers remains a problem. Moreover, the urban and population growth rate of Kathmandu is the highest in South Asia and involves therefore a lot of problems such as an increase in poverty [9] [10]. As a consequence, the price as well as the sales of compost could be limited because of the low ability to pay of the customers.

People in Nepal often know about the bad impacts of chemical fertilisers and about many advantages of compost. They are even interested in having an efficient solid waste management including composting as treatment of the organic fraction [10]. And additionally, there is a rising number of health and environment conscious customers that want to buy organic products even though these are expensive [18]. Consequently there is a large potential demand as people know about environmental protection and want to support this theoretically, but only very few people are self-motivated and really take action, whereas most Nepalese have in practice an out-of-mind-out-of-sight- and a not-in-my-backyard-attitude towards solid waste management [10] [23]. It is even supposed that the inhabitants of Kathmandu would not follow rules and legislation if for instance provisions about source segregation existed [25]. As this is a similar situation as mentioned above, it is again very difficult to react appropriately. Again these circumstances need a change of attitudes and this could only be achieved by organising training and awareness programmes.

Further social issues are of financial nature as there is not much land available in Kathmandu and capital investments are very expensive [10]. But as the considered plants already exist, these problems will only arise if NEPCEMAC or KMC respectively intend to expand its production.

Table 2: Overview of the most important factors of the social environment influencing the compost market

Most important factors	Possible reactions
Attitude	Training and awareness programmes, but very difficult to overcome
Use of competing products and unawareness of compost	Training and awareness programmes
Financial aspects	Not urgent; could become a problem if an expansion of the plant is intended

3.2. Political / Legal Environment

There exist plenty of laws about environmental protection. But even though solid waste is one of the most prominent problems, no direct provisions have been established about it. There are only few regulations regarding the construction and operation of waste treatment plants. National Policy however raises the problem of solid waste management [10]. As composting is one of the most important procedure to reduce organic waste and to recover resources, composting plant operators can be sure of getting support from the Government. This statement can be confirmed by the fact that privatisation is trend and is among others one point in National Policy [10]. It is for instance foreseen by the Constitution of the Kingdom of Nepal that environmentally concerned citizens can call the Government to account or they are allowed to take action on their own [10]. Therefore collaboration and arrangements between Kathmandu Metropolitan City (KMC) and the private sector about solid waste management already exist.
The concern of the Government, particularly KMC, about the involvement of citizens in the solid waste management, can also be recognised by the fact that the Community Mobilisation Unit (part of the Solid Waste Management section which is itself part of the Environment Department) promotes actively composting and recycling [12].
Another additional indirect support of composting by the Government is the favourable National Agricultural Development Policy since one goal of it is to spread organic farming as well as to replace chemical fertilisers in the long term [19] [26]. There is still a long way to go, but all subsidies for chemical fertilisers have been removed up to now except for transportation subsidies for remote areas and small price subsidies given by the AIC (Agriculture Inputs Corporation, the governmental importer). Yet, there are also no subsidies neither for organic farmers nor compost use nor commercial compost production. As the purchasing power of farmers is limited and switching to organic farming is expensive, the lack of subsidies could become a problem [28] [29].

To come back to what was said above about subsidies for chemical fertilisers, it is to point out that the different references are partly contradictory and no one was able to clarify the present state of affairs. On account of the facts in hand it seems that officially the Government does not provide any support for chemical fertilisers anymore [25] [30]. However, the governmental importer AIC grants transportation subsidies for remote areas and irregularly price subsidies in the case that the Japanese Government gives financial contributes or supplies directly certain quantities of chemical fertilisers. The references talking about subsidies ([11] [26] [27]) may also mean cross-subsidies as AIC is part of the Government.

Besides a large waste production, KMC also faces the problem of a changing composition of the waste and the problem of a lacking medical waste collection system [10] [12]. This leads to severe quality constraints of compost produced in Kathmandu. Source segregation that has not been introduced on large scale up to now would be a possible solution to this. However, according to earlier studies, households would probably not segregate even if source segregation is prescribed by law [10] [25]. As mentioned above these circumstances are very hard to change and overcome.

The establishment of composting plants and schemes is a further problem facing the Government as households generally oppose to the founding of decentralised composting plants and as for centralised composting schemes there is a lack of land and financial resources [10]. But as the considered plants already exist, this is not an urgent question to treat.

To sum up, one can say that even if existing legislation and policies are still inadequate and even the Government is instable and slow, yet it wants to tackle the solid waste problem and therefore supports NGOs and decentralised composting schemes as well as promotes organic farming. One should profit from this state of affairs to collaborate with the Government and to promote compost. Furthermore, one should – also as a private organisation – push quality standards and subsidies for organic farming.

Table 3: Overview of the most important factors of the political / legal environment influencing the compost market

Most important factors	Possible reactions
Lacking of source segregation and of medical waste collection system	Training and awareness programmes and establishing of a medical waste collection system
Support from the Government	A composter should make use of the support from the Government. Policy might be influenced and the Government could be used as a channel for one's own awareness programmes
Opposition of the households	Not urgent; could be a problem if an expansion of the plant is intended

3.3. Economic Environment

Only few competitors and competing products are in the market as no faecal or wastewater sludge is used, there are merely a few composting plants on small scale and only one bone mill exists whose output is used to enhance compost rather than to compete it [25]. The most important competitors thus are self-made compost as well as chemical fertilisers which used to be so heavily pushed by the Government during the Green Revolution that one can almost say the Government forced the farmers to use them [10] [19] [29]. However, the former should not be fought against as for the Government and for NGOs achieving household composting is often a goal. In contrast, chemical fertilisers cannot be so easily dismissed. A high dependency on mineral fertilisers has been caused by the Green Revolution as already mentioned. This involves a high demand for chemical fertilisers and additionally the Government (AIC) itself imports fertilisers and gives still price subsidies due to a certain support of the Japanese Government once in a while and transportation subsidies for remote areas as mentioned above. At least, the Government promotes the use of chemical fertilisers and compost on balance [19] [26]. Nevertheless, the quick response, easy availability, easy usage and the promotion

of certain chemical fertilisers such as DAP by the Government [11] render mineral fertilisers very strong competitors.
A further problem is the fact that the Nepalese Government is not entirely free in setting prices as the fertiliser price policy of Nepal is directly dependent on that of India. India provides price subsidies to their farmers which lead to an illegal trade at the borders [14]. But keeping the prices high encourages unauthorised import from India.
From a composter's point of view it is pleasing that the demand for chemical fertilisers cannot be met by the supply of the Government and the private sector does not enjoy high confidence among farmers [26]. Moreover, organic farming with a high demand of compost is increasing and is also promoted by the Government.
Although the present situation is difficult to tackle, judging by some present and expected trends, the future for compost seems to be bright: More and more subsidies are removed, deregulation caused a decrease in fertiliser supply, adverse impacts of chemical fertilisers are revealed and organic farming with a high demand of compost especially in urban areas – as there is not enough organic matter available [29] – is advancing. In addition, the fertiliser consumption in Nepal is quite low compared to other countries [11].
There are two more reasons why chemical fertilisers are not such a threat to compost products made in Kathmandu. Firstly, chemical fertilisers and compost are not in direct competition as compost is a soil amender rather than a fertiliser. To meet the nutrient demand by compost alone might be difficult [28]. Secondly, as in Kathmandu only small-scale composting plants exist, among them the ones of KMC and NEPCEMAC, they are likely to target households and nurseries – both of which do usually not use mineral fertilisers – rather than farmers. But as farmers remain a potential market segment, a compost producer should keep an eye on chemical fertilisers. For, many farmers are not aware of the indirectness of the competition between chemical fertilisers and compost products so that they are likely to treat them as substitute products. Because of this fact and the above mentioned reasons, chemical fertilisers are, as already said, a very strong competitor in the farmers' but not in the households' and nurseries' market segment.

According to findings of former studies, compost produced of solid waste will easily be marketed and adsorbed, especially if farmers are targeted [9] [10]. In spite of that there has been just a very small amount of municipal waste compost in the market up to now. Therefore advertising and promoting is a very important issue. It is also significant in view of the fact, that farmers are willing to pay only a very low price whereas they are purchasing raw material to make their own compost at higher prices [10]. This gap between ability to pay and willingness to pay should be capitalised on.

Table 4: Overview of the most important factors of the economic environment influencing the compost market

Most important factors	Possible reactions
Chemical fertilisers	Very strong competitors in the farmers' market segment, but present and expected trends let conclude that future might be brighter for compost
Support from the Government for chemical fertilisers	The Government is still supporting chemical fertilisers at the moment, but in future it may help to replace chemical fertilisers. This could be reinforced by advertising and promoting compost.
Farmers do not want to pay much for compost	Advertising and promoting should help to make use of the gap between ATP and WTP

3.4. Environmental Environment

Natural hazards like earthquakes, forest fires, windstorms, hailstorms and thunderbolts occur in Nepal every year [11]. This gives rise to increased poverty and is therefore adverse to every business. However it is impossible to react to that situation. Yet, there are some natural hazards in particular forest depletion and soil degradation that are also influenced by human activities. These environmental problems lead to erosion especially during the Monsoon [11]. On the one hand soil erosion also increases poverty, but as compost is a soil amender and belongs to the indigenous soil fertility management practices, it can be used to stabilise soil and thus for erosion control.
Although these environmental problems do farmers a lot of harm, they are also kind of helpful for the compost business.
Another problem Nepal is facing is the increasing acidification of soil on account of heavy rainfall as well as of unbalanced application of mineral fertiliser [11] [18] [25] [29].
Because of the above mentioned there is even a marginalizing of the land. As a result of this marginalizing, acidification and soil degradation there is a large need for soil amenders among which compost is the best solution. Nevertheless and in spite of the fact that composting is a central part of the agricultural system in Nepal and can affect other agricultural systems, there is still unawareness of compost as soil amender and soil fertility is still reduced by insufficient organic restitution [10]. However, the fact that compost is in this agricultural country already present makes it easier to organise efficient training and awareness programmes.
The coming up of organic farming is additionally very helpful to spread the idea of using compost.

Besides the natural hazards discussed above further environmental problems have arisen in Nepal. The urban and population growth results in cruel impacts on the environment. One of the most important problems is solid waste. Therefore an efficient solid waste management could address not only waste but also public health problems [10]. Composters can capitalise on this fact as composting is the most useful treatment of the organic fraction. Furthermore people are gradually more aware of environmental issues because of the increasing pollution and they desire thus a good solid waste management [10].

The Monsoon has also an impact on the operation of a composting plant as the plant might be flooded or piles, boxes or windrows could become at least wet. This can easily result in high moisture levels

and slow down decomposition and promote anaerobic degradation [17]. But there are several solutions to tackle this problem such as roofing, construction of walls, plantations and many more.

Table 5: Overview of the most important factors of the environmental environment influencing the compost market

Most important factors	Possible reactions
Natural hazards	Increase poverty but increase simultaneously the need for compost
Pollution of the environment	Increases the need for an efficient solid waste management
Human activities	Lead to acidification and forest depletion and thus increase the need for compost.

3.5. Technical Environment

Treating composting techniques in detail is hardly possible as there are not many composting plants in operation and those which are operated are mostly on demonstration scale. The most important of the latest composting techniques in Kathmandu is vermi composting which is applied on almost every composting plant on demonstration scale at least and it has also been promoted by the Government. Further composting techniques applied in Kathmandu are pile composting (sometimes aerated by perforated plastic pipes), bin / barrel composting, box composting and at the KMC plant there is some compost even produced in chambers. Pit composting is sometimes still used at household-level. Except for a loader that is usually not in use at the KMC plant, there is no mechanical support to produce compost in Kathmandu.

So much for the composting techniques, further analysis of the technical environment has therefore to concentrate on the changing agricultural techniques such as the switch to organic farming. This farming technique uses natural processes to substitute chemical fertilisers and pesticides and focuses thus among other things on composting [18] [21]. The application of compost in the organic agriculture not only saves money because chemical fertilisers and pesticides are not used anymore, but it is as already mentioned also very favourable to soil health since it provides for instance erosion control [19] [29]. It should be capitalised on the fact that organic farming demonstrates all benefits one can get from applying compost. Consequently, compost producers should support the change to organic farming and raising the awareness, which is still very low, of organic and quality food in order to increase the demand for compost products [29]. However, there is still a long way to go as the Green Revolution has led to a dependency on chemical fertilisers and to a lost of old knowledge. Furthermore, the number of chemical fertilisers is still increasing indicating that the demand for mineral fertilisers is still growing [19]. Some farmers have even lost their confidence in organic manure. Last but not least, switching to organic farming is very expensive on account of two reasons. Firstly, there is a quite complicate certification, as experts from abroad have to be hired and secondly, in the first years of change, very large quantities of compost are required to get the soil into a good condition [28] [29]. These circumstances pose very hard challenges to overcome. The awareness and training programmes already done by the Government have to be intensified and national standards should be pushed.
Further problems faced by organic farmers in Nepal are the lack of standards, pest problems, low production and as a consequence low consumer awareness [19] [29].

It has to be emphasised again that as a composting plant operator, one should support organic agriculture associations and the Government to organise awareness and training programmes as well as to promote compost. Great store should be set by the correct application of compost since natural pesticides and fertilisers may also harm the soil [20]. Therefore attention has to be paid to that point since this could lead to an adverse reaction of the households and farmers towards organic matter used in agriculture.

Table 6: Overview of the most important factors of the technical environment influencing the compost market

Most important factors	Possible reactions
Perception of the farmers and dependency on chemical fertilisers	Training and awareness programmes
Possible problem: adverse reaction of the population toward organic matter because of compost application in a wrong way	Training and awareness as well as demonstration programmes and good advertising
Organic farming	This is a great opportunity, for it involves a large potential demand for compost; Therefore, organic farmers associations and the Government should be supported

3.6. Key Factors of the Market Environment

The following list summarises the most important factors found in the analyses of the respective environments.

- *People's attitude towards waste and environmental problems:* Most people in Nepal know about environmental pollution and that for instance source segregation would be very important, but very few citizens take action to tackle the waste problems.
- *Environmental problems*: These problems lead to a demand for an efficient solid waste management including composting schemes and to an increase of the demand for erosion control and soil amenders. Nevertheless, people, especially farmers, are still unaware of compost. Furthermore, environmental problems can increase poverty and thus decrease the ability to pay for compost products.
- *The Government:* On the one hand the Government has been promoting and pushing composting and the compost use. In spite of that, existing legislation is still inadequate and the Government is simultaneously supporting the use of chemical fertilisers.
- *Organic farming:* Organic farming involves a large potential demand for compost. As organic agriculture is still run on a low level, it will take a lot of time to change the present agricultural techniques, but at least, the Government is actively promoting organic farming.
- *Chemical fertilisers:* Mineral fertilisers are the strongest competitors for compost products but simultaneously they are competing compost only in the market segment of farmers and merely indirectly as a combined use of chemical fertilisers and compost would be possible.

On account of the above analysis of the threats and opportunities of the market environment, the following conclusions can be drawn: compost producers should collaborate with the Government and (organic) agricultural associations. Furthermore they need to advertise and promote compost products by pushing forward the following arguments: compost is environmentally friendly, provides erosion control, increases soil fertility, amends soil, saves money, helps to become self-helping and can partly solve solid waste problems.
To sum up, one can say that demonstration, awareness and training campaigns are the most important activities to overcome the possible threats of the market environment. And these activities could and should be organised in collaboration with the Government and farmers' associations.

3.7. Evaluation Market Environment Analysis

It should be mentioned that most of the market environment data was gathered by interviews and literature. As the conditions – particularly the political circumstances – in Nepal are rapidly changing, literature and studies done just some years ago might not be adequate for the present situation. In addition, there were sometimes contradictory statements found in the interviews especially about chemical fertiliser use, subsidies and policy. On the one hand it thus would have been helpful to go to the Ministry, but on the other hand if all the interviewed people do not know about the present policy, this policy seems to be implemented very badly. Altogether, one should be very careful with the findings of the market environment analysis but nevertheless the conclusions and recommendations above can surely be helpful and would not be harmful in any case

4 Market Assessment

Table 7 shows the segmenting of the present market according to chapter 4.1 in the compost marketing handbook. This segmenting took place before the market assessment was conducted. But it was adjusted afterwards and can thus be considered as a summary of the present market segments, whereas Table 8 represents potential customer groups.

