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Logistic Solutions for School Milk Distribution in Hungary

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S T A T E M E N T

I confirm that the thesis
“Logistic Solutions for School Milk Distribution in Hungary
is my individual work.
I list all sources, materials and literature
at the end of this work.

In Prague, 4th May 2011 Signature

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INTRODUCTION

Every[1] child in the EU is entitled to receive small package of milk every school day[2] for free. The price of the milk is usually covered partly by the EU government and partly by the national government. However, each country has different policy of how much the school milk is subsidized by the national government. Therefore, it is not usually the case that really every child gets the milk as the cost of milk from dairies together with the milk distribution is higher than the milk subsidies.

The idea of this project came up from Cool Milk Group founder Jon Thornes who wants to spread his vision of children receiving fresh milk at schools over the Europe. Besides Great Britain where the company is very successful and appreciated, Jon Thornes decided to try the same in Hungary, based on some previous analyses of European markets.

PROJECT GOAL

The Hungarian company Cool Tej (one of the companies that belong to British Cool Milk Group) performs losses on distributing milk to schools in one particular part of Hungary called [redacted] County. Therefore, the milk distribution in Hungary is the issue that is going to be further analysed and for which various solutions will be found and evaluated.

Scope of the project is to analyse buying milk and its cost price, work with third party to bring about a solution to logistics, deal with different possibilities and ideas for logistics supply chain for getting milk to the customer, understanding what Cool Milk / Cool Tej does in the value chain, understanding the values of Cool Milk / Cool Tej, come up with a low cost solution to ensure the milk can get to schools cheap and efficiently and that the solution could be used in other countries. The project is not finding new customers, working with governments to engage them on schools milk, production of milk on farm, packaging of milk at the dairy, spending lots of money on a state of the art distribution system.

[1] Each EU country has a slightly different rule of what child and of which age is entitled to receive milk for free. The EU regulations and the national regulations closely specify the rules and conditions.

[2] School day is also more specifically defined in the national regulations. A minimum number of hours are usually defined per day to call the day a school day.

1 Cool Tej Foundation

1.1 Cool Milk Group

Cool Milk group is a British alliance of companies which aim is to provide every child in early years and primary education with the opportunity to drink fresh milk every day. The group consists of companies that supply children with milk, a company that leases refrigerators to store school milk at schools, a company that is responsible for IT support etc. All the services needed for supplying the milk to schools are in different companies so that all activities were clear and transparent.

The original company is Cool Milk at School Ltd which was established in 1998. Cool Milk at School Ltd works in partnership with local authorities to supply free and subsidised milk for children in primary, infant, junior and special schools.

Second and very important company for the group is Cool Milk Ltd. This company was established in 2001 to supply free milk for children aged under five in pre-schools, nurseries, children's centres, crèches, etc. Cool Milk Ltd also works in partnership with local authorities.

The Cool Milk group and its employees have earned many awards including:

- Caroline Walker Trust, 2004
- Community Mark Award, 2005-2007
- Business Champions, 2001-2006.

1.2 Cool Tej Foundation

A Hungarian foundation called Cool Tej that has the same subject of business as the entire group, which is supplying children with fresh milk, can also be counted as a part of the Cool Milk group.

The reason for founding a company in Hungary was to spread the idea to Europe. A market research that was devoted to school milk schemes in Europe was done European-wide and based on the research results a decision was made to start the business in Hungary.

The Hungarian foundation was established in September 2008. It is still a very small company that has around five employees. However, the company takes its responsibility seriously and already operates in three Hungarian Counties in which supplies children with fresh milk in primary schools.