Table 7: Segmenting of the present market. DADO means District Agriculture Development Office, whereas CRC stands for Community Recycling Centres

Segment	Description and location	Volume	Frequency of demand	Number of customers in this segment	Comments (e.g. location, income, reliability, payment terms etc.)
Households	Throughout Kathmandu and Lalitpur as well as in nearby villages	low / medium	Steady (considering the whole market segment) / irregular considering a single household)	A lot of households / 2 Schools / 6 households doing vegetable farming on small scale	Use of compost: Flower pots, gardening; present customers of KMC / NEPCEMAC; KMC has also some households doing vegetable farming on small scale and they have schools as customers which use compost for flower pots
Nurseries / Seed companies	Throughout Kathmandu and Lalitpur	low to high	Steady (considering the whole market segment) / irregular (considering a single nursery)	3	Use of compost: selling, growing plants; present customers of NEPCEMAC
Companies Using Compost for Selling Purpose (agro-vets, CRC)	Lagan / Mahaboudha / Kalimati (Agro-Vet)	high (agro-vet low)	regular (agro-vet: irregular)	3	Use of compost: selling; present customers of KMC (the one in Mahaboudha is customer of NEPCEMAC as well)
DADO	Thankot / Kathmandu	low	irregular / regular	2	Use of compost: research; present customers of KMC
Municipality	Lalitpur Submetropolitan City	high	irregular	1	Reforestation; present customer of NEPCEMAC

The DADOs (District Agriculture Development Office) only use compost for research. Even though they were questioned during the customer survey, they are not treated as an own market segment in the further marketing study due to the small amounts they buy. The municipality of Lalitpur (Patan) ordered only once a very high amount of compost (around 4 tons) for a reforestation programme. However, they do not intend to purchase compost again.

Table 8: Market segments of the potential market.

Segment	Description and location	Volume	Frequency of demand	Number of customers in this segment	Comments (e.g. location, income, reliability, payment terms etc.)
Households	Throughout Kathmandu and Lalitpur as well as in nearby villages	low / medium	Steady (considering the whole market segment) / irregular considering a single household)	152155 (total no. of HH in Kathmandu)	See table 8
Nurseries / Seed companies	Throughout Kathmandu and Lalitpur	low to high	Steady (considering the whole market segment) / irregular (considering a single nursery)	200	Nurseries could also act as retailers.
Companies Using Compost for Selling Purpose (agro-vets, CRC)	Most of the agro-vets are located in Kalimati	low to high	?	?	Agro-vets could also act as retailers and they have a direct link to farmers.
Hotels	Throughout Kathmandu	medium	Steady (considering the whole market segment) / irregular (considering a single hotel)	80	Very similar characteristics and requirements as households and nurseries
Farmers	Urban and rural areas of Kathmandu Valley	high	Seasonal but regular	?	Use of compost: vegetable and crop farming; Problem: are unaware of municipal compost and are probably not able to pay much for compost products

The customer survey gave a better picture of the customer segments. The results of the analysis are summarised and put together in the market segment profiles presented in the next few chapters after chapter 4.1 *Market Demand*. This section is put in front as the estimations of the market demand are needed to fill in the market segment profiles properly.

4.1. Market Demand

Present Demand: all customers who buy compost considered.
Potential Demand: everyone in a market segment considered.
All calculations can be retraced in Annex A.

4.1.3. Households

[32] UDASH 2004 supposes that 29% of all households use and 10% of all households (152'155 households in total) purchase compost. That leads his calculations to a present demand of 44 t/a and a potential demand of 18'086 t/a
In contrast, [33] KMC, PEMON AND CEN 2005 start from the assumption that 82% use compost with an application rate of 12 to 24 kg per household per year and 67% of all households buy compost. They only calculated the present demand which varies from 1003 t/a to 2994 t/a.

The potential demand was calculated on the one hand with the data of the customer survey (100 to 500 kg/HH/a) and on the other hand with the average land holding (85 to 123 m^2) and average number of plants per household (50 to 75) as well as application rates from the survey (0.01 to 30 kg compost per flower) and [31] CKV-JICA STUDY TEAM 2004 (12 t/ha for vegetables).
The present demand was estimated then by using the percentage figures of [32] UDASH 2004 and [33] KMC, PEMON AND CEN 2005.

Finally, all findings were compared and the figures which did not seem to be plausible were stroke off. The other values were used to calculate the mean and standard deviation. But as the standard deviation was as large as the mean, the present and potential demands were estimated very roughly in a way as reasonable as possible.

4.1.4. Nurseries / Seed Companies

[32] UDASH 2004 equated present demand with potential demand. He used 200 as a total number of nurseries, but he did not explain how he found the result of 407.6 t/a.

The first own calculation was conducted with the data of the customer survey (100 to 500 kg/nursery/a) and the second calculation of the present demand made use of application rates of the customer survey (50 g/flower) and [32] UDASH 2004 (3.28 kg/m^2) and [34] ROTHENBERGER S. AND ZURBRÜGG C 2006 (1 kg/m^2). Furthermore, an average land area of 857 to 3'141 m^2/nursery and an average number of plants (1000 plants/nursery) was assumed.
The potential demand was then elicited by assuming that 10% to 50% of the present chemical fertiliser application can be replaced by compost [31].

At last, the same procedure as above for the demand of the households was repeated: comparing all figures, striking off the unrealistic ones and estimating reasonably. The problem with this result is the fact that the self-production of compost is only roughly considered.

4.1.5. Companies Using Compost for Selling Purpose (agro-vets, CRC)

[32] UDASH 2004 found that a nursery sells around 636 kg/a. The customer survey also revealed an annual sales volume of 500 to 1000 kg. As total number of all companies selling compost 250 (rough estimation of all CRCs [Community Recycling Centres], agro-vets and nurseries) was used.
The present and potential demands were supposed to be the same since in the near future no changes are expected.

4.1.6. Hotels

No studies have been carried out so far on the compost demand of hotels. The survey revealed that hotels need 500 to 1000 kg of compost per year. The total number of hotels (80) was estimated with the help of a tourist map. This procedure is plausible as on a tourist map only larger hotels are depicted.
Just as the demand of companies using compost for selling purpose, the present demand was equated with the potential demand.

4.1.7. Farmers

[32] UDASH 2004 estimated the present demand in Kathmandu Valley to 913'190 t/a and the potential demand to 1'585'950 t/a (Kathmandu itself: 576'090 t/a).

Three own calculations were undertaken. Firstly, the information of [37] (1250 kg/HH/a) and the number of households from [36] (arable land owners: 53'280 in Kathmandu and 111'357 in Kathmandu Valley) were used to calculate the present demand. However, this estimation does not consider any self-production.
The second calculation attempted to estimate the potential demand. For this purpose, it was according to [31] CKV-JICA STUDY TEAM 2004 assumed that 20% of the fertiliser application can be replaced. The quantity of replacement was calculated by data from [36] CBS (total amount of fertilisers) and [31] CKV-JICA STUDY TEAM 2004. The latter report contains a table that compares the application of compost with the application of different fertilisers. On account of this table it was possible to calculate how many kilograms of compost would replace how many kilograms of which fertiliser.
This estimation of the potential demand does however not consider the actual compost application and the possible replacement of manure.
The third and most sophisticated estimation considered mainly data from [31] CKV-JICA STUDY TEAM 2004. This report provides information about the total application of every fertiliser and how much compost corresponds to how much of which fertiliser (as mentioned above). The actual manure and compost application was calculated by using the figures in kg/ha from [31] CKV-JICA STUDY TEAM 2004 and the land uses in ha from Lalitpur, Bhaktapur and Kathmandu from [36] CBS.
The present demand was then estimated by building the sum of the actual compost application, whereas the potential demand was calculated by assuming that 20% of the application of chemical fertilisers can be replaced and 20%, 40% and 50% of the present manure application can be substituted [31].

Finally, all figures were compared and the mean and the standard deviation were calculated. However, the standard deviation is again far too high.

The table summarises all of the calculations above.

Table 9: Summary of all findings during the calculations of the present and potential demand of all market segments. Ktm stands for Kathmandu and Ktm V for Kathmandu Valley. The market segment of companies using compost for selling purpose is abbreviated by *Selling Purpose*.

	Present Demand			**Potential Demand**		
Market Segment	Reasonable estimation [t/a]	Maximum [t/a]	Minimum [t/a]	Reasonable estimation [t/a]	Maximum [t/a]	Minimum [t/a]
Households	1'200	2'994	44	20'000	76'078	15'216
Nurseries	200	572	20	350	408	182
Selling Purpose	150	250	125	150	250	125
Hotels	80	80	17	80	80	17
Farmers (Ktm)	34'723	66'600	2'847	372'231	576'090	168'373
Farmers (Ktm V)	352'458	913'190	4'987	699'123	1'585'950	216'358
Total (Ktm)	36'353			392'811		
Total (Ktm V)	354'088			719'703		

The total waste production in Kathmandu is around 95’000 tons (260 tons per day multiplied with 365 days). This waste consists of 70% organic compounds, 66’500 tons could thus be composted every year. Assuming an input/output-ratio of 5:1 or 4:1, the total possible compost production in Kathmandu would amount to 13’300 and 16’600 tons per year respectively. Consequently, the calculations above show that compost produced from municipal waste could easily be absorbed if farmers were targeted.

4.2. Households

Customer Group: Households (Present Customers NEPCEMAC)	
No. of people questioned	9
Geographic location	Most of the interviewed customers are either near to NEPCEMAC's office or close to the composting plants. And most of these households utilise the home delivery service, even though most of them own a vehicle.
Attitudes and perceptions	The use of compost is well known although 56% of the surveyed households have been using compost for less than a year. Most households expect compost to improve the soil as well as to be good for plants. For 61% of the households, compost is a recycling of organic waste. Nevertheless, they suppose that people in general consider compost as a dirty waste product except for educated persons who should know about compost and its benefits.
Uses	Compost is used mostly for growing of flowers and vegetables. Only few households have also some fruit trees. In order to get the wished soil quality and yield, households generally mix the compost with soil or spread it on the top of the soil during planting.
Quantity	About 37% use only 1 to 50 kg of organic matter per year, whereas 25% need 100 to 500 kg and another 25% 500 to 1000 kg. The statements of the organic matter application are more or less in line with the need of compost so that one can suppose that only few competing products are used.
Quality	The surveyed persons would like to have high nutrient content. All except for one person find the compost quality of NEPCEMAC good or are at least satisfied and have never had problems caused by this compost. The only unsatisfied household complains about a low moisture content, weeds growing in the compost and insects that have been found in the compost.
Ability to pay	The average price at which households are purchasing compost is around 7 NRs./kg. These customers claim to pay this price easily.
Willingness to pay	As this customer segment wants to buy compost in order to get better growth and better yield of plants and do not produce compost by their own as well as are easily able to pay the present price, the willingness to pay can be presumed.
Purchasing behaviour	70% of the questioned households buy their compost still from NEPCEMAC. And 50% would suggest packaging compost in bags of 5 kg. Half of the customers see no variation in their demand, whereas the other 50% declare a varying demand.
Competing products used	Besides normal compost from NEPCEMAC, this market segment uses also pina, vermi compost and bone mill products. No chemical fertilisers or only a very small amount is used by these customers.
Estimated potential	The present demand is estimated at 1'200 t/a The potential demand is estimated at 20'000 t/a

Comment and Conclusion The present customers of NEPCEMAC know well about compost and its benefits. This segment is also able and willing to pay the present price. Furthermore, the households are satisfied with the quality. Even though some customers claim to have a varying demand, this market segment can probable be expected to need a small but steady supply of compost year-round.
This customer segment seems to provide reliable sales volumes. The whole present demand of households is estimated at 1'200 t/a which is not met by NEPCEMAC and the other composting plants in Kathmandu at all. NEPCEMAC should extend their home delivery to more households located near to the office or the composting plants.

Customer Group: Households (Present Customers KMC)	
No. of people questioned	5
Geographic location	The households buying KMC's compost are located all around Kathmandu Metropolitan Area and even in some villages outside of Kathmandu (e.g. Kirtipur).
Attitudes and perceptions	The questioned households want compost to make the soil fertile and to improve flower growth. 60% of them have been using compost for 1 to 2 years. Compost is a recycling of organic waste for most of them and they expect other people to think in the same way.
Uses	Most customers use compost in order to plant vegetables and flowers and to improve soil quality as well as yield and growth of plants. Only very few fruit trees are grown. Few customers have also a larger demand as they do vegetable farming on a small scale.
Quantity	60% of the interviewed persons apply between 100 and 500 kg of organic matter per year and about the same percentage also needs 100 to 500 kg compost so that can be supposed that only few other competing products are used.
Quality	The largest part of the households wishes high nutrient value and one person wants compost to kill pests. All except for one person find the compost quality of KMC good or are at least satisfied and have never had problems caused by this compost. The only unsatisfied household is the same household that also complains about NEPCEMAC's compost. This customer buys normal compost from NEPCEMAC and vermi compost from KMC and he complains about a low moisture content, weeds growing in the compost and insects that have been found in the compost
Ability to pay	The questioned persons are able to pay the price of around 15 NRs./kg easily.
Willingness to pay	Since the customers are easily able to pay the present price and are satisfied with the quality, they are also willing to pay for KMC's compost.
Purchasing behaviour	Most of the customers of this segment buy compost still from KMC and do not see any variation of their demand during the year.
Competing products used	This market segment only use very few competing products such as chicken manure and bone mill products. Chemical fertilisers are not used or used only in very few amounts.
Estimated potential	The present demand is estimated at 1'200 t/a The potential demand is estimated at 20'000 t/a

Comment and Conclusion Just as the market segment of present household customers of NEPCEMAC, this segment seems to provide reliable sales volume for KMC as well. In spite of that and as already mentioned above, even the present demand shows a lot of potential that remains still untouched. In view of the distribution of the customers throughout the city, it might be very useful to develop a home delivery system or to use other distribution channels such as nurseries or agro-vets.

Customer Group: Households (Potential Customers)	
No. of people questioned	3
Geographic location	This customer group is located throughout Kathmandu and Lalitpur.
Attitudes and perceptions	All questioned households use compost to improve soil fertility and plant growth and yield respectively and they have been using compost for about 1 to 2 years. They consider compost as a recycling of organic waste and believe that this is also the general opinion.
Uses	Compost is mostly used for gardening which includes growing of vegetables, flowers and fruit trees. To make the soil fertile and to increase yield, they spread compost on the soil before planting.
Quantity	The annual need of compost is stated as 100 to 500 kg.
Quality	This market segment does not show any specific quality requirements. One person would like if compost killed pests.
Ability to pay	These households buy compost at an average price of 15 NRs./kg and find it to be easily payable.
Willingness to pay	They also confirm to be willing to pay the present price.
Purchasing behaviour	The interviewed customers buy their compost from nurseries and agro-vets rather than producing it by their own. They do not expect their demand to vary.
Competing products used	The most used competing products are cow dung and chicken manure as well as some quantities of chemical fertilisers.
Estimated potential	The present demand is estimated at 1’200 t/a The potential demand is estimated at 20’000 t/a

Comment and Conclusion The potential household customers are naturally very similar to the present household customer and confirm the statements above.
KMC and NEPCEMAC are able to satisfy their present household customers. On account of that, there should not be great difficulties in winning new customers in this segment since households - present customers or not - behave in comparable ways and have similar wants and needs. It might be sufficient just to invest more in promotion.

4.3. Nurseries / Seed Companies

This group of customers use compost not only for themselves but also for selling purpose by selling compost products to their own customers. It is thus also comparable with the next customer segment *Companies Using Compost for Selling Purpose (agro-vets, CRC).* Moreover, the figures of the market demand distinguish between demand for selling purpose and demand for the nurseries themselves.

Customer Group: Nurseries / Seed Companies (Potential Customers)	
No. of people questioned	13
Geographic location	Nurseries can be found throughout Kathmandu and Lalitpur.
Attitudes and perceptions	All questioned nurseries use compost and most of them have been using it for more than 5 years. The purpose of use is mainly to provide nutrients to the plants and to improve soil quality and fertility as well as plant growth and yield. Yet, it is also used as a substitute of chemical fertilisers. For most of the interviewed persons, compost is a recycling of organic waste, but they are not in line with each other about what people think about compost in general. The opinions range from a *recycling of organic waste* to *a dirty waste product* and that compost is the same thing as cow dung.
Uses	Compost is used to sell to their customers as well as for growing flowers, trees and fruits. Nurseries usually mix compost with soil and make use of compost products mainly in order to improve plant growth and yield and to get healthy plants without chemicals.
Quantity	Most customers apply more than 1000 kg of organic matter per year. However, the need for compost is very low (mostly 1 to 50 kg per year). This is on the one hand due to a high self-production and on the other on account of applications of other organic matter than compost. Furthermore, only one nursery experiences sometimes compost scarcity. The sales volume of compost is probably in the range of 100 to 500 kg per year.
Quality	No specific quality requirements could be elicited. One person would like to have quality standards.
Ability to pay	33% of the interviewed nurseries claim not to afford as much compost as they would need. Also 33% find the present price (average 13.9 NRs/kg) not easy to pay but affordable and one nursery means that this price is even unaffordable. However, nurseries tend to sell the compost at around 20 NRs/kg.
Willingness to pay	Around 20% of the questioned persons are not willing to pay the present price and would like to have lower prices.
Purchasing behaviour	Most of the nurseries produce their own compost and only very few buy it from fertiliser shops or agricultural industries. Nurseries seeing a variation of their demand are as numerous as nurseries claiming to have a constant demand. For selling purpose, nurseries suggest packaging the compost in 5 kg bags.
Competing products used	The strongest competitor in this market segment is the production of compost by the nurseries themselves. Nevertheless, there are a lot of other competing products used in nurseries, such as pina, Urea, DAP, cow dung and bone mill products. All nurseries also apply chemical fertilisers (42% apply 1 to 50 kg per year, 25% 50 to 100 kg and another 25% 100 to 500 kg)
Estimated potential	Estimation of the present demand: 200 t/a Estimation of the potential demand: 350 t/a Demand for selling purpose: 150 t/a

Comment and Conclusion One seed company which is a present customer of NEPCEMAC was also questioned. This interview has also contributed to fill in the market segment profile above. That company uses compost for top dressing, weeding and at the moment also for research. The total organic matter application of this company is 50 to 100 kg, but once they will have finished their studies, the compost need will amount to 500 to 1000 kg per year. The questioned person has made important suggestions to improve the compost quality. He recommends lowering the moisture content and doubling the NPK values. This company is willing to pay the present price of 5 NRs./kg, however they mean that crop farmers with a bulk demand are not able to pay this price.

Although nurseries need and use compost, the demand is quite low. This is largely owing to the high self-production of compost. The requirements are similar to the ones of the households since they want compost to improve soil fertility and plant growth. It is very likely to satisfy nurseries with the same kind of products as for the household segment. Given the low demand, this fact meets NEPCEMAC and KMC respectively halfway since not much effort should be spent in order to target them.
However, this does not mean to leave nurseries aside. Nurseries are an important market segment, but they can be targeted in the same way as households are treated. This fact renders nurseries even a very interesting segment.
Nevertheless, the statements about the price and the fact that some nurseries cannot afford the compost price should not be so easily dismissed. This ought to be considered in the pricing.

4.4. Companies Using Compost for Selling Purpose (agro-vets, CRC)

Customer Group: Companies Using Compost for Selling Purpose (agro-vets, CRC) (Present Customers KMC)	
No. of people questioned	3
Geographic location	These customers are located in the urban area of Kathmandu. However, they are not too far away from KMC's composting plant.
Attitudes and perceptions	For most of the questioned persons compost is a recycling of organic waste and they think that the public opinion is in line with theirs.
Uses	These companies only sell compost products and do not use it for themselves. But their customers purchase compost mainly in order to grow flowers and vegetables.
Quantity	The answers about the sales volume range from 1 to 50 kg per month to 500 to 1000 kg per month, but all companies agree that there is no potential to increase the sale. This is mainly due to no new customers in this market. These companies buy monthly 1 to 50 kg compost from KMC.
Quality	From their point of view, the quality could be better, but the vermi compost shows very good quality. One company means that the prices of KMC are too high and that the quality is not that effective.
Ability to pay	Two of three interviewed companies find the present prices of 14 NRs/kg (average) for normal compost and 22.5 NRs./kg (average) for vermi compost affordable but not easy to pay. These companies sell normal compost at 18 NRs./kg (average) and vermi compost for 27.5 NRs./kg (average).
Willingness to pay	Two of the three questioned persons are not willing to pay the present price.
Purchasing behaviour	One questioned customer does not buy compost from KMC anymore on account of unsatisfying quality. The others purchase still from KMC, nevertheless, they buy also from other companies. One company faces a compost shortage once in a while and says that KMC cannot meet their demand. Anyway, the opinion of these companies is to buy from those composters that offer the lowest price. The demand of these customers is higher in the planting season and they suggest packaging the compost in bags of 1 or 10 kg.
Competing products used	They sell a lot of competing products such as chemical fertilisers. But from their point of view, the strongest competitors for KMC are nurseries.
Estimated potential	Estimated present / potential demand: 150 t/a

Comment and Conclusion This market segment has not a big potential and present demand. However, they have the whole potential demand of farmers in the background, so targeting them is very important. Since the present composting products are too expensive, the demand of farmers is not fully reflected in the estimated 150 t/a. However, by adjusting the products and prices, the demand of farmers could appear in the demand of agro-vets in the future.

Furthermore, these companies cannot only act as a convenient distribution channel, but they also can provide composters with good advices and recommendations about quality and prices since they have

direct contact to customers, especially farmers. That is the reason why a compost producer should take the fact serious that two of three companies find the prices to be too high.

Customer Group: Companies Using Compost for Selling Purpose (agro-vets, CRC) (Potential Customers)	
No. of people questioned	5
Geographic location	These interviewed companies are located in Kalimati (near the vegetable market which provides the raw material for KMC's composting plant)
Attitudes and perceptions	This customer group considers compost as a recycling of organic waste and believes that people in general think in the same way.
Uses	The customers of these companies want compost to increase soil productivity and fertility. Furthermore, they buy compost to overcome environmental and health problems caused by chemical fertilisers.
Quantity	The questioned persons find it difficult to estimate the monthly sales volume. Therefore, the answers range from 500 to 1000 kg per month to more than 1000 kg per year. They also consider it difficult to predict whether the sales volume could be extended or not.
Quality	No specific quality is required by this market segment.
Ability to pay	They buy vermi compost at an average price of 15 NRs/kg and all except for one company are easily able to pay this price. Only one company considers the present price to be not easy to pay but affordable. And these companies sell compost for an average price of 21 NRs./kg.
Willingness to pay	All questioned persons are willing to pay the present price.
Purchasing behaviour	One company produces its own compost, but the others buy mostly from India along with chemical fertilisers. To sell the compost they recommend packaging the compost in bags of 5 or 10 kg. According to the questioned companies, the demand varies and one company faces sometimes compost shortage.
Competing products used	Just as the present customer, this customer group sells competing products such as chemical fertilisers.
Estimated potential	Estimated present / potential demand: 150 t/a

Comment and Conclusion Similar to the present customers, this customer group is a very important segment as it has good relations with farmers. Furthermore, the questioned companies which are located in Kalimati could be delivered by KMC easily since KMC collects the waste from the Kalimati vegetable market.

It is alarming that quite a lot of the interviewed companies import compost from India and this compost is not even cheaper. This makes no sense from an economical as well as an environmental point of view and one should thus take action against that.

4.5. Hotels

Customer Group: Hotels (Potential Customers)	
No. of people questioned	3
Geographic location	Hotels can be found in the whole urban area of Kathmandu and Lalitpur.
Attitudes and perceptions	All of the interviewed hotels use compost and have been using it for over 5 years. They expect it to render the soil fertile, to provide nutrients to plants and to protect plants from pests. The questioned persons consider compost as a recycling of organic waste as well as a fertiliser like manure, whereas they believe that the public looks at compost as a dirty waste product or a recycling of organic waste.
Uses	All of these hotels grow plants, flowers and some fruit. Prior to application of the compost during planting, they mix it with soil.
Quantity	The application of organic matter amounts to more than 1000 kg per year. But as they apply also other organic matter than compost and chemical fertilisers, the need of compost ranges between 500 and 1000 kg per year.
Quality	Besides wishing a good quality and high nutrient content, no further specific quality requirements have been taxed.
Ability to pay	The present average price of 16.7 NRs./kg can easily be paid by this market segment.
Willingness to pay	As they need compost and are easily able to pay the price for it, the hotels are willing to purchase compost at its present price.
Purchasing behaviour	These potential customers buy mainly from nurseries and one uses sometimes compost from KMC.
Competing products used	Most of the questioned hotels apply less than 1 kg of chemical fertilisers per year.
Estimated potential	Estimated present / potential demand: 80 t/a

Comment and Conclusion This market segment is well aware of compost and its use. Just as the nurseries, it has similar requirements of compost as the household market segment. Therefore, not much additional effort has to be spent to target this segment. Furthermore, selling compost to this segment could be even easier than to nurseries, as hotels generally do not produce their own compost and can easily afford a quite high price. Despite of a rather low present demand, this segment should not remain untouched.

4.6. Farmers

No survey of farmers was carried out, however, data was gathered by interviews of an employee of DADO (District Agriculture Development Office) and of farmers during a training programme organised by SIMI/Winrock International. Further information was collected by interviews conducted during the market environment analysis and by reviewing literature.

Customer Group: Farmers	
Geographic location	Farmers are located in urban as well as in rural areas.
Attitudes and perceptions	The use of compost is well known, nevertheless, some farmers face problems due to a lack of compost management [40]. Compost is considered as an essential resource for soils since it provides nutrients [40]. In spite of that, farmers sometimes regard compost only as a substitute of chemical fertilisers and do not take a combined application into consideration [39]. This is probably due to Green Revolution, in the scope of which, farmers lost much knowledge how to produce their own proper fertilisers or soil amenders respectively [38]
Uses	Farmers will apply compost prior to planting [40] and they need it mainly on account of the nutrient content.
Quantity	Theoretically, there is a very high demand for compost, but as they produce much compost by their own, the need for additional compost is rather low. In spite of that, some urban areas face the problem of not having enough organic matter [38].
Quality	The most important point for most farmers is a high nutrient value [40]. In order to use compost produced of municipal waste for organic farming, it has to be further processed since the raw material contains a lot of chemical and inorganic compounds. On account of this and in order not to confuse customers or organic farmers, the compost should thus not be called “organic”. A certification would be advisable [38].
Ability to pay	Farmers are likely to afford a price of 3 - 5 NRs/kg [37] [39] [40]. High production costs and low prices of vegetables have led to monetary problems for many farmers [38]. Therefore, the price should be as low as for composters possible [40].
Willingness to pay	If compost could supply all essential nutrients and increase production due to a healthier, amended soil, farmers would buy compost rather than chemical fertilisers [32] [39]
Purchasing behaviour	The demand is varying during the year, as farmers apply compost before planting and thus not year-round. Most of the farmers produce their own compost or can buy compost from their neighbours at very low prices [39].
Competing products used	In the market segment of farmers, chemical fertilisers are the strongest competitors [40]. But also the high self-production and the use of farmyard manure (chicken and cattle waste) are largely competing municipal compost [39].
Estimated potential	Estimation of present demand in Kathmandu: 34’723 t/a Estimation of present demand in Kathmandu Valley: 352’458 t/a Estimation of potential demand in Kathmandu: 372’231 t/a Estimation of potential demand in Kathmandu Valley: 739’525 t/a

Comment and Conclusion Farmers have far the largest demand of compost and thus should be targeted in the long-term. However, producing compost that is suitable for farmers involves great difficulties as the price has to be low and farmers will only be willing to pay for compost produced of

municipal waste, if it is of very good quality. A further problem is the fact that the segment of farmers has remained untouched up to now and it is likely to take a lot of effort to raise the awareness. Moreover, satisfying organic farmers could be very difficult owing to their sophisticated quality requirements. Because of all these reasons, farmers should not be targeted in the short-term, but in the long-run, one should not lose sight of this market segment.
Additionally, DADO organises still some programmes in collaboration with KMC once in a while. This fact could be capitalised on in order to promote municipal compost.

4.7. Conclusions of the Market Assessment

In the short-term, NEPCEMAC and KMC should focus on households and nurseries. Both organisations have experiences in targeting these two market segments and not even the present demand has been met so far. The sale of compost can still be expanded in these customer groups, especially since the potential demand of the households seems to be very high. However, no trend appears in outlines in both customer segments since not many new households and nurseries buying compost can be expected [32]. Nevertheless, by promoting compost actively and organising awareness and training programmes, the big potential demand of households could be stimulated.

Agro-vets and CRCs (Community Recycling Centres) have to be targeted immediately. As KMC receives the raw material from Kalimati Vegetable Market and as most agro-vets are just located in Kalimati, KMC could supply them with compost and take the vegetable waste from the market on the way back. Furthermore, it could pay to target agro-vets in order to target farmers in the long-term, as agro-vets sell compost to farmers in small amounts so as to make farmers aware of these compost products.
Moreover, it does not make sense from an economical and ecological point of view to import compost from India.
The supply of this market segment should be planned carefully since its demand has certain seasonality as opposed to households and nurseries. This seasonality is partly caused by farmers in the background.

The segment of hotels should be targeted as well since it behaves in a similar way as nurseries and households. This makes it easy to sell compost to this segment.

So far, KMC’s and NEPCEMAC’s composting plants have not been designed to produce compost for farmers since they produce too few compost and KMC’s vermi compost is too expensive to buy in bulk. Nevertheless, farmers have to be targeted in the long-term in order to extend the production in the future and in order to build an efficient solid waste management system that also treats organic waste, because farmers are just the largest customer segment. However, KMC and NEPCEMAC have to adjust not only production and products, but first of all the prices. The ability and willingness to pay for all segments can be presupposed except for farmers as they could have problems in being able to pay.
Furthermore, it could be very difficult to target farmers as awareness and training programmes have to be organised and they tend to be risk averse. The production of compost has to be planned carefully too because the demand of farmers varies seasonally.
As the farmers have not been customers up to now and will not be before long, this segment was not further divided into large-scale cash crop farmers, smallholders or other types of farmers.

4.8. Evaluation Market Assessment

First of all it must be admitted that the design of the questionnaires could have been carried out much better. Some information was collected redundantly. However, the main difficulty was the underlying time restrictions of this study. That led to the problem that the questionnaires had not been pilot tested. Certain questions were obviously misunderstood. It is not clear whether the reason of misunderstanding lies in the question itself, in the translation or maybe if the volunteers conducting the interviews had already some problems. Additionally, the sample was chosen randomly and the question remains if it is representative or not. Anyway, the survey and the analysis of the survey were also done with a certain spontaneity and flexibility.
Another problem that is faced by this study is the fact that sometimes only one or very few persons were interviewed and for the farmers' segment not even a survey was conducted.
As for the calculations of the market demand, there are, as mentioned above, too many uncertainties.

5 Product, Positioning and Location (KMC)

5.1. Production Process

Even though the production process has already been introduced in chapter 1.3, it is again summarised here as part of the product analysis by using information from [41], [43], [44] and [45] as well as from [49].

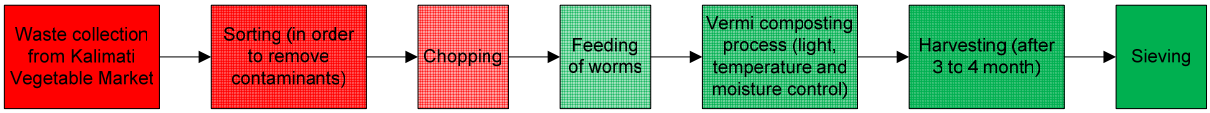

Figure 3: Flowchart of the present production process

The raw material consists of 97% organic waste as it is waste of the Kalimati vegetable market. The waste is either brought by trucks of the market or KMC sends an own rickshaw collecting the waste. Latter procedure is more effective, but also more time consuming since one worker collects in one hour only 150 kg of waste.
As the feedstock is quite rich in N, saw dust is added with a ratio of 10:1. The composting process is regularly monitored so as to ensure that temperature does not increase too much and moisture of the compost is around 50%.

Figure 4: KMC's Vermi Composting Plant at Teku Transfer Station

A layer of coconut husks is used as bedding material in the vermi composting tanks (see Figure 5) in order to facilitate drainage and movement of the worms. The composting tanks themselves also maintain drainage flow as they are sloped 3° to 5°. After manual harvesting of the worms, the compost is stored for about two weeks in order to allow cocoons to hatch. Finally the worms are separated from the compost again by placing the compost with worms on one side and new bedding and food material on the other side so that worms begin to migrate. The input/output ratio is about 4.8:1.

Figure 5: Vermi composting tank

Figure 6: Honey comb box

The only possible breakdown the composters of KMC can think of are financial problems.
Normal compost is produced in a chamber house (see Figure 7), barrels and honey comb boxes (see Figure 6). These different procedures are used for research reasons. The first of total three turnings of the compost in the honey comb boxes takes place after 15 days. Effective microorganisms, cow dung, surface soil or old compost are used as activators. The input/output ratio is 5.2:1 for unscreened compost and 7.8:1 for screened compost. Moreover, the nutrient content is lower than that of vermi compost.