The organisation structure of the foundation can be seen in the exhibit below. Due to the [redacted]

Exhibit 1 Cool Tej Foundation Organisation Structure

[redacted]

1.3 Cool Tej Value Added

Each company that is established can be successful only if it adds value for its final customer. The value that is added to a services or a product is the value for which the customer is willing to pay. Even non-profit companies have their added value. In the case of Cool Tej Foundation, the value that it adds is:

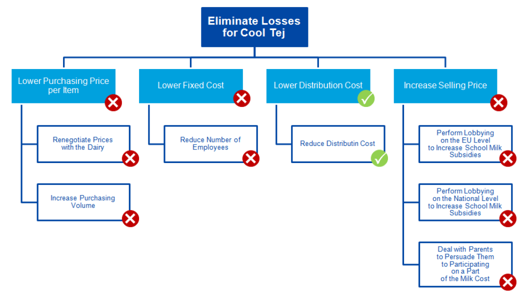
- Free milk for children
- No milk reimbursement claim forms to complete
- No waiting for reimbursement
- Admin-friendly

- Freephone customer support
- Fresh local milk
- Cool Milk / Cool Tej deals with the dairy
- Dairy invoices Cool Milk / Cool Tej directly
- No money tied up in milk waiting for reimbursement
- Milk paperwork reduced to possible minimum

The key value for schools that Cool Tej brings is that Cool Tej does all the necessary administration for schools to receive milk free of charge. Moreover, Cool Tej also pays for the milk and its distribution with its financial funds and claims the reimbursement to the national government and the EU. The reimbursement is usually received much later after the milk distribution to children which could be very inconvenient for schools to have its financial funds tied up in milk for very long time. The milk money is usually paid back by the national government and the EU in 3 to 6 months.

2 Methodology

2.1 Tree Method



The very easy but very helpful method of specifying the direction which is going to be taken within a project to find project solutions is a Tree. The problem that is to be solved is placed at the top of the Tree. Activities that help solving the problem are placed below the problem. Each of the specified activity is further specified up to a detail that is needed. When such a Tree is constructed, the direction which the project is going to take is chosen taking into account the customer needs together with limits and constraints that refer to each of the direction.

2.2 SIPOC

S	I	P	O	C
SUPPLIER	INPUT	PROCESS	OUTPUT	CUSTOMER
Cool Tej	List of schools and registered pupils, order templates	Preparing and sending orders to schools	Orders	Schools
Schools	List of pupils and their updates, orders	Confirmation of orders by sending a report	Reports	Cool Tej
Cool Tej	Reports	Preparing and sending orders to dairies	Milk Orders	Dairies
Dairies	Milk orders	Communication with production and stock, loading ordered items	Loaded van with milk bottles	Distributor
Distributor	Loaded van with milk	Distribution of milk	Milk distributed	Schools

The SIPOC method allows relatively quickly construct a first view on the process. The letters in the name of the method mean S – supplier, I – input, P – process, O – output and C – customer. Supplier can be either external or internal (internal supplier can be for example a department within an examined process in a company). The supplier delivers inputs for the process / activity that are described in the third column. Other inputs might also be needed to process the inputs to outputs. The last item of the process chain is a customer. The customer can also be internal or external depending on the process or its part we examine. The entire table should consist of 4 – 6 processes. The most relevant is to construct a 5-process SIPOC. Processes should be balanced which means they should be relatively similarly demanding.

2.3 CTQs

Each company either providing services or producing products has its customers. Those customers have voices (VOC) that say what they like and what do not like about the company´s service / product. The voices of the customers are transformed into customer needs. Those needs are not usually measurable. Therefore, the non-measurable customer needs are further transformed into measurable outputs which are called CTQs.

2.4 Defects

Defects are unsatisfactory outputs of a process which cause non-fulfilling customer needs. By measuring the amount of defects, the process capability can be analysed. The process capability is a measurement of how well the company satisfies its customers by its services or products. The very favourite and widely used method that uses the methodology of defects and measures the process capability is Six Sigma methodology.

To very briefly explain the aim of Six Sigma, it is a methodology that eliminates defects and process variability. The results of Six Sigma methodology are to have a stable and meaningful process. Stable process means that the methodology reduces variation in the process and meaningful means that the process mostly concentrates on activities that bring value to final customers. This methodology is very well described in many literature sources.

2.5 Brainstorming

Brainstorming is a method that helps to generate ideas. It usually breaks out established, common patterns of thinking and new ways of thinking can, therefore, be developed. Furthermore, brainstorming is a very enjoyable activity and so it helps team members bond with one-another while solving problems.