Figure 7: Chamber house at Teku Transfer Station

Table 10: Overview of the capacity of different composting facilities of KMC

Composting facility	Capacity [t/mth]
Chamber house	6.0
Honey comb boxes	2.4
Compost barrels	0.4
1 Vermi tank	1.0
For maturation	2 vermi tanks used

Figure 8 shows the compost production of KMC for the time period from September 2005 to July 2006. The average production per day was 16.5 kg. Unfortunately, this data was collected during the pilot project while the plant was not run at full capacity. That is the reason why conclusions have to be drawn carefully. Nevertheless, it can be assumed that the production depends heavily on the fluctuating input of waste. As the raw material is brought irregularly, a stable output cannot be expected. However, only one present customer faces compost shortage once in a while.

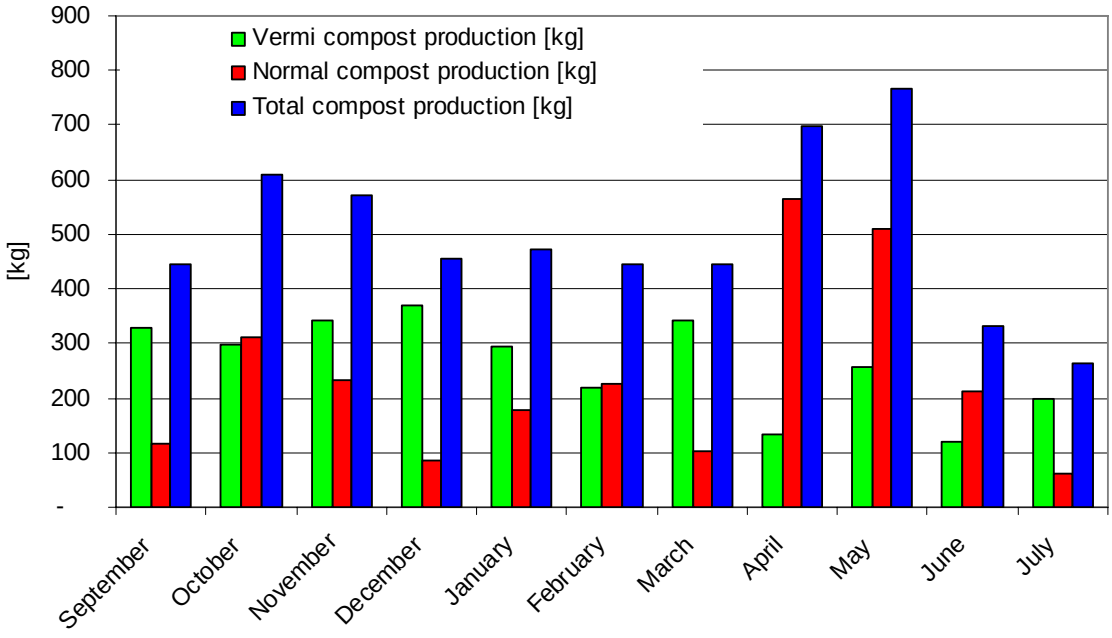

Figure 8: Compost production from September 2005 to July 2006 according to [44]

Problems faced during the composting process according to [43] [44] and [45]:

- Limited manpower and health problems of workers such as headaches caused by smell and dust, common cold, reduced smelling power, Typhoid, Paratyphoid and chest pain.
- Barriers to the rest of Teku Transfer Station are needed as sometimes problems with scavengers, animals or airborne litter arise.
- One of the largest problems is the inadequate drainage for leachate and rain. The compost can be damaged by the run-off from the entire paved area within Teku Transfer Station during heavy rainfall. Additionally, the composting site is not sheltered enough so that it is sometimes flooded during Monsoon. Furthermore, sorting and preparation of the raw material is difficult

during a hot and sunny day or during rain as there is no shelter for workers. Paved trails in order to transport waste and compost during rainy days would also be helpful.

- The roof for the vermi composting tanks is inappropriate as the tanks are exposed to direct sunlight in the afternoons.
- Waste input is not regular.

5.2. Product and Packaging

The product description of KMC is as follows: *Vermi compost is a mixture of worm castings, decomposed bedding material and organic waste as well as worms. It is 100% organic, safe, non-toxic and odour-free. Vermi compost is convenient to produce a high-quality product while keeping the production costs low. It is best to use for vegetables and flowers.*

The compost is packed in 1 and 5 kg bags while packaging in 50 kg bags is planned. The compost bag provides information about content and application rate as well as shows the brand name.
The size of the bags are well chosen as some of the questioned households suggest packaging in 5 kg bags whereas companies using compost for selling purpose recommend that compost should be packed in 1, 5 or 10 kg bags.

5.3. Quality

Moisture and temperature is monitored during the composting process. While temperature is measured, the moisture content is only controlled by touching the compost. The compost quality is monitored by field and laboratory tests. The field tests are conducted by NARC (Nepal Agriculture Research Council), DADO and by KMC on own test plots. Some compost was also given to farmers who returned good responses. DADO and NARC were given compost samples to carry out laboratory analyses. Especially NARC is for governmental institutions not expensive.
Table 11 shows the results of a quality analysis of the vermi compost produced by KMC. Quality variations were found in the beginning of the pilot project, but as no further analyses have been conducted, one does not know whether the quality is stable or not today. It is alarming that the heavy metal content and the presence of pathogens have never been analysed. Due to this fact, KMC should not claim to have a 100% organic and non-toxic product. Even though the raw material is only vegetable market waste, heavy metals can be expected since they are contained in insecticides or pesticides. Composters have a responsibility to provide compost which can be used in the long-term without damaging the environment, or posing a health risk to human beings [46].

Table 11: Analysis of the quality of vermi compost as well as compost produced in honey comb boxes.

Comment	pH	N%	P (P_2O_5) %	K (K_2O) %	OM %	Moisture %	C:N
Initial period (vermi compost)	8.00	0.62	0.84	3.48	17.05	58.70	15.80
Recent (vermi compost)	8.10	2.02	0.93	4.13	27.30	60.50	8.50
Honey comb box experiment	8.20	1.10	0.68	0.87	19.32	56.90	10.21

It is hardly possible to compare the available data with international standards as many parameters are missing. Nevertheless, by comparing the above quality analysis with the standards of Switzerland, India and Great Britain (provided in [46]) the following statements can be made:

- pH-values comply with the standards of Switzerland and Great Britain, but not with that of India
- The total N-content corresponds to the standards of Switzerland, Great Britain and India whereas the figures for phosphorus comply with the Swiss as well as more or less with the Indian standards. However, the K-values are much higher than those in the standards of India and Great Britain.
- Furthermore, the moisture content is higher than the considered compost quality standards whereas the organic matter content is lower.
- The very low C:N-Ratio hits the eye. It is much lower than the Swiss, British and Indian standards and [47] suggests a C:N-Ratio ranging from 25:1 to 40:1 to obtain an efficient composting process. According to [47] this compost seems to be deficient in carbon so that it would be advisable to add wood chips, saw dust or dry leaves.

However the results of the pilot project phase differ from other vermi compost analyses [44]. This is probably due to a very low number of worms in the initial phase or because waste was left outside for several days so that nutrients were lost by leachate.

Table 12: Quality requirements of different market segments according to the customer survey

Market segment	**Quality requirements**
Households (potential and present customers)	• HH would like to have high nutrient values for increased yield and growth for plants, especially flowers, fruit trees and vegetables • One HH wants compost to kill pests • Problems faced by one HH: too low moisture content, weed seeds and insects found in the compost
Nurseries	• HH would like to have high nutrient values for increased yield and growth for plants, especially flowers, fruit trees and vegetables • Additionally, they want to have healthy plants without chemicals • One questioned person would prefer to have standards
Companies using compost for selling purpose	• These companies would like to have as good quality as possible. • Problems faced: compost is often too expensive and sometimes KMC's compost was not that effective.
Hotels	• Hotels want to have fertile soil for plants, flowers and fruits
Farmers	• According to [42] farmers are willing to use municipal compost and are willing to pay for it, if the quality is good. • However compost produced out of municipal waste should be further processed for organic farmers as the raw material contains a lot of chemical and inorganic compounds [50].

5.4. Storage

There are two rooms located on the area of Teku Transfer Station. These rooms are adequate sheltered and should protect the matured compost from weeds. Furthermore, the storage capacity has been sufficient so far [49].

5.5. Place and Distribution

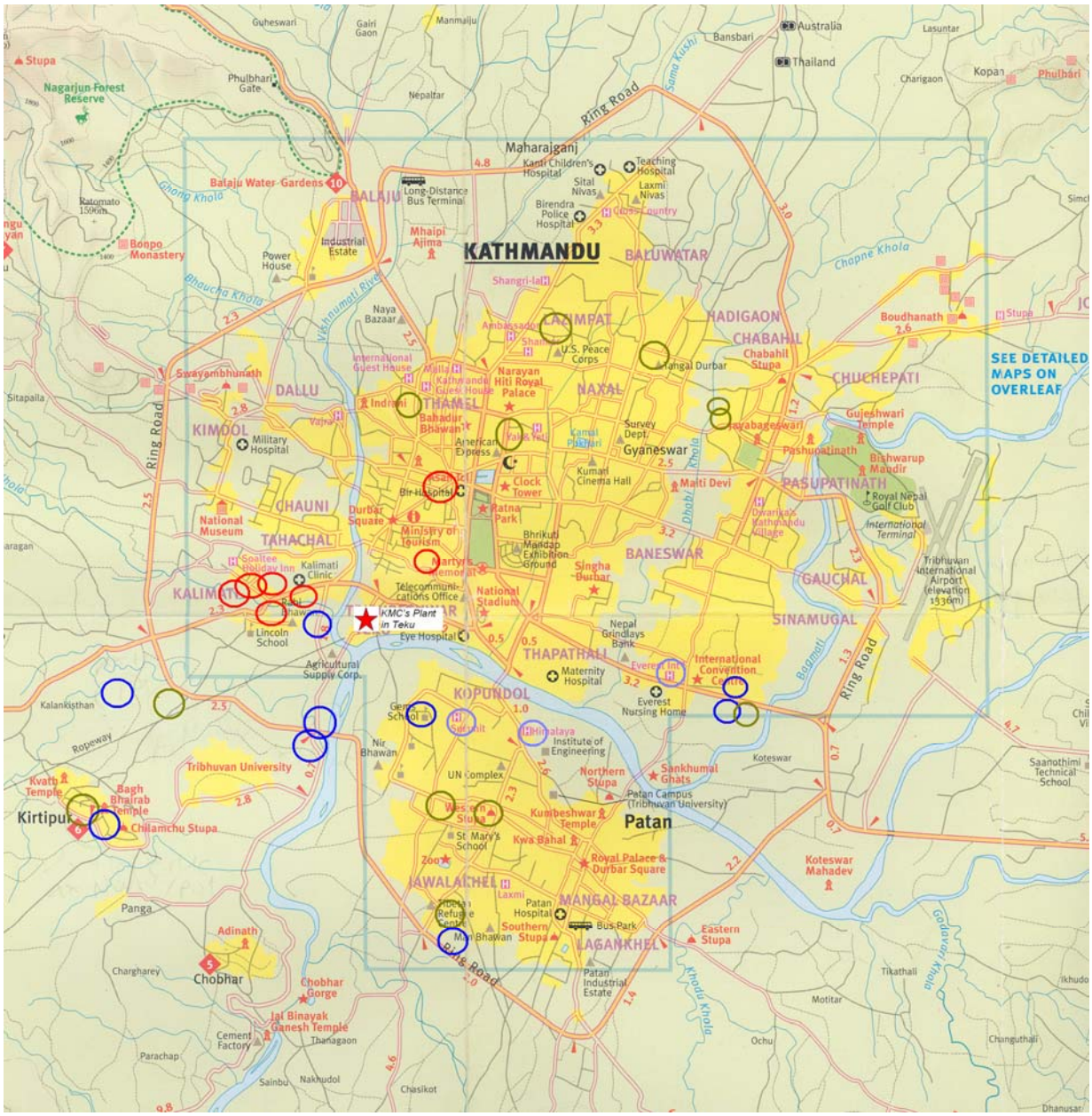

Figure 9: Market map for KMC. The composting plant is marked with a red star, whereas the questioned customers during the customer survey are depicted by rings:
Blue = Households (present and potential customers)
Green = Nurseries / Seed companies (present and potential customers)
Red = Companies using compost for selling purpose (present and potential customers)
Light blue = Hotels (potential customers)

The site for KMC's compost plant was finally selected along the eastern wall of Teku Transfer Station, because it is easily accessible and located next to the area where waste is being dumped [43].
Except for the CRCs (Community Recycling Centres) which act as the only retailers, KMC does not deliver its customers. Even though some of them have problems to find Teku Transfer Station, this is besides the CRCs the only sales point for KMC's compost.

According to [41] it was intended to build a “marketing division” which would have bought all compost products and then sold to agro-vets and nurseries. This plan was not put into practice. Nevertheless, agro-vets and nurseries can still be considered as possible retailers in the future. According to the distribution analysis of [41], nurseries and agro-vets would be excellent distribution channels as they are already established channels for fertiliser sales and have good knowledge about compost and customer requirements.
Retailers would also be accepted by the consumers as according to the customer survey 75% of the present household customers would buy from a middleman. Additionally, 100% of the hotels and 75% of the companies using compost for selling purpose would also buy from a middleman. Only all of the potential household customers and 91% of the nurseries claimed that they would not buy from a middleman.

5.6. Recommendations for Product and Quality Design

The most important thing is to start regular monitoring safety levels of heavy metals and pathogens and try to meet these levels. This is not only important in order to take the responsibility of the produced compost, but also to not lose the reputation of compost made of municipal waste. Furthermore, if KMC attempts to comply with international standards, this could be put forward while promoting the compost. In addition to this, organic farmers would know if this compost could be applied by them. However, a reliable control institution such as NARC is needed.
A further problem is the fluctuation in the waste input even though the Kalimati vegetable market produces a constant waste output. KMC should think of signing a contract with Kalimati vegetable market or establish an own collection service. Moreover, a lot of problems during the production process are already known. It is needless to say that these problems should be tackled.
In order to target farmers, the production should be cheaper. Therefore, it might be advisable to extend the production of normal compost.

5.7. Recommendations for Distribution Channels

As already mentioned in chapter 4.4 and above, agro-vets should be targeted. As most of them are located in Kalimati, delivery of compost by KMC could be very easily established because trucks from Kalimati bring the raw material and go nowadays empty back. By coupling the raw material supply from Kalimati with the compost supply of the agro-vets KMC’s delivery system might be extended. Agro-vets have a close relation to farmers and are thus an important channel to promote compost among them.
Furthermore, NEPCEMAC seems to be very successful by supplying households with compost in the same time as they collect waste. A similar system could also have great returns for KMC.

6 Product, Positioning and Location (NEPCEMAC)

6.1. Production Process

Just as mentioned in chapter 5.1 the composting production process of NEPCEMAC is here described again.

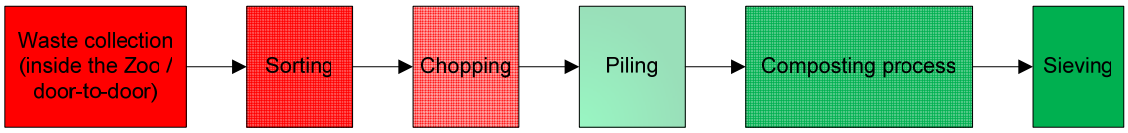

Figure 10: Flowchart of the production process of NEPCEMAC

The raw material for the Zoo plant is collected inside the Zoo area by NEPCEMAC. The feedstock consists mainly of gardening and canteen waste as well as of animal excrements and is thus organic. The collected waste that is not used for composting is brought to Teku Transfer Station.
Contrary to that, the Handigau plant receives the waste from house-to-house collection around the plant. NEPCEMAC collects waste from 14'000 households of which 7'700 are located in Handigau and 6'300 near to the main office in Ekantakuna. However, only six rickshaws per day supply the composting plant with raw material. As the raw material consists of mixed waste from households, it has to be sorted prior to piling. The recyclables are sold by the waste collectors.

Figure 11: NEPCEMAC's composting plant in the Zoo of Patan

The plant in the Zoo is run without aeration, but after three months the piles are turned and then matured for another three months.
In contrast, the compost piles in Handigau are not turned due to complaints about the smell. However, these piles are aerated by vertical pipes (see Figure 12. In order to maintain moisture, ash is spread every 15 cm.
The composters do not see any possible breakdown of the composting process.

Figure 12: NEPCEMAC's composting plant in Handigau

Considering Figure 13, one can draw the conclusion that the production is constant, whereas the sales volume is clearly varying. However, it turned out that some wrong assumptions were made in terms of the production volume. Instead of three tons per month, it is more probable that the plants produce together 11 tons per month (four tons in the Zoo and around seven tons in Handigau). While the Zoo plant does not have problems to sell its compost, in Handigau there are around two to three tons per month which have to be stored. Anyway, compared to the plant of KMC, these two plants receive a stable supply of raw material.

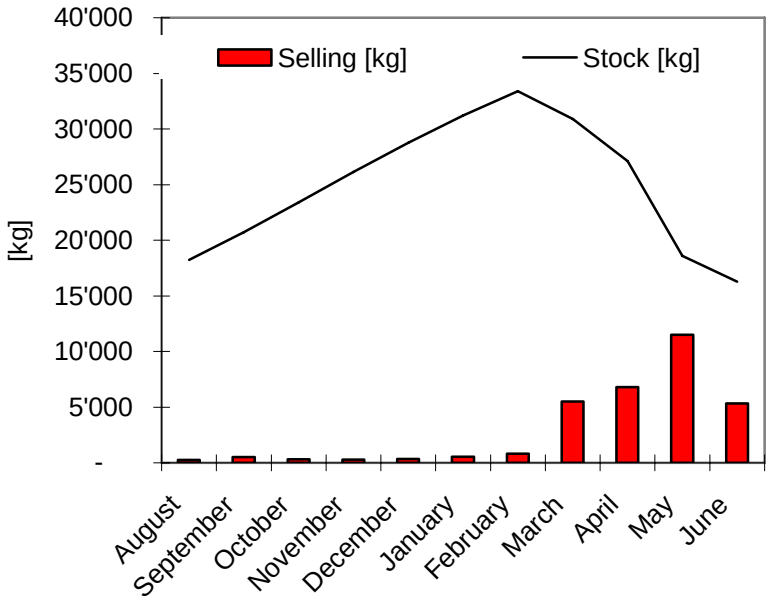

Figure 13: Illustration of the compost sale and total stock of NEPCEMAC according to [48]. However, the stock is calculated with the assumption of a total production of 3 tons per month, what is surely not possible.

6.2. Product and Packaging

According to NEPCEMAC, its compost is best used for vegetable farming and floriculture as well as for gardening.

NEPCEMAC packages its compost in 1 and 5 kg bags. These sacks are unprinted and sometimes old bags are reused. However they have the intention to print the plastic bags in the near future.
According to the customer survey, present households prefer to have 5 kg bags, whereas companies using compost for selling purpose suggest packaging compost in bags of 1 and 10 kg or 5 and 10 kg.

6.3. Quality

No regular monitoring of the compost quality is conducted. Once in a while, a sample of compost is sent to ATC (Agricultural Technology Centre) or NARC (Nepal Agricultural Research Council) in order to obtain an analysis of the nutrient content. But just as KMC, NEPCEMAC does not know about the presence of pathogens or heavy metals. Therefore, NEPCEMAC can also not be sure if its compost is safe and does not damage the soil and environment.

Table 13: Quality analyses of NEPCEMAC's compost

Zoo plant

Comment	pH	N%	P (P_2O_5) %	K (K_2O) %	OM %	Moisture %	C:N
mixed compost	7.00	1.28	0.82	3.52	22.16	42.32	10.00
leaf compost	7.20	1.02	0.65	2.65	27.10	51.58	15.00
		1.18	4.25	4.05			
		0.63	2.12	3.91			
mixed compost	5.25	0.77	0.28	31.20	9.05	6.97	
leaf compost	6.75	0.95	0.23	32.00	11.63	19.05	

Handigau

Comment	pH	N%	P (P_2O_5) %	K (K_2O) %	OM %	Moisture %	C:N
	7.60	1.54	0.27	3.00	12.41	75.10	
	7.60	1.54	0.28	2.30	16.55	1.57	

Table 13 shows the results of quality analyses for compost produced in Handigau and in the Zoo. It is again hard to compare these findings with the Swiss, British and Indian standards as quite a lot of parameters have not been measured so far. Moreover, the laboratory results seem to be very odd. For instance, the moisture content is extremely varying and so do other parameters such as N, P_2O_5 and K_2O. Even though these figures are irreproducible, the following conclusions were tried to make:

- The pH lies in the range of the standards except for one value (5.25).
- The N-values meet more or less the standards of Switzerland, India and Great Britain. However, the phosphorus content and the potassium content as well as the moisture content cannot be compared to the standards since they are varying too much.
- The C:N-ratio as well as the portion of organic matter seem to be quite low in comparison with the Swiss and British standards.

Table 14: Quality requirements of different market segments according to the customer survey

Market segment	**Quality requirements**
Households (potential and present customers)	• HH would like to have high nutrient values for increased yield and growth for plants, especially flowers, fruit trees and vegetables • Problems faced by one HH: too low moisture content, weed seeds and insects found in the compost
Nurseries	• HH would like to have high nutrient values for increased yield and growth for plants, especially flowers, fruit trees and vegetables • Additionally, they want to have healthy plants without chemicals • One questioned person would prefer to have standards
Companies using compost for selling purpose	• These companies would like to have as good quality as possible. • Problems faced: compost is often too expensive and sometimes the KMC compost was not that effective.
Hotels	• Hotels want to have fertile soil for plants, flowers and fruits
Farmers	• According to [42] farmers are willing to use municipal compost and are willing to pay for it, if the quality is good. • However compost produced out of municipal waste should be further processed for organic farmers as the raw material contains a lot of chemical and inorganic compounds [50].

Customers usually prefer the Zoo compost as it has a higher nutrient value.
An interviewed seed company recommends that the nutrient value, above all NPK, should be doubled, whereas the moisture content ought to be lowered.

6.4. Storage

The compost of the Zoo plant is stored in the main office of NEPCEMAC in Ekantakuna, while the plant in Handigau has an own storage on the composting site. Both storehouses provide enough space for the moment. In addition to this, they are probably enough sheltered and protected from weeds. Nevertheless, as around seven tons of compost are produced per month in Handigau and the monthly sales volume amounts to around four tons, a problem of space is very likely to arise.

6.5. Place and Distribution

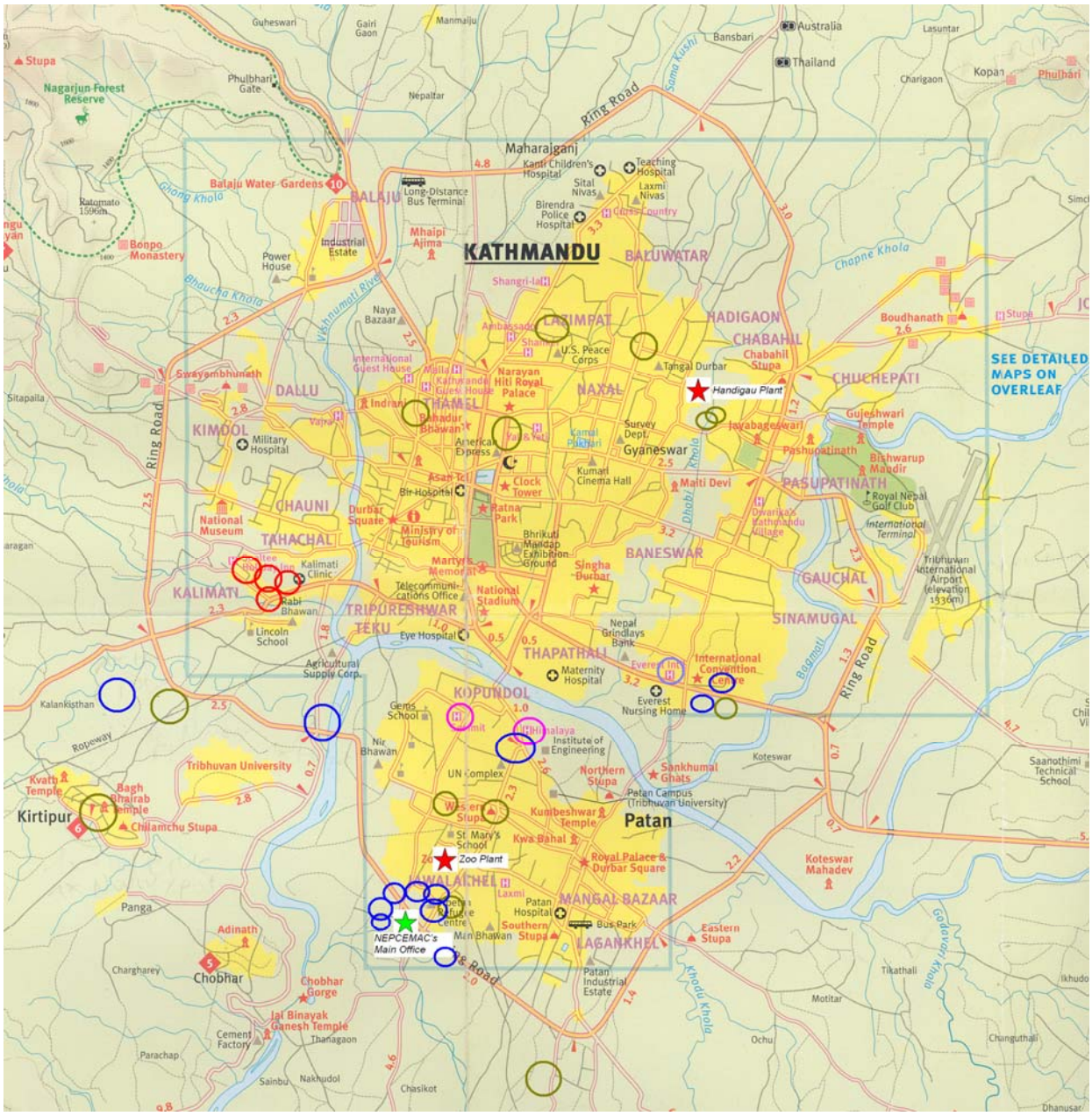

Figure 14: Market map for NEPCEMAC. The composting plants are marked with red stars and the main office with a green star, whereas the questioned customers during the customer survey are depicted by rings:
Blue = Households (present and potential customers)
Green = Nurseries / Seed companies (present and potential customers)
Red = Companies using compost for selling purpose (potential customers)
Light blue = Hotels (potential customers)

NEPCEMAC's compost is mainly sold in three ways: either the customers come to NEPCEMAC's office in Ekantakuna or they go to the plant in Handigau. The waste collectors act as a third distribution channel since they deliver compost to households in the same time as they collect the waste. According to the customer survey, this home delivery seems to be very successful, not at least

also in terms of promotion. Even though a lot of present customers have their own vehicle, they make use of this delivery system.
Nurseries and agro-vets are considered as possible distribution possibilities in the future. But some nurseries buy already today compost in order to sell it afterwards in the nursery shop.
No clear conclusion about acceptance of retailers by customers can be drawn. 62% of the present and 100% of the potential household customers as well as 91% of the interviewed nurseries would not buy from a middleman, whereas 75% of the companies using compost for selling purpose and 100% of the questioned hotels would buy from a retailer.

NEPCEMAC does not intend to found new composting plants in Kathmandu. However, there is another office of NEPCEMAC in the Terai, where a new plant has been built recently in Itahari and another plant is planned in Biratnagar.

6.6. Recommendations for Product and Quality Design

The main point to improve in the production process is the aeration. In order to aerate adequately during box composting, there should be perforated walls, perforated bottom grids and vent-pipes allowing air circulation through the waste [47]. If the aeration is not appropriate, it is probable that the composting piles produce ammonia or methane which is a very strong greenhouse gas and in addition to that, the composting process takes much time.
Furthermore, NEPCEMAC should improve the monitoring of its compost and measure temperature and moisture as KMC does. However, just as KMC, NEPCEMAC ought to begin regular monitoring of safety levels of heavy metals and pathogens too. The statements about that point made in chapter 5.3 apply also to NEPCEMAC (to measure pathogens and heavy metals is not only important in order to take the responsibility of the produced compost, but also to not lose the reputation of compost made of municipal waste. Furthermore, if NEPCEMAC attempts to comply with international standards, this could be put forward while promoting the compost. In addition to this, organic farmers would know if this compost could be applied by them. However, a reliable control institution such as NARC is needed).
Another thing to improve is the raw material in Handigau. It could pay great returns on quality if source segregation could be implemented. The increased quality of this compost could also lead to a higher demand for the compost from Handigau so that storage problems could be avoided.

6.7. Recommendations for Distribution Channels

The present delivery system of NEPCEMAC is very successful. Since there is no high acceptance of middlemen among the customer segments and as it is not as obvious as it is for KMC to target agro-vets, no recommendations for the near future can be made. However, targeting agro-vets could be important in the long-run as they have direct contact to farmers.

7 Pricing (KMC)

7.1. Present State of Affairs

Table 15 shows the present prices of the compost produced by KMC, while
Table 16 and Table 17 present prices which are suggested in [51].
Except for CRCs which sometimes can have credits, the usual term of payment is cash [54] [56].
All revenue from the sale of compost is directly sent to the Revenue Department [54] [56].

Table 15: Present prices of KMC's compost

NRs./kg	Compost	Vermi Compost
Packed	10	15
Bulk	6	10

Table 16: Prices suggested by [51] for different distribution channels.

NRs./kg	Vermi Compost
Distributors	10
Retailers	12
Consumers	15

Table 17: Prices suggested by [51] for different bag sizes sold directly to consumers.

NRs./kg	Vermi Compost
1 kg bag	15
5 kg bag	13.5
30 kg bag	12.5

7.2. Calculation of the Production Costs

The calculations of the production costs are depicted in appendix 14C.1. For these computations, a monthly basis is used. That means that all costs are converted to costs per month. The information about cost of labour was gathered in the survey of composting plant [54] [56], whereas the cost of material and maintenance was found in [53] MAHARAJAN 2006. Packaging is done by compost makers and thus included in the cost of labour. Costs for transportation is considered in the cost of material and maintenance as KMC owns a rickshaw and a SAFA-Tempo which is run by battery and used to deliver the CRCs. Cow dung was bought only once, but today, compost makers collect directly cow dung from the meadows so that expenses on that are included in the monthly earnings of compost makers. In the computations, it was assumed that the total initial investments are depreciated linearly over 30 years what is usual for real estates. The annual depreciation was then divided by 12 months.
A hidden rent was not considered as Teku Transfer Station cannot be used in another way and could hardly be rented.
In order to refer the monthly costs to a certain amount of compost, the expenditure was divided by the mean of production according to [53] MAHARAJAN 2006.
These calculations lead to production costs of 41 NRs./kg! According to the customer survey, no one would be willing to pay this price as it is far too high. However, some hidden costs are saved because all the waste treated at the vermi composting plant has not to be landfilled. According to [53]

MAHARAJAN 2006, the average of waste input was 6.5 t/mth in the period from September 2005 to June 2006. Considered these savings, the production costs would amount to 8 NRs./kg which is very close to the findings of 7.5 NRs./kg in [51] KMC, PEMON AND CEN 2005. [52] UDASH 2004 computed for a plant producing 1.5 t/d the production cost at 2 NRs./kg. Even though these calculations are quite sophisticated, no depreciation of the composting plant and composting area was considered. Furthermore, KMC produces less than 1.5 t/d what can lead to higher costs per kilogram, particularly at the moment as the plant is only run on a pilot project level.

7.3. Present Prices and Ability to Pay

Table 18: Overview of the average price and the range of the present prices paid by the market segments as well as the degree of ability to pay according to the customer survey

Market segment	Average present price [NRs./kg]	Range of present prices [NRs./kg]	Degree of ability to pay
Households [present customers]	14.75	10 – 20	Easily payable
Households [potential customers]	15.3	15 – 16	Easily payable
Nurseries (using compost for themselves) [potential customers]	13.9	3 – 25	Only 67% are able to afford as much compost as they need. 51% easily payable 33% not easily payable, but affordable 8% not affordable
Nurseries (using compost for selling) [potential customers]	Self-production		
Companies using compost for selling purpose [present customers]	14 (normal compost) 22.5 (vermi compost)		33% very easily payable 67% not easily payable, but affordable
Companies using compost for selling purpose [potential customers]	15.4	10 - 18	75% easily payable 25% not easily payable, but affordable
Hotels [potential customers]	16.7	15 - 20	100% very easily payable

According to the information gathered at a training programme for farmers organised by SIMI/Winrock, farmers produce a lot of compost by themselves and buy from neighbours at a price ranging from 0.6 to 0.8 NRs./kg. An estimation of [58] Ms. Srijana Shakya and Ms. Shriju Pradhan Tuladhar as well as of [59] Mr. Achute Prasad, 3 NRs./kg should be affordable for farmers; nevertheless, compost producers should set the price as low as possible.