This method is based on asking people or team members about as many ideas as possible within relatively short time. The ideas can be crazy. However, it usually happens that people come up with revolutionary or at least very creative ideas thanks to the crazy ideas. The very important factor of brainstorming is not to evaluate the ideas within the brainstorming process. The brainstorming process is really about coming up with as many ideas as possible. The feasibility, efficiency or other factors are evaluated after brainstorming is finished.

2.6 Task of Business Traveller / Circular Transport Problem

The optimization of milk routes was based on method from Operation Research study area. This method is called Task of Business Traveller / Circular Transport Problem.

The task is based on particular known points / places / towns and its network which joins the towns. Each distance from one place to another must be known. The aim of this method is to determine in which order the business traveller should go through each of the town to get to each of the town just once. The business traveller returns back to the town in which started at the end of the task. The total route has to count for minimum possibly reachable length (e.g. in km) within the entire route.

In today´s technology world, PC software rules almost any study / research area which is also the case of the Operation study area. The programme Lindo is an application that can find the optimized route with minimum driven kilometres.

The PC application needs the knowledge of number of kilometres that are in between each of the town. Based on the information of all distances, the application is able to calculate the optimal route. The exhibit below shows how the data is necessary to sort out for the PC application.

Exhibit 2 Data Organization for Lindo Programme

[redacted]																		
[redacted]	12	20	23	35	40	36	34	30	35	57	49	33	30	28	23	25	16	12
[redacted]	0	6,5	9	20	25	22	20	16	21	43	35	33	36	27	22	11	16	24
[redacted]	6,5	0	8,5	20	25	22	20	16	21	43	35	26	24	20	15	5	9,5	14
[redacted]	9	8,5	0	22	27	24	22	18	23	45	37	39	38	30	25	14	18	33
[redacted]	20	20	22	0	8	4,5	17	13	18	39	32	35	33	30	25	18	26	30
[redacted]	25	25	27	8	0	3,5	9,5	16	17	31	33	36	34	35	30	23	31	35
[redacted]	22	22	24	4,5	3,5	0	5,5	12	15	35	29	31	30	32	27	19	28	35
[redacted]	20	20	22	17	9,5	5,5	0	7	9,5	31	23	26	25	28	25	17	25	30
[redacted]	16	16	18	13	16	12	7	0	14	36	28	30	29	26	21	13	22	26
[redacted]	21	21	23	18	17	15	9,5	14	0	22	14	16	15	19	19	11	20	24
[redacted]	43	43	45	39	31	35	31	36	22	0	13	19	20	24	29	33	35	38
[redacted]	35	35	37	32	33	29	23	28	14	13	0	5,5	7,5	11	16	26	23	25
[redacted]	33	26	39	35	36	31	26	30	16	19	5,5	0	2,5	6	11	21	18	20
[redacted]	36	24	38	33	34	30	25	29	15	20	7,5	2,5	0	4	9	19	15	18
[redacted]	27	20	30	30	35	32	28	26	19	24	11	6	4	0	5	15	12	16
[redacted]	22	15	25	25	30	27	25	21	19	29	16	11	9	5	0	10	6,5	10
[redacted]	11	5	14	18	23	19	17	13	11	33	26	21	19	15	10	0	10	14
[redacted]	16	9,5	18	26	31	28	25	22	20	35	23	18	15	12	6,5	10	0	4
[redacted]	24	14	33	30	35	35	30	26	24	38	25	20	18	16	10	14	4	0

The PC application returns back a table that consists of zeros and ones by which it shows the most efficient connections from one place to another. Joining the efficient connections, the optimized route is reached.

Exhibit 3 Result Table from the Lindo Programme

[redacted]

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

The optimized route can be seen in the exhibit below.

Exhibit 4 Optimized Route by the Lindo Programme

[redacted]

2.7 Calculation of Hungarian School Days

The average number of Hungarian school days in the school year 2010 / 2011 is 18 days a month. The number of school months is 10.

The following table shows the number of school days from September to June in 2010 / 2011 and bank holidays that ended up on a school day (the bank holidays that are at the weekend are not calculated and are not presented in the table). The final column represents the cleaned up school days after deducting relevant bank holidays. The total sum is divided by 10 school months.

Exhibit 5 Calculation of Hungarian School Days

	Number of school days in 2010 / 2011	Bank Holidays appearing in school days	School days cleared from bank holidays	
September	23		23	
October	21	-1	20	
November	17		17	
December	15		15	
January	16		16	
February	20		20	
March	23	-2	21	
April	17		17	
May	22	-1	21	
June	11	-2	9	
TOTAL	185	-6	179	17.9

2.8 Benchmarking

Benchmarking is a methodology used in many businesses to compare their business with peer businesses.

The basic rule is to find similar businesses / competitors from the market and decide which attributes are to be benchmarked. Those attributes can be either from the financial perspective like revenues or operation cost, or they can be from the customer point of view like for example, the amount of unsatisfied customers, the amount of claims or defects etc. When peer businesses are chosen and the attributes are selected, the analysis can be done. The analysis is based on findings of analysed data of the competitor / business that is to be the benchmark for the company which means the data research is the main part of this methodology.

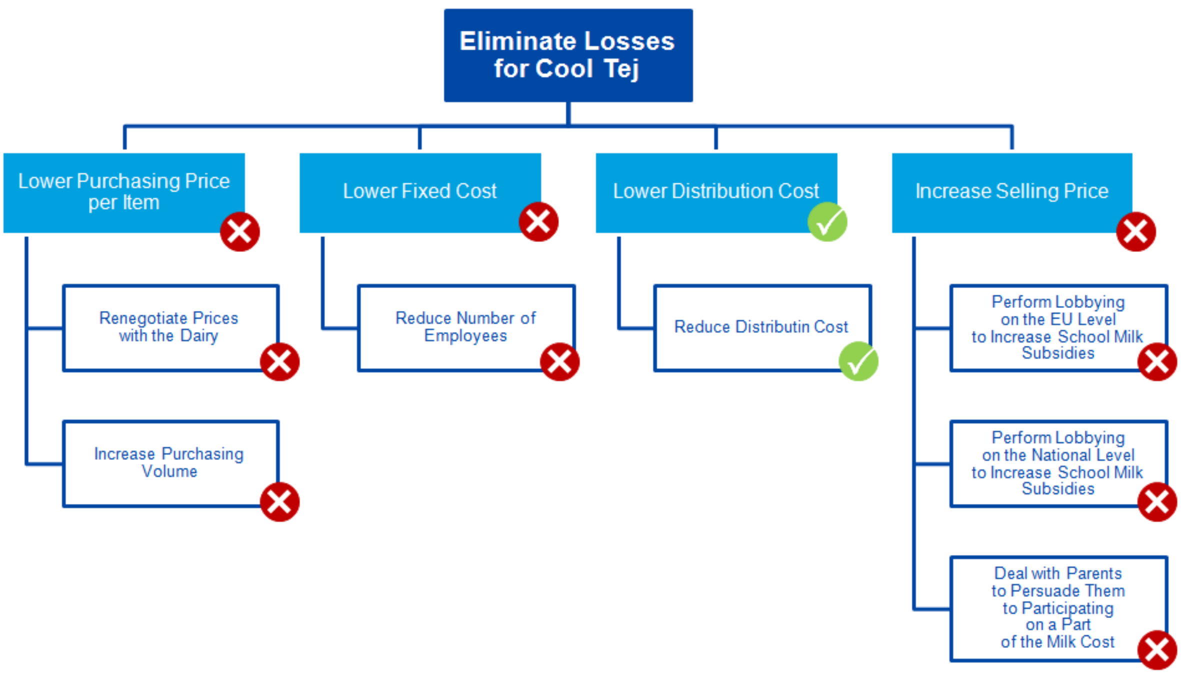
3 Project Definition

3.1 Project Specification

Before starting the project a specific direction of the project needs to be specified. Information that the Hungarian company Cool Tej (one of the companies that belong to British Cool Milk Group) performs losses on providing milk to schools in one particular part of Hungary called [redacted] County was given.

The decision about which area to choose to eliminate the losses of Cool Tej in the [redacted] County was made based on a method called Tree.