7.4. Willingness to Pay

Table 19: Overview of the willingness to pay according to the customer survey.

Market segment	Price range willed to pay [NRs./kg]	Percentage of questioned persons agreeing with this range	Comment
Households [present customers]	10 - 15	91%	
Households [potential customers]	< 10 10 - 15	67% 33%	
Nurseries (using compost for themselves) [potential customers]	< 10 10 – 15	46% 45%	20% are not willing to pay the present prices
Companies using compost for selling purpose [present customers]	10 – 15 < 10	67% 33%	67% are not willing to pay the present price. They sell compost at an average price of 18 NRs/kg for normal compost and an average price of 27.5 NRs./kg for vermi compost
Companies using compost for selling purpose [potential customers]	10 – 15	100%	They sell compost in a range from 12 NRs/kg for normal compost to 30 NRs./kg for vermi compost
Hotels [potential customers]	10 – 15 < 10	67% 33%	

According to [57], farmers are willing to pay 4 to 5 NRs./kg if the compost has a good quality. [52] UDASH 2004 found in his study that farmers would pay 500 NRs./t (0.5 NRs./kg). However, in order to produce their own compost they are purchasing raw material at 600 NRs./t (cattle waste) or 1200 NRs./t (chicken waste). As these prices refer to raw material whose volume will be reduced during composting, the costs to produce their own compost are higher than the price they are willing to pay for municipal compost. Consequently, effective promotion is needed in order to turn this ability to pay around 3 to 4 NRs./kg into willingness to pay.

7.5. Possible Price

In order to cover the production costs, the prices have to be set at least at 8 NRs./kg. As most customer segments are more or less easily able to pay around 15 NRs./kg for compost and as they are willing to pay a price between 10 to 15 NRs./kg, the present prices can be maintained. In this way, KMC can not only cover its cost, but also make profit. However, the suggestions of [51] KMC, PEMON AND CEN 2005 to charge different prices for different bag sizes could be interesting in terms of sales promotion.
The only but important exception to the statements above is the farmers' customer segment. Farmers are not able and not willing to pay more than 3 to 5 NRs./kg. In order to set the prices so low, the production costs should be decreased. However, the largest entries are costs of manpower and depreciation. As the production of normal compost is less labour intensive, it might pay off to increase the produced amount of normal compost in the long-term when farmers will be targeted. Other ways to save costs are selling compost in bulk or to set high prices for households and nurseries so as to cross-subsidise the low prices for farmers.

7.6. Terms of Payment

The customer survey revealed that most of the questioned persons prefer cash payment. 19% of the potential customers of the nurseries segment would prefer short-term credits and 8% advance payment. The short-term credits are probably wished due to the fact that some nurseries claim to have financial bottle necks during summer and periods with little sunshine. Furthermore, 75% of potential consumers in the market segment of companies using compost for selling purpose would prefer advance payment whereas 33% of the present customers of this segment favour long-term credits and 17% short-term credits.
As KMC and NEPCEMAC should focus on households and nurseries in the short-term, the current practice of cash payment and short-term credits can be maintained. However, attempting to target agro-vets, KMC should consider enabling advance payment and long-term credits.

8 Pricing (NEPCEMAC)

8.1. Present State of Affairs

Table 20 gives an overview of the present pricing policy of NEPCEMAC. However, the advertising price was given as a discount during a very short period of time. If households make use of the home delivery by waste collectors, they have to pay 2 NRs. extra. The waste collectors can keep this money as an extra income.

Table 20: Present prices of NEPCEMAC's compost.

Type of price	**[NRs./kg]**
Normal price	8
Price for delivered compost	10
Advertising Price	1

The most important revenue of NEPCEMAC is the monthly collection fee of 125 NRs. per household. This leads to a total proceeds of 1'750'000 NRs. per month. The present term of payment is cash. However, cheques are accepted from governmental organisations.

8.2. Calculation of the Production Costs

The calculations of NEPCEMAC's production costs can be retraced in appendix 14C.2. The information for these computations was elicited during the surveys of the composting plants [54] [55]. The production costs were calculated first separately for the plants in Handigau and in the Zoo and then, the total production costs of NEPCEMAC were computed.
In order to consider monthly expenditures on equipment and maintenance, one made use of [52] UDASH 2004. The ratio total annual expenditure on equipment and maintenance to total investment in equipment is according to [52] for a plant producing 1.5 t/d around 0.65. Multiplying this 0.65 with the total investment of 10'000 NRs. for equipment, one can obtain monthly costs of 542 NRs. The total costs of packaging were portioned in equal shares for the two composting plants. The costs for Handigau are quite high as ash that involves high transportation costs is needed and the monthly rents for the area as well as the collection costs are expensive. In order to transport the compost from the plant in the Zoo to the main office, means of transport is needed. If there is no own vehicle available, there are also transportation costs to be considered for the plant in the Zoo.
Just as for the calculations of KMC's production costs, the total investment for the composting plants is supposed to be depreciated linearly over 30 years.
The total production costs per kg amount to 4 NRs., whereas the production costs for Handigau are 5 NRs. and 3 NRs. for the Zoo respectively. However, if one considers the saving of costs due to prevented landfilling costs for the plant in Handigau, total production costs sum to 3 NRs./kg and to 4 NRs./kg for Handigau.

8.3. Present Prices and Ability to Pay

Table 21: Overview of the average price and the range of the present prices paid by the market segments as well as the degree of ability to pay according to the customer survey

Market segment	Average present price [NRs./kg]	Range of present prices [NRs./kg]	Degree of ability to pay
Households [present customers]	6.9	5 – 10	25% very easily payable 75% easily payable
Households [potential customers]	15.3	15 – 16	Easily payable
Nurseries (using compost for themselves) [potential customers]	13.9	3 – 25	Only 67% are able to afford as much compost as they need. 51% easily payable 33% not easily payable, but affordable 8% not affordable
Nurseries (using compost for selling) [potential customers]	Self-production		
Companies using compost for selling purpose [potential customers]	15.4	10 - 18	75% easily payable 25% not easily payable, but affordable
Hotels [potential customers]	16.7	15 - 20	100% very easily payable

According to the information gathered at a training programme for farmers organised by SIMI/Winrock, farmers produce a lot of compost by themselves and buy from neighbours at a price ranging from 0.6 to 0.8 NRs./kg. An estimation of [58] Ms. Srijana Shakya and Ms. Shriju Pradhan Tuladhar as well as of [59] Mr. Achute Prasad, 3 NRs./kg should be affordable for farmers; nevertheless, compost producers should set the price as low as possible.

8.4. Willingness to Pay

Table 22: Overview of the willingness to pay according to the customer survey

Market segment	Price range willed to pay [NRs./kg]	Percentage of questioned persons agreeing with this range	Comment
Households [present customers]	10 – 15 < 10	62% 38%	
Households [potential customers]	< 10 10 - 15	67% 33%	
Nurseries (using compost for themselves) [potential customers]	< 10 10 – 15	46% 45%	20% are not willing to pay the present prices
Companies using compost for selling purpose [potential customers]	10 – 15	100%	They sell compost in a range from 12 NRs/kg for normal compost to 30 NRs./kg for vermi compost
Hotels [potential customers]	10 – 15 < 10	67% 33%	

According to [57], farmers are willing to pay 4 to 5 NRs./kg if the compost has a good quality. [52] UDASH 2004 found in his study that farmers would pay 500 NRs./t (0.5 NRs./kg). However, in order to produce their own compost they are purchasing raw material at 600 NRs./t (cattle waste) or 1200 NRs./t (chicken waste). As these prices refer to raw material whose volume will be reduced during composting, the costs to produce their own compost are higher than the price they are willing to pay for municipal compost. Consequently, effective promotion is needed in order to turn this ability to pay around 3 to 4 NRs./kg into willingness to pay.

8.5. Possible Price

The price has to be set higher than 3 to 4 NRs./kg so as to cover the production costs. As the customer survey revealed a willingness to pay a price of 10 to 15 NRs./kg, NEPCEMAC could obtain a profit margin between 190 to 330%, if they increase the price. An increase of the prices would be possible as most of the potential customers pay nowadays higher prices than the ones of NEPCEMAC. Additionally, NEPCEMAC has a large income from the collection fee. These two reasons help to make profit with the composting business if NEPCEMAC would sell compost to farmers at prices of 3 to 4 NRs., which would barely cover the production costs. But similar to KMC, NEPCEMAC could cross-subsidise the low prices for farmers by selling compost at higher prices to households and nurseries and by decreasing some production costs by selling in bulk.
NEPCEMAC could also consider demanding a higher price for the compost from the Zoo as this compost is favoured by the present customers.

8.6. Terms of Payment

The customer survey revealed that most of the questioned persons prefer cash payment. 19% of the potential customers of the nurseries segment would prefer short-term credits and 8% advance payment. The short-term credits are probably wished due to the fact that some nurseries claim to have financial bottle necks during summer and periods with little sunshine. Furthermore, 75% of potential consumers in the market segment of companies using compost for selling purpose would prefer advance payment.
As KMC and NEPCEMAC should focus on households and nurseries in the short-term, the current practice of cash payment can be maintained. However, attempting to target agro-vets, NEPCEMAC should consider enabling advance payment and long-term credits.

9 Promotion (KMC)

9.1. Past and Present Promotional Efforts

KMC has placed its advertisements on TV, Metro F.M. and in a monthly bulletin. Despite going to all 35 wards and to every department, this bulletin is only for governmental institutions. The TV spots take around 10 minutes and during that time, KMC promotes also composting bins. Furthermore, KMC organises training and awareness campaigns on request by interested people, as it is from KMC's point of view not sustainable to organise such programmes without being requested. These programmes focus on reducing waste and on suggesting composting on household level. They can thus been seen as a technical support. According to [68] it is not expensive to organise these campaigns.
Moreover, KMC has already done some sales promotion as compost in bulk is cheaper. However, no customer has ever bought in bulk.
In addition to all these promotional activities, KMC has also very often a stall at an exhibition. But if these exhibitions are not organised by KMC, they are very expensive (around 5000 NRs./d).

A formerly conducted marketing strategy [61] suggested the following;

- To invest in raising awareness
- To give customers more information
- To build top of mind awareness of brand among the target audience while simultaneously building the brand's image
- To encourage product trial among target audience while simultaneously encouraging product stocking among retailers

According to [61] KMC, PEMON AND CEN 2005, these goals should be reached by

- In store advertising, such as point-of-purchase display, because 75% of purchase decisions are made in store
- Leaflets
- Advertisements in print, radio and television
- Trade promotion: push strategy to induce intermediaries to carry, promote and sell the product. This should be done mainly by giving price discounts.
- Consumer promotion: pull strategy to induce consumers to try and purchase the product. That should be tried to be done by giving price discounts, by booth activity as well as by distribution of leaflets

9.2. Customer Survey

Table 23: Overview of the findings of the customer survey concerning promotional activities. N.u.a. means no useful answer.

Market Segment	Newspapers / magazines read	TV channel watched / radio broadcast listened to	Remembered past promotional efforts	Getting aware of KMC's compost by
Households [present customers]	• Kantipur	n.u.a.	None	• Friends • TV
Households [potential customers]	n.u.a.	• NTV • Kantipur FM	• "Hamro Kathmandu" (NTV) • "We are the world" (Kantipur FM)	-
Nurseries [potential customers]	• Kantipur • Further: Annapurna Post, Himalayan Times, Gorkhapetra and Samacharpetra	• Kantipur FM	-	• Friends • Composters contacted directly
Companies using compost for selling purpose [present customers]	• Kantipur • Annapurna Post	• NTV	• "Hamro Kathmandu" (NTV) • Compost bin promotion (only the CRC which is a joint venture of KMC and a local youth hostel is able to remember)	• Friends • (one CRC is a joint venture of KMC and a local youth club)
Companies using compost for selling purpose [potential customers]	n.u.a.	n.u.a.	-	-
Hotels	n.u.a.	n.u.a.	-	-

[63] PEMON 2006 found that most customers know about KMC's compost from the advertisement of Metro F.M. However this can not be consolidated by the new customer survey as that suggests that the most important communication channel is word to mouth and maybe the TV-Spot "Hamro Kathmandu" on NTV.

Samir Newa [69] from organic village has the opinion that for farmers, demonstration plots are the most effective promotional activities. Additionally, it could be helpful to make more research on plant growth after the application of the compost.

The brand names of KMC are Healthygro (vermi compost) and Kathmandu compost (normal compost). Most of the present customers either do not know about KMC's brand name or think that the brand names are fine.

During the customer survey it was also searched for brands or competing products which are more popular among the customers than KMC's brand. The customer survey revealed that most of the customers do not know any competitors. Very few responded that nurseries are very well known in the urban area and chemical fertilisers in the rural areas.

9.3. Possible Promotional Activities in the Future

The brainstorming with the responsible persons has revealed that no further ideas to promote compost exist. At the moment KMC has a lot of problems with scavengers as well as with the production process so that promotion is not considered as the most important point.

After analysing the promotional activities and customer requirements as well as already during the brainstorming [68], following suggestions can be and were made:

- The office in Teku is very unattractive (see Figure 15) and sometimes hard to find. It would be very advisable to make the area nicer by separating the plant from the Teku Transfer Station by walls and by making a demonstration plot or a little nursery. This demonstration plot would not only render the site more attractive, but also is a very efficient way of promoting since customers can directly see how the compost is applied and how it improves plant growth. And as soon as the plant looks nicer, an open day event could be organised to show people how KMC's compost is produced.

Figure 15: Teku Transfer Station. Just next to the composting plant of KMC, scavengers search the waste for recyclables.

- As already mentioned in the analysis of the market environment, organising awareness, training and demonstration as well as education programmes are the most important activities to overcome the threats of the market environment. KMC has already experience in organising such programmes and should therefore arrange more campaigns as well as show presence at exhibitions.
- Besides these campaigns, it is also important to provide professional advice. As soon as agro-vets are targeted, these companies could also be used as compost experts in order to support farmers. Furthermore, SIMI/Winrock [70] showed its interest in linking farmers with KMC and NEPCEMAC respectively. KMC should capitalise on this opportunity when they target farmers in the long-term.
- According to [68], KMC plans to start a door-to-door collection service with source segregation by collecting on one day only inorganic and on the other day only organic waste. This is intended to be done in collaboration with the private sector. If it is possible to build such a system, KMC could also develop a similar distribution service as NEPCEMAC. The waste collectors could not only sell the compost but also promote it. As the customer survey showed and also according to [61], the most effective way of promotion is word of mouth. Furthermore, this promotion is done for free.
- In order to target households, nurseries and agro-vets as well as hotels, KMC should maintain its present promotional efforts. Besides the TV-spots on NTV, they should also advertise in newspapers. The most read newspaper in Kathmandu seems to be *Kantipur*. However, KMC should think of switch its radio advertisements from Metro F.M. to Kantipur F.M.
- While targeting agro-vets, it might be advisable to advertise in store as suggested by [61] KMC, PEMON AND CEN 2005.
- KMC packages its compost very convenient for customers and the bags are also printed eye-catching and informative. It is very important to make use of the packaging as one should print the bags anyway. Nevertheless, KMC should be careful by claiming that its vermi compost is 100% organic, safe and non-toxic as long as KMC cannot prove it. Not keeping promises can turn in a big damage of reputation. In contrast, if KMC began to monitor pathogens and heavy metals, that could be used for promoting. For instance, if the standards of Switzerland were met, KMC could claim to have compost with Swiss quality.
- For all advertisements it is very important to use the brand name everywhere. Up to now, in the composting business, there is no brand awareness [61]. Furthermore, the customer survey divulged that most customer segments are interested in an increase of soil fertility and plant growth. Additionally, a lot of people in Nepal are concerned about environmentally friendly products. Advertisements should thus focus on these points. In order to target farmers, it is also important to mention additionally that compost also provides erosion control, amends soil, saves money and supports to become self-helping.
- The opening hours of KMC are 10am to 5pm. As these are the normal working hours in Nepal, KMC should think of shift the opening hours in order to make it more convenient for customers to buy compost.
- Sales promotion has been done so far in giving discount for lager quantities. This practice seems to be reasonable and should therefore be maintained. Furthermore, in order to target the potential customers, for instance agro-vets and hotels, KMC could sell compost to them at a very low price. However, KMC has to make clear that this discount is only for a short time.