Exhibit 6 Tree – Project Specification



As it can be seen from the Tree, various possibilities can be used to eliminate losses.

The first option is to lower purchasing price per item of milk. Reducing the price would then mean that Cool Tej would have to either renegotiate the existing prices with the dairy or Cool Tej would have to purchase greater volume of milk. The first suggestion of renegotiating the existing prices is not feasible at the moment due to a price increase of raw milk in 2011. The second suggestion of increasing the purchasing volume, it was tried to be fulfilled during the last year negotiations with new schools (=customers), however, the plan did not meet the volume it was assumed. Due to the fact that the volume has not changed significantly, this solution is to be dismissed as well.

Second option illustrated in the Tree is to lower fixed cost by reducing the number of employees. The Cool Tej company is a small company which employs up to 10 employees. [redacted] the company employs only those professions that they need in numbers they need. Therefore, this way is not the way to go.

Further option represented in the last column of the Tree suggests increasing selling price of the Cool Tej milk product. Two strategies with different consequences on the final customer can be performed. The first strategy regards to a consequence that the final customer still receives the milk for free. However, to ensure that the customer (=child / parent resp. school) receives the milk for free, new lobbying must be undertaken. The lobbying can be either done on the side of the national government, or on the side of the EU government, or even on both sides. Nevertheless, such an activity takes a long time. It will not bring any quick improvements at present when the improvements are so much needed. Therefore, this strategy is not the way the project will evolve. The second strategy regards to a consequence that the final customers would participate with a small portion on the product price. However, not even this strategy is the right one for solving the loss of the company. The reason for this fact is (as it will be seen in the further section about CTQs) that the customer wants to receive the subsidized milk for free.

The last option that was omitted on purpose is the option that this project will further analyse and solutions will be searched for. To reduce distribution cost is the option of how to eliminate the Cool Tej losses. At present, dairies are the distributors of milk to schools. Therefore, the objective of this project is to find other solutions of logistics for school milk distribution in the [redacted] County to lower the distribution cost.

3.2 Project Scope

Activities which are included in the process of getting milk from dairies to schools can be illustrated by a method SIPOC[3]. This method allows a quick view on the process.

[3] SIPOC is explained more in details in the part Methodology.

Exhibit 7 SIPOC

S	I	P	O	C
SUPPLIER	INPUT	PROCESS	OUTPUT	CUSTOMER
Cool Tej	List of schools and registered pupils, order templates	Preparing and sending orders to schools	Orders	Schools
Schools	List of pupils and their updates, orders	Confirmation of orders by sending a report	Reports	Cool Tej
Cool Tej	Reports	Preparing and sending orders to dairies	Milk Orders	Dairies
Dairies	Milk orders	Communication with production and stock, loading ordered items	Loaded van with milk bottles	Distributor
Distributor	Loaded van with milk	Distribution of milk	Milk distributed	Schools

Based on the Tree by which the direction of this project was determined, the part of the process which is going to be examined in this project is situated within the orange circle.

To specify which activities should / should not be included in the project, the method "IS / IS NOT" can be used.

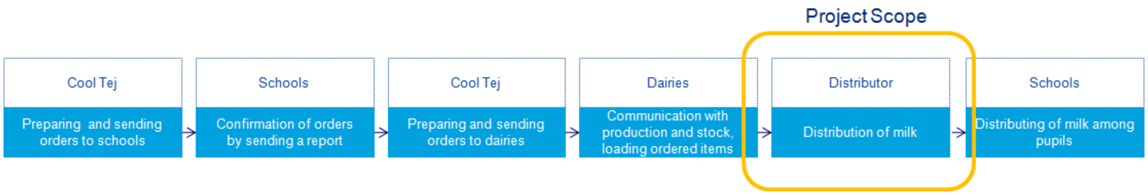
Exhibit 8 "IS / IS NOT"

	IS	IS NOT
What	• Logistics supply chain for getting milk to the customer • Cost price for buying milk • Understanding what Cool Milk / Cool Tej does in the value chain, understanding the values of Cool Milk / Cool Tej • A low cost solution to ensure the milk can get to schools cheap and efficiently	• Finding new customers • Spending lots of money on a state of the art distribution system
Where	• Logistic solutions for Hungary that could be used in other countries	• Production of milk on farm • Packaging of milk at the dairy
Who	• Working with Cool Tej • Working with third parties (dairies, schools) to bring about a solution to logistics	• Working with governments to engage them on schools milk

It can be seen from the table that this method creates a clear scope of the project which should be kept within the entire work. Due to such specification, the team should not get out of the track. The most important information is that the work consists of finding logistic solutions that are low cost and efficient and the parties with which it is going to be worked with are dairies and schools as it was already illustrated in the SIPOC exhibit.

Based on the IS / IS NOT analysis and the SIPOC method, the project scope can be graphically illustrated by the following exhibit.

Exhibit 9 Project Scope



The milk distribution is the area that is going to be analysed and examined to find solutions for getting milk from dairies to schools in the way that it reduces / eliminates losses that Cool Tej suffers from in the [redacted] County.

The way of distribution will be influenced and though chosen based on customers´ needs, therefore the following chapter specifies what kind of output the customer evaluates as satisfying.

3.3 CTQs

Required measurable outputs satisfying company customers will be called CTQs (Critical to Quality)[4]. Three CTQs were defined for the company Cool Tej. These three CTQs refer to cost, time and quality.

The first CTQ concerns cost. The customer wants to receive the school milk for free. This fact means that taking into account the amount of subsidies from the state and from the EU which gives in total [redacted] HUF per a 200 ml bottle of milk when considering [redacted] County, the Cool Tej selling price cannot be higher than those [redacted] HUF / 200 ml. (200 ml bottle of milk is the amount that a child[5] is entitled to receive on a school day[6].)

The second CTQ refers to time. The customer wants to have the milk at disposal for its consumption every school day at 9 am. This means that the deliveries have to be organized in volumes and in frequencies that milk will be at the customer disposal every school day at 9 am.

The third CTQ refers to quality. The customer wants fresh milk. The freshness can be ensured if milk deliveries are at least twice a week, milk is stored in fridges (if the deliveries are not every day) and milk is consumed within the delivery week.

[4] CTQs are explained more in details in the Methodology part of this work.

[5] Each EU country has a slightly different rule of what child and of which age is entitled to receive milk for free. The EU regulations and the national regulations closely specify the rules and conditions.

[6] School day is also more specifically defined in the national regulations. A minimum number of hours are usually defined per day to call the day a school day.

4 As-Is Analysis

4.1 Regulations Regarding EU School Milk Subsidies

Children in the EU are entitled to receive "under Article 102(4) of Regulation (EC) No 1234/2007, the maximum daily quantity per pupil on which aid can be granted the equivalent of 0.25 litres of milk". "Aid shall only be granted on the products listed in Annex I to this Regulation if the products comply with the requirements of Regulation (EC) No 852/2004 and Regulation (EC) No 853/2004, and in particular with the requirements concerning preparation in an approved establishment and the identification marking requirements specified in Section I of Annex II to Regulation (EC) No 853/2004" (for the list of products please see the Attachment No. 1).

The children that are entitled to receive products in the framework of the European School Milk Scheme are those who are in regular attendance at:

- nursery schools, kindergartens or other pre-school establishments
- primary schools and
- secondary schools

Those education establishments are needed to be administered or recognized by the Member State's competent authority (for example by the Ministry of Education).

The aid rates by the EU government are stated in the following table according to the category to which the product belong. The milk is the category No. 1.

Exhibit 10 Project Scope

Aid rates

(a) EUR 18,15/100 kg for category I products;

(b) EUR 16,34/100 kg for category II products;

(c) EUR 54,45/100 kg for category III products;

(d) EUR 163,14/100 kg for category IV products;

(e) EUR 138,85/100 kg for category V products.

The subsidy can be applied for by the following beneficiaries "an educational establishment, an education authority in respect of the products distributed to the pupils within its area, the supplier of the products", an organisation acting on behalf of one or more educational establishments or education authorities and specifically established for that purpose".

The beneficiaries "shall benefit from the aid only on school days. The total number of school days, excluding holidays, shall be notified by the education authority or by the educational establishment to the competent authority of the Member State and, where appropriate, to the applicant. Pupils shall not benefit from the aid during stays at holiday camps."