A problem faced by the organisational setup of KMC is that the responsible persons of the plants only can make suggestions but not decide about promotion. For instance, they would like to improve the attractiveness of the plant area, but they are not allowed to make decisions about it. However, demonstration plots and more improvements of the sites are planned.

In order to create effective advertisements, the following information should be included according to [60]:

- how compost can be used and its benefits;
- nutrient value, organic matter content, and other features;
- pictures (for example, showing its effect on plant growth);
- evidence, such as product test results or certification of quality.
- contact details and information about where and when customers can buy compost.
- furthermore: the language has to be correct and appropriate to the targeted audience.

10 Promotion (NEPCEMAC)

10.1. Past and Present Promotional Efforts

The past promotional efforts contained advertisements in radio, having a stall at an exhibition, distributing pamphlets and word of mouth-promoting by waste collectors. The pamphlets were distributed by the waste collectors to all members of NEPCEMAC (around 14'000 households). Moreover, NEPCEMAC also arranges training and awareness programmes for housewives, students and community leaders. These programmes aim at explaining what waste is and presenting different techniques of composting. According to [67], it is not so expensive to organise such campaigns. Mr. Laxmi Prasad Ghimire means also that promotion is never a financial problem as all their promotional activities are cheap.
NEPCEMAC has also done some sales promotion by selling compost at 1 NRs./kg. This action gave very good responses.

10.2. Customer Survey

Table 24: Overview of the findings of the customer survey concerning promotional activities. N.u.a. means no useful answer.

Market Segment	Newspapers / Magazines read	TV channel watched / radio broadcast listened to	Remembered past promotional efforts	Getting aware of NEPCEMAC's compost by
Households [present customers]	• Kantipur • Annapurna Post	• NTV	• Word of mouth by waste collectors	• Friends • Waste collectors • Exhibition • KMC
Households [potential customers]	n.u.a.	• NTV • Kantipur FM	• "Hamro Kathmandu" (NTV) • "We are the world" (Kantipur FM)	-
Nurseries [potential customers]	• Kantipur • Further: Annapurna Post, Himalayan Times, Gorkhapetra and Samacharpetra	• Kantipur FM	-	• Friends • Composters contacted directly
Companies using compost for selling purpose [potential customers]	n.u.a.	n.u.a.	-	-
Hotels	n.u.a.	n.u.a.	-	-

As already mentioned in chapter 9, the customer survey suggests that the most important communication channel is word to mouth.
Samir Newa [69] from organic village has the opinion that for farmers, demonstration plots are the most effective promotional activities. Additionally, it could be helpful to make more research on plant growth after the application of the compost.

Most of the present customers either do not know about NEPCEMAC's brand name *NEPCEMAC Compost* or think that this name is fine. However, some customers also mean that the brand name is not useful and too difficult to pronounce.

During the customer survey it was also searched for brands or competing products which are more popular among the customers than NEPCEMAC's brand. The customer survey revealed that most of the customers do not know competitors. Very few responded that nurseries are very well known in the urban area and chemical fertilisers in the rural areas.

10.3. Possible Promotional Activities in the Future

Similar to KMC, NEPCEMAC does not consider compost promoting as one of the most important points. The composting activity of NEPCEMAC is just one part of the tasks of NEPCEMAC. They focus mainly on waste collection and building awareness. Besides that, they also recycle paper, do composting and plant trees in Kathmandu. The main reasons for not extending the composting activities are the lack of land and the attitude of people. Nevertheless, NEPCEMAC intends to distribute pamphlets again and they also plan to print their bags. On the packaging, quality, brand name and eye-catching colours should be depicted.

The following suggestions are more or less the same as the ones for KMC, however, some adjustments were made after the analysing of the promotional activities of NEPCEMAC:

- The office in Ekantakuna and the plant in Handigau look very nice (see Figure 16) because there are a lot of plants around the buildings and small nurseries were set up at both sites. These plots demonstrate directly the use of compost and its effectiveness. It could be a good idea to organise an open day event to present NEPCEMAC's compost production.

Figure 16: Nursery at NEPCEMAC's main office in Ekantakuna

- As already mentioned in the analysis of the market environment, organising awareness, training and demonstration as well as education programmes are the most important activities to overcome the threats of the market environment. NEPCEMAC has already experience in organising such programmes and should therefore arrange more campaigns as well as show presence at exhibitions. The latter seems to be a successful way of promotion for NEPCEMAC as some of the questioned customers know NEPCEMAC from an exhibition.
- Besides these campaigns, it is also important to provide professional advice. If NEPCEMAC intends to target agro-vets, these companies could also be used as compost experts in order to support farmers. Furthermore, SIMI/Winrock [70] showed its interest in linking farmers with KMC and NEPCEMAC respectively. NEPCEMAC should – just as KMC – capitalise on this opportunity when they target farmers in the long-term.
- As NEPCEMAC collects waste door-to-door, this allows promoting their compost with direct contact through the waste collectors. According to the customer survey, this is the most effective way of promotion. And additionally, this promotion is done for free. In the same line falls the idea of distributing pamphlets to the households through the waste collectors what also seemed to be successful.
- In order to target households, nurseries and agro-vets as well as hotels, NEPCEMAC should maintain the radio spots. Moreover, it could be worth to advertise in the most read newspaper *Kantipur*. Advertising on NTV might be too expensive for NEPCEMAC, in spite of that, it should be considered.
- It is very important for NEPCEMAC that they intend to print the bags. In this way it is not only important to build awareness about NEPCEMAC's brand, but also to inform customers properly about application and quality. This can make customers more confident about NEPCEMAC's compost. As already mentioned in chapter 6.3 investing in monitoring

pathogens and heavy metals, could also pay for promoting. For instance, if the standards of Great Britain were met, NEPCEMAC could claim to have compost with British quality.

- Since NEPCEMAC produces compost in the Zoo and gives some compost to the Zoo for free, the Zoo uses NEPCEMAC's compost for plants and trees inside the Zoo. This fact should be capitalised on, as NEPCEMAC could advertise in the Zoo, for instance with a poster, by telling the visitors that these plants and trees are grown by applying NEPCEMAC's compost.
- For all advertisements it is very important to use the brand name everywhere. Up to now, there has been no brand awareness in the composting business [61]. Furthermore, the customer survey divulged that most customer segments are interested in an increase of soil fertility and plant growth. Additionally, a lot of people in Nepal are concerned about environmentally friendly products. Advertisements should thus focus on these points. In order to target farmers, it is also important to mention additionally that compost also provides erosion control, amends soil, saves money and supports to become self-helping.
- The opening hours of NEPCEMAC are 7am to 3pm. Opening so early could be very convenient for customers as most Nepalese people start working at 10am. However, NEPCEMAC could also consider to make long lunch breaks and to extend the sale of compost in the evening.
- Within the scope of sales promotion, NEPCEMAC sold compost at 1 NRs./kg during a short time. Since this was quite successful, a similar campaign could be launched in order to target new customer segments such as hotels or agro-vets. However, NEPCEMAC has to make clear that this discount is only for a short time.

In order to create effective advertisements, the following information should be included according to [60]:

- how compost can be used and its benefits;
- nutrient value, organic matter content, and other features;
- pictures (for example, showing its effect on plant growth);
- evidence, such as product test results or certification of quality.
- contact details and information about where and when customers can buy compost.
- furthermore: the language has to be correct and appropriate to the targeted audience.

11 Summary of the Marketing Strategy for KMC

The following table summarises all conclusions of the previous chapters and it shall thus help to obtain an overview of the marketing strategy for KMC.

Conclusion from	Conclusions
Market Environment	• Collaboration with the Government and (organic) agricultural associations • Advertising and promoting compost by pushing forward the following arguments: compost is environmentally friendly, provides erosion control, increases soil fertility, amends soil, saves money, helps to become self-helping and can partly solve solid waste problems. • Demonstration, awareness and training campaigns
Market Assessment	• Targeting households, nurseries, hotels and agro-vets in the short-term • Agro-vets have a direct link to farmers and they can thus provide advices and recommendations to farmers as well as to composters. Furthermore, they are an excellent distribution channel and they can help to make farmers aware of the composting products. • Targeting farmers in the long-term in order to extend the production and to build an efficient solid waste management system. However, as it is not easy to target them, KMC should focus on households and nurseries in the short-term. • More promotion and awareness programmes to win new households and to stimulate the demand • In view of the spread of KMC's customers throughout the city, it might be very useful to develop a home delivery system or to use other distribution channels such as nurseries or agro-vets.
Product	• Monitoring of heavy metals and pathogens • Complying with international standards. This could also be used for promotion. • Solving the known problems • Overcoming the waste input fluctuations
Place	• Coupling the raw material supply with the compost supply to agro-vets

Price	• The present prices cover the costs and should not be changed.
	• In order to target farmers in the long-term, the prices have to be lowered by:
	  • Selling compost in bulk
	  • Cross-subsidising by higher prices for households and nurseries
	  • Extending the production of KMC's normal compost.
	• The farmers' ability to pay a price of 3 to 4 NRs./kg has to be turned into a willingness to pay.

	• As KMC should focus on households and nurseries in the short-term, the current practice of cash payment and short-term credits can be maintained. However, attempting to target agro-vets, KMC should consider enabling advance payment and long-term credits.
Promotion	• Making the plant more attractive (separation from Teku Transfer Station, demonstration plot, little nursery) • Open day event • Demonstration, awareness and training programmes • Exhibitions • Professional advice through agro-vets or SIMI/Winrock • Radio advertisements on Kantipur FM • TV-Spots on NTV • Advertisements in Kantipur (Newspaper) • Changing the opening hours • Discount prices for new customer segments and for larger quantities

12 Summary of the Marketing Strategy for NEPCEMAC

Just as in the previous chapter for KMC, the following table summarises the marketing strategy for NEPCEMAC.

Conclusion from	Conclusions
Market Environment	• Collaboration with the Government and (organic) agricultural associations • Advertising and promoting compost by pushing forward the following arguments: compost is environmentally friendly, provides erosion control, increases soil fertility, amends soil, saves money, helps to become self-helping and can partly solve solid waste problems. • Demonstration, awareness and training campaigns
Market Assessment	• Targeting households, nurseries, hotels and agro-vets in the short-term • Agro-vets have a direct link to farmers and they can thus provide advices and recommendations to farmers as well as to composters. Furthermore, they are an excellent distribution channel and they can help to make farmers aware of the composting products. • Targeting farmers in the long-term in order to extend the production and to build an efficient solid waste management system. However, as it is not easy to target them, NEPCEMAC should focus on households and nurseries in the short-term. • More promotion and awareness programmes to win new households and to stimulate the demand • As NEPCEMAC is very successful with its present delivery system, they should think of extend that service.
Product	• Monitoring of heavy metals and pathogens • Complying with international standards. This could also be used for promotion. • Improving the aeration of the composting piles • Implementing source segregation in Handigau
Place	• No suggestions (except for: maintaining the present successful delivery system)

Price	• The present prices cover the costs and could even be a little higher.
	• In order to target farmers in the long-term, the prices have to be lowered by:
	  • Selling compost in bulk
	  • Cross-subsidising by higher prices for households and nurseries
	  • Cross-subsidising by the monthly collection fee
	• The farmers' ability to pay a price of 3 to 4 NRs./kg has to be turned into a willingness to pay.
	• As NEPCEMAC should focus on households and nurseries in the

	short-term, the current practice of cash payment and short-term credits can be maintained. However, attempting to target agro-vets, NEPCEMAC should consider enabling advance payment and long-term credits.
Promotion	• Open day event • Demonstration, awareness and training programmes • Exhibitions • Professional advice through agro-vets or SIMI/Winrock • Word of mouth through waste collectors • Distribution of pamphlets through waste collectors • Radio advertisements • Advertisements in Kantipur (Newspaper) • Printing the compost bags • Discount prices for new customer segments

13 Acknowledgements

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A. Market Demand

A.1 Households

Table 25: Data collected during the customer survey except for the application rates for "cereals" and "vegetables" which were taken from [31]

	Land [m^2/HH]	No. of plants	Compost Use	Total organic matter application [kg/a/HH]		Need of compost [kg/a/HH]		chemical fertilisers	Flowers [kg/flower]		Cereals [kg/ha]	Vegetables [kg/ha]
Present Customers NEPCEMAC	123	50	Flowers / Vegetables	100	500	100	500	no	0.01	30	2000	12000
Present Customers KMC	85	75	Flowers / Vegetables	100	500	100	500	no	0.01	30	2000	12000
Potential Customers	148		Flowers / Vegetables	100	500	100	500	more or less no	0.01	30	2000	12000
All Customers	119	60	Flowers / Vegetables	100	500	100	500	more or less no	0.01	30	2000	12000

Table 26: Further information used for the calculations

		References
Application rate of compost [kg/HH/a]	10	[33]
	12	[33]
	24	[33]
	20	[32]
Percentage of HH using compost [%]	82	[33]
	29	[32]
Percentage of HH purchasing compost [%]	67	[33]
	10	[32]
Percentage of HH having plantations [%]	57	[32]
Average no. of plants [#/HH]	56.4	[32]
Average land [m^2/HH]	89	[32]
No. of households in Kathmandu	152155	[32]
No. of households having flower pots	76078	[32]
No. of households having a garden	38039	[32]

Table 27: Results of [32] and [33]

References	Present Demand [t/a]	Market Demand [t/a]	Comment
[32]	441	18068	households using compost
	44		households purchasing compost
[33]	1497		households using compost (12 kg/a)
	1003		households purchasing compost (12 kg/a)
	2994		households using compost (24 kg/a)
	2006		households purchasing compost (24 kg/a)

Table 28: First own calculations: (use) means that the total organic matter application was used (left: 100 kg; right: 500 kg) whereas figures with (appl. rate) are calculated by using the application rates from the customer survey (left: 0.01 kg; right 30 kg) and [31].

Own calculations 1	Potential Demand (use) [t/a]		Potential Demand (appl. rate) [t/a]	
Present Customers NEPCEMAC	15216	76078	22534	250691
Present Customers KMC	15216	76078	15634	357869
Potential Customers	15216	76078	27023	27023
All Customers	15216	76078	21819	295607

Table 29: Second calculations: (use) means that the total organic matter application was used (left: 100 kg; right: 500 kg) whereas figures with (appl. rate) are calculated by using the application rates from the customer survey (left: 0.01 kg; right 30 kg) and [31]. In order to estimate the present demand, the percentages of [32] were used

Own calculations 2	Present Demand (use) [t/a]		Present Demand (appl. rate) [t/a]	
Present Customers NEPCEMAC	441	2206	5653	119731
Present Customers KMC	441	2206	3937	175054
Potential Customers	441	2206	6756	6756
All Customers	441	2206	5478	142371

Table 30: Third calculations: (use) means that the total organic matter application was used (left: 100 kg; right: 500 kg). In order to estimate the present demand, the percentages of [33] were used

Own calculations 3	Present Demand (use) [t/a]	
Present Customers NEPCEMAC	8359	41797
Present Customers KMC	8359	41797
Potential Customers	8359	41797
All Customers	8359	41797

Table 31: All findings for the present demand of households

PRESENT DEMAND	Minimum [t/a]	Maximum [t/a]
[32]	44	441
[33]	1003	2994
Customer Survey	441	~~175054~~
Reasonable	441	2994
Mean [t/a]	1220	
Stddev [t/a]	1212	
Estimation	**1200**	

Table 32: All findings for the potential demand of households

POTENTIAL DEMAND	Minimum [t/a]	Maximum [t/a]
Composting as an…	18068	18068
Customer Survey	15216	~~357869~~
Reasonable	15216	76078
Mean [t/a]	31857	
Stddev [t/a]	29511	
Estimation	**20000**	

A.2 Nurseries / Seed Companies

Table 33: Data collected during the customer survey except for the application rates are obtained from [32] (3.28 kg/m^2) and [34] (1 kg/m^2). Furthermore, the total no. of nurseries is also gathered from [32].

	Land [m^2/Nursery]		Plants [No./nursery]	Use	Org matter [kg]	chem. fert. [kg]	need [kg]		Application rate [kg/m^2]		No. of nurseries
Potential Customers	857	3141	1000	flowers/fruits	1000	50	100	500	1	3.28	200

Table 34: Results of [32]

References	Present demand [t/a]	Potential demand [t/a]
[32]	407.6	407.6

Table 35: (use) means that the total organic matter application was used (left: 100 kg; right: 500 kg) whereas figures with (appl. rate) are calculated by using the application rates from [32] (the upper figures) and [34] (lower figures). For the average land holding, figures from the customer survey were used (left: 857 m^2/nursery; right: 3'141 m^2/nursery). Furthermore, it was supposed that a flower needs 50 g compost per year.