The regulation also mentions that milk and milk products that are used in the preparation of meals will not be subsidized.

"However, milk and milk products used in the preparation of meals within the premises of the educational establishment and which do not involve heat treatment may benefit from the aid. Moreover, heating of products listed under Category I (a) and (b) of Annex I may be allowed." [7]

4.2 Hungarian School Milk Subsidies

The EU subsidies do not cover the entire cost of getting milk to schools, therefore, national governments take part in the School Milk Scheme.

School milk in Hungary is subsidized by the Hungarian government only for primary school children at the age of 7 to 14. The Hungarian subsidy together with the EU subsidy covers 100 % of the product price for schools only in some parts of Hungary. The 100 % subsidy means that the cost of getting milk to schools is entirely covered by the EU subsidies together with the subsidy from the national government. The EU subsidizes only 10 - 12 HUF per a 200 ml bottle of milk which is only [redacted] of the product price for schools. The Hungarian government subsidizes different parts of Hungary differently. The subsidies can cover 100 %, 50 % or less of the product price for schools depending on how much a particular region is developed. The Hungarian subsidy in [redacted] County is [redacted] HUF per a 200 ml bottle of milk.

At present, Cool Tej operates in regions that are 100 % subsidized. It reflects the CTQ that customers want to receive school milk for free which means 100 % subsidized.

[7] Commission Regulation (EC) No 657/2008 of 10 July 2008 laying down detailed rules for applying Council Regulation (EC) No 1234/2007 as regards Community aid for supplying milk and certain milk products to pupils in educational establishments

4.3 [redacted] County Milk Deliveries

In previous chapters the components of claimed subsidy and their sizes were stated. At this point, it should then be clear that the maximum selling price of milk to schools is [redacted] HUF/200 ml bottle of milk taking into account the CTQ regarding the price.

The components of the milk selling price to schools consist of a purchase price of 200 ml bottle of milk from a dairy, distribution cost and fixed cost. The equation can be illustrated as showed in the exhibit.

Exhibit 11 School Milk Price Components I

Dairies that deliver [redacted] County are at the moment two. The first dairy is situated in [redacted] and is called [redacted] and the second dairy is situated in [redacted] and is called [redacted]. The Exhibit below shows how [redacted] is divided in between these two dairies together with the distribution price they offer if the dairies distribute the milk themselves.

Exhibit 12 Dairies Distributing Milk in [redacted] County

[redacted]

[redacted] town is situated eastwards from the map extract showed in the exhibit. The distance between [redacted] to get to the first stop (=school) in [redacted] County is more than an hour drive, therefore, the distribution price by [redacted] increases the more westwards the milk is distributed.

The best purchase price of 200 ml bottle of milk from a dairy that Cool Tej can get is [redacted] HUF. Adding the distribution price (if distributed by the dairy) to the purchase price of the milk and then if the total number is deducted from the selling price to schools, a conclusion of how much forints is left for fixed cost per a bottle of milk can be easily made. The equations can be illustrated as showed in the exhibits.

Exhibit 13 School Milk Price Components II

CT selling price of 200 ml bottle of milk to schools − CT purchase price of 200 ml bottle of milk from a dairy − Distribution cost = Fixed cost

Exhibit 14 Funds to Cover Fixed Cost

[redacted]

The exhibit regarding the funds that are needed to cover fixed cost presents the necessity of finding new options of distributing the particular part of [redacted] County. One of the options that could be already mentioned at this point could be renegotiations of the distribution price with the dairy [redacted]. However, the distribution prices presented in the exhibit 14 are already new prices (for milk deliveries to schools every day) that resulted from recent renegotiations. The original loss was much higher due to the fact that distribution price by [redacted] was [redacted] HUF per 200 ml bottle of milk. Therefore, this option will not be further considered.

4.4 Benchmarks of Milk & Milk Products Supply Chains

In the milk & milk products market the transportation / distribution is either insourced or outsourced.