Own calculation 1	Present Demand (use) [t/a]		Present Demand (appl. rate) [t/a]	
	20	100	181	638
			572	2070

Table 36: (use) means that the total organic matter application was used (1000 kg) whereas figures with (appl. rate) are calculated by using the application rates from [32] (the upper figures) and [34] (lower figures). For the average land holding, figures from the customer survey were used (left: 857 m^2/nursery; right: 3'141 m^2/nursery). Furthermore, it was supposed that a flower needs 50 g compost per year and that 10% or 50% of the chemical fertiliser application can be substituted.

Own calculation 2	Potential Demand (use) [t/a]	Potential Demand (appl. rate) [t/a]		Comment
	200	182	639	10% chemical fertiliser substituted
		573	2071	
		186	643	50% chemical fertiliser substituted
		577	2075	

Table 37: All findings for the present demand of nurseries

PRESENT DEMAND	Minimum [t/a]	Maximum [t/a]
[32]	407.6	407.6
Customer Survey	20	~~2070~~
Reasonable	20	~~572~~
Mean [t/a]	256	
Stddev [t/a]	228	
Estimation	**200**	

Table 38: All findings for the potential demand of nurseries

POTENTIAL DEMAND	Minimum [t/a]	Maximum [t/a]
[32]	407.6	407.6
Customer Survey	182	~~577~~
Reasonable	182	200
Mean [t/a]	354	
Stddev [t/a]	191	
Estimation	**350**	

A.3 Companies Using Compost for Selling Purpose (agro-vets, CRC)

Table 39: Data collected during the customer survey and gathered from [32]. The no. of agro-vets/nurseries is just an estimation.

	Sales volume [t/a]	
Potential Customers	500	1000
Present Customers	50	100
No. AgroVets / Nurseries	250	
[32]	636 kg/nursery/a	

Table 40: Putting together of the results for the market demand of companies using compost for selling purpose.

PRESENT / POTENTIAL DEMAND	Minimum [t/a]	Maximum [t/a]
[32]	127	127
Customer Survey	125	250
Reasonable	125	250
Mean [t/a]	167	
Stddev [t/a]	72	
Estimation	**150**	

A.4 Hotels

Table 41: Data collected during the customer survey except for the application rates for "cereals" was taken from [31] and the no. of hotels was estimated with the help of a tourist map.

	Land [m^2/HH]	Compost Use	Total organic matter application [kg]	Need of compost [kg]		chemical fertilisers	Cereals [kg/ha]	No. of hotels
Potential Customers	1092	Plants, Flowers	1000	500	1000	more or less: no	2000	80

Table 42: The minimum demand was calculated with the application rate of [31] and the maximum with the need of compost from Table 41.

PRESENT / POTENTIAL DEMAND	Minimum [t/a]	Maximum [t/a]
Customer Survey	17	80
Mean [t/a]	46	
Stddev [t/a]	32	
Estimation	**80**	

A.5 Farmers

Table 43: Information used for the calculations from [34]

Application rate for	[t/ha/a]
Cereals	12
Vegetables	8

Table 44: Information used for the calculations from [37]

Present demand [kg/a/HH]	1250

Table 45: Information used for the calculations from [36]. HH means households.

	Kathmandu	Kathmandu Valley
Total area treated with fertiliser [ha]	22'972	44'580
Quantity of fertilisers used [kg]	9'961'228	4'968'508
Arable Land [ha]	12'765	27'641
No. of HH owning arable land	53'280	111'357
Permanent crops	25	96
No. of HH with permanent crops	917	3'210

Table 46: Further information from [36]. Qty means the total quantity of chemical fertiliser used for the respective crop.

Districts	Paddy		Maize		Potato		Vegetable	
	Area (ha)	Qty (kg)	Area (ha)	Qty (kg)	Area (ha)	Qty (kg)	Area (ha)	Qty (kg)
Lalitpur	2'564.9	737'578	4'164.9	538'209	105.4	37'882	215.5	54'612
Bhaktapur	3'958.1	1'089'411	1'120.0	278'807	319.9	215'399	402.4	240'024
Kathmandu	7'912.0	1'888'413	3'482.2	799'127	825.4	283'894	764.8	221'142
Total		3'715'402		1'616'143		537'175		515'778

Districts	Sugarcane		Wheat		Other Crops	
	Area (ha)	Qty (kg)	Area (ha)	Qty (kg)	Area (ha)	Qty (kg)
Lalitpur	0.0	0	1'848.8	428'837	2'661.2	315'537
Bhaktapur	0.0	0	3'241.2	895'155	1'006.5	161'269
Kathmandu	0.0	0	7'124.8	1'313'139	2'862.3	462'793
Total				2'637'131		939'599

Table 47: Information used for the calculations from [31]. SW-C means compost produced of solid waste, whereas HH means households.

Percentage of HH using SW-C for paddy, potato and vegetables [%]	30
Percentage of HH knowing about SW-C [%]	50
Percentage of HH using SW-C in Kathmandu	50
Cultivated land in Kathmandu [ha]	19205
Cultivated land in Kathmandu Valley [ha]	45607
Vegetable area in Kathmandu [ha]	4575
Vegetable area in Kathmandu Valley [ha]	17585

Table 48: Table from [31] which was use to calculate how much compost corresponds to how much of which fertiliser.

Crops	Compost	Urea	DAP	Potash	kg compost/ kg Urea	kg compost/ kg DAP	kg compost/ kg Potash
Paddy	6000	192	65	50	31	92	120
Wheat	6000	175	109	42	34	55	143
Maize	6000	105	65	50	57	92	120
Oil crops	6000	96	87	33	63	69	182
Potato	30000	110	109	67	273	275	448
Vegetables	30000	110	109	67	273	275	448
Mean					**122**	**143**	**243**
Stddev.					118	103	160
Mean [kg compost / kg "fertiliser"]					**169**		

Table 49: Results of a survey of [31] about chemical fertiliser and manure replacement in Kathmandu and Kathmandu Valley

Manure	50% of HH in Kathmandu believe that 40-50% of the manure application can be replaced by compost
	32.5% of HH in Kathmandu Valley believe that up to 20% of the manure application can be replaced by compost
	37.5% of HH in Kathmandu Valley believe that 40-50% of the manure application can be replaced by compost
Fertilisers	62.5% of HH in Kathmandu believe that up to 20% of the chemical fertiliser application can be replaced by compost
	40% of HH in Kathmandu Valley believe that up to 20% of the chemical fertiliser application can be replaced by compost

Table 50: Results for the potential and present demand of [32]

References	Area	Present Demand [t/a]	Market Demand [t/a]
[32]	Kathmandu Valley	913'190	1'585'950
	Kathmandu		576'090

Table 51: First calculations: the data of Table 44 and Table 45 was used.

Own calculation 1	Present demand [t/a]
Kathmandu Valley	139'196
Kathmandu	66'600

Table 52: Second calculations: the data of Table 46 was used. According to Table 49 it was assumed that 20% of the present application of chemical fertilisers can be replaced. The information about how much compost corresponds to how much chemical fertiliser was drawn from Table 48.

Own calculation 2	Potential demand [t/a]
Kathmandu Valley	216'358
Kathmandu	168'373

Table 53: Calculation of the present manure and compost application: the application rate in [kg/ha] was drawn from [31], whereas the manure and the compost application was calculated by using this rate and Table 46.

	Paddy	Maize	Potato	Vegetable	Wheat	Other crops
Manure [kg/ha]	3018	4412	12051	11793	3651	7667
Compost [kg/ha]	0	81	1491	1744	0	0
Manure [t/a]						
Lalitpur	7740	18374	1270	2541	6750	20403
Bhaktapur	11944	4941	3855	4745	11834	7717
Kathmandu	23874	15362	9947	9019	26013	21944
Total	43558	38678	15072	16306	44596	50063
Compost [t/a]						
Lalitpur	0	337	157	376	0	0
Bhaktapur	0	91	477	702	0	0
Kathmandu	0	282	1231	1334	0	0
Total	0	710	1865	2412	0	0

Table 54: Application of chemical fertiliser and manure. The data for chemical fertiliser is from [31] while the manure application was calculated in Table 53.

Fertiliser	Kathmandu Valley [t/a]
Urea	5'103
DAP	2'916
Potash	193
Manure	208'273

Table 55: Calculation of the potential replacement of the present application of chemical fertilisers and manure. Percentages come from Table 49 and the present application from Table 54. The information about how much compost corresponds to how much of which fertiliser was calculated in Table 48.

Fertiliser	-20% replaced	40% replaced	50% replaced
Urea	124281		
DAP	83503		
Potash	9394		
Manure	41655	83309	104136

Table 56: Third calculations: the present demand corresponds to the sum of the actual compost application in Kathmandu Valley and Kathmandu respectively (Table 53). The potential demand was calculated by adding the potential replacement according to Table 55 to the present demand.

Own calculation 3	Kathmandu Valley [t/a]	Kathmandu [t/a]	Comment
Present Demand	4987	2847	
Potential Demand	263819		20% of chemical fertiliser application and 20% of manure application replaced
	305474		20% of chemical fertiliser application and 40% of manure application replaced
	326301		20% of chemical fertiliser application and 50% of manure application replaced

Table 57: All findings for the present demand of farmers

PRESENT DEMAND	Kathmandu Valley [t/a]	Kathmandu [t/a]
[32]	913'190	
Own calculation 1	139'196	66'600
Own calculation 3	4'987	2847
Mean	**352'458**	**34'723**
Stddev.	490'223	45'080

Table 58: All findings for the potential demand of farmers

POTENTIAL DEMAND	Kathmandu Valley [t/a]	Kathmandu [t/a]
[32]	1'585'950	576'090
Own calculation 2	216'358	168'373
Own calculation 3 (Minimum)	263'819	
Own calculation 3 (Maximum)	326'301	
Own calculation 3 (Mean)	295'060	
Mean	**699'123**	**372'231**
Stddev.	769'023	288'300

B. Product, Positioning and Location

B.1 KMC

Table 59: Temperature measurements during the composting and vermi composting process. The compost in the honey comb boxes was turned on the 16th, 36th and 72nd day.

Day	Honey comb box		Vermi composting
	Averag Temp.	Core Temp.	Average Temp.
1	30.7	31.0	23.2
4	63.8	65.5	25.7
8	60.2	60.5	23.7
12	54.5	58.0	23.9
16	51.5	54.0	26.6
20	62.8	71.0	26.9
24	44.1		22.5
28	38.8	48.2	25.9
32	37.0	46.5	24.7
36	33.3	40.0	23.1
40	36.3		23.6
44	37.5		24.2
48	34.1		24.4
52	34.0		25
56	31.0		24.6
60	35.0		25.8
60	32.0		26.5
68	31.0		25.1
72	30.0		25.4
76	35.0		25
80	32.0		26.2
84	26.2	26.3	24.8
88	26.1	26.1	25.6
92	26.1	26.1	24.3

Table 60: Information from [44] about waste input, compost production and sales volume as well as about expenditure from July 2005 to July 2006.

Month	Waste input [kg]	Vermi compost production [kg]	Normal compost production [kg]	Total compost production [kg]	Production per day [kg/d]	Sale [Rs.]	Expenditure [Rs.]
July				458	8		
August				458	8	575	
September	5'260	327	118	445	15	4'474	457
October	7'810	299	310	609	20	476	457
November	5'648	341	232	573	19	210	457
December	7'450	368	87	455	15	1'537	704
January	6'500	295	178	473	16	1'079	300
February	16'520	219	227	446	15	11'970	1'964
March	4'670	343	102	445	15	3'017	525
April	9'003	134	564	698	23	6'449	740
May	1'850	258	510	768	25	3'311	839
June	664	121	212	333	11	2'571	287
July	-	200	62	262	8	515	271

B.2 NEPCEMAC

Table 61: Information from [48] about compost production, stock and sales volume from August 2006 to June 2007

Month	Production [kg]	Selling [kg]	Selling [Rs.]	Stock [kg]
August	3'000	252	1'439	18'238
September	3'000	507	2'831	20'731
October	3'000	317	1'502	23'414
November	3'000	284	1'736	26'130
December	3'000	355	1'974	28'775
January	3'000	560	3'212	31'215
February	3'000	802	5'414	33'413
March	3'000	5'507	7'192	30'906
April	3'000	6'796	15'858	27'110
May	3'000	11'512	30'731	18'598
June	3'000	5'318	7'743	16'280

C. Pricing

C.1 KMC

Table 62: Information about sale and expenditure from [44] from July 2005 to July 2006

Month	Sale [Rs.]	Expenditure [Rs.]
July		
August	575	
September	4'474	457
October	476	457
November	210	457
December	1'537	704
January	1'079	300
February	11'970	1'964
March	3'017	525
April	6'449	740
May	3'311	839
June	2'571	287
July	515	271

Table 63: Calculation of the production costs. Information about cost of labour, saw dust and total investments come from [54], while data about cost of material, maintenance and equipment are gathered from [53]. The avoided costs were calculated with information from [52].

	NRs./mth/worker	No. of worker	NRs./9mth	NRs./Sack	Sacks/mth	NRs.	NRs./mth	NRs./t	t/mth	Monthly costs [NRs.]
Cost of labour	4000	2								8000
Cost of material/maintenance/equipment			7000							778
Saw dust				10	25					250
Total investments						4000000	11111			11111
Avoided costs								2465	7	16115
							Monthly costs [NRs./mth]			36254
							Production costs[1] [NRs./kg]			41
							Production costs[2] [NRs./kg]			8

[1] avoided costs not considered

[2] avoided costs considered

C.2 NEPCEMAC

Table 64: Compilation of NEPCEMAC's costs. All information come from [55] except for the avoided costs which were calculated with data from [52].

													Zoo	Handigau
	NRs./mth	NRs./mth	NRs.	NRs.	NRs./mth	Rs/l	l/mth	kg sugar/l	NRs./kg	NRs./Truck	Trucks/mth	NRs./mth	Monthly cost [NRs.]	Monthly cost [NRs.]
Cost of labour (Zoo)	8500												8500	
Cost of labour (Handigau)		8400												8400
Equipment (Zoo)			10000		542								542	
Equipment (Handigau)				10000	542									542
Zoo: Activator (EM)						100	5	1	33				663	
Handigau: Activator (EM)						100	6	1	33					795
Transportation costs for ash										650	2			1300
Cost of packaging												500	250	250

	NRs./mth	kg/mth	Lost revenue [NRs./mth]	NRs./mth	NRs.	NRs.	NRs./mth	NRs./worker	Rickshaws/d	Rickshaws/worker	NRs./t	t/mth	Monthly cost [NRs.]	Monthly cost [NRs.]
Cost of transportation	500												500	
"Rent" (Zoo)		100	800										800	
Rent (Handigau)				10000										10000
Total investment (Zoo)					100000		278						278	
Total investment (Handigau)						100000	278							278
Cost for collection								4000	6	2				12000
Avoided costs											136	50		6732

Table 65: Calculation of the production costs of NEPCEMAC's plant in the Zoo and in Handigau

	Zoo	Handigau
	Monthly cost [NRs.]	Monthly cost [NRs.]
Cost of labour (Zoo)	8500	
Cost of labour (Handigau)		8400
Equipment (Zoo)	542	
Equipment (Handigau)		542
Zoo: Activator (EM)	663	
Handigau: Activator (EM)		795
Transportation costs for ash		1300
Cost of packaging	250	250
Cost of transportation	500	
"Rent" (Zoo)	800	
Rent (Handigau)		10000
Total investment (Zoo)	278	
Total investment (Handigau)		278
Cost for collection		12000
Avoided costs		6732
Monthly costs (Zoo) [NRs./mth]	11532	
Production costs (Zoo) [NRs./kg]	3	
Monthly costs[1] (Handigau) [NRs./mth]		33564
Production costs[1] (Handigau) [NRs./kg]		5
Monthly costs[2] (Handigau) [NRs./mth]		26832
Production costs[2] (Handigau) [NRs./kg]		4
Monthly costs[1] (Zoo and Handigau) [NRs./mth]	45096	
Monthly costs[2] (Zoo and Handigau) [NRs./mth]	38364	
Production costs[1] (Zoo and Handigau) [NRs./kg]	4	
Production costs[2] (Zoo and Handigau) [NRs./kg]	3	

[1] avoided costs not considered

[2] avoided costs considered