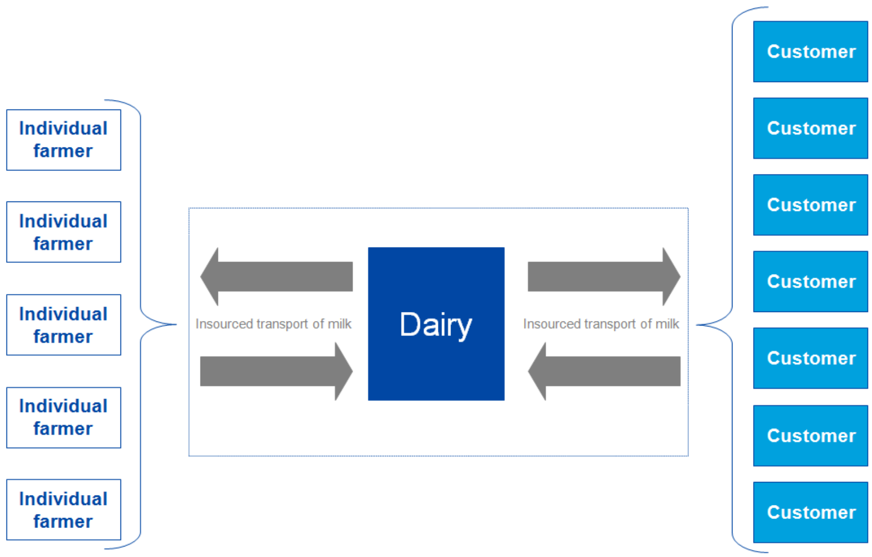
4.4.1 Insourcing Transportation

In the exhibit 15, it can be seen that raw milk is collected from milk farmers by the dairy´s own transportation and delivered to the dairy. The finished / processed product is then also delivered from the dairy to its customers by the dairy´s own transportation.

This solution of having own fleet and managing own transportation has its advantages and disadvantages.

From the customer point of view, if the dairy has its own transportation, the customer does not have to take care about the transportation and can only concentrate on which products the customer wants and when the customer needs them. On the other hand, the first limit for the dairy that has its own transportation can be the lack of efficiency of providing the transportation. The other disadvantage for the customer results from the transportation cost that is not transparent to the customer, the dairy can charge the customer for the transportation cost more. This transportation cost that is not transparent to the customer disables the customer to compare transportation prices with competition in the market and though any assessment if the existing way is the most efficient, cannot be done.

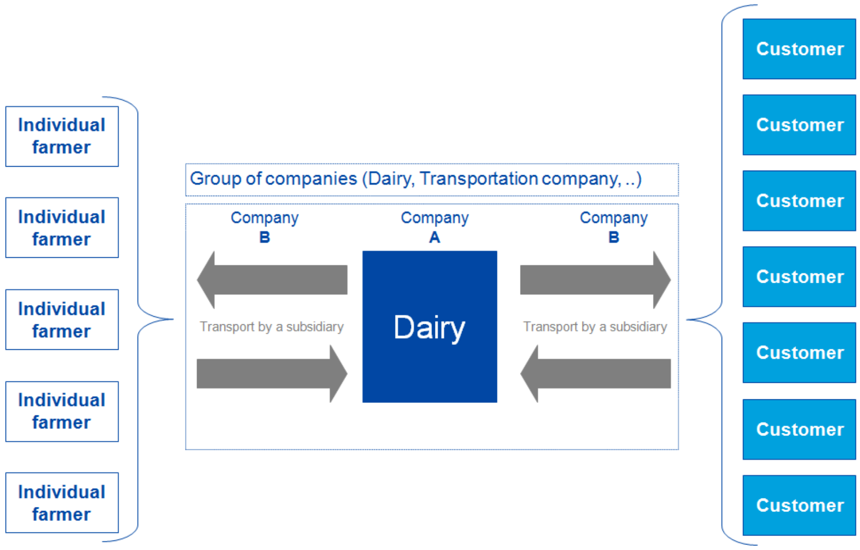
Exhibit 15 Insourcing Transportation



4.4.2 Subsidiary Providing Transportation

Other method is that the dairy and the transportation company can belong to the same group of companies. Then the subsidiary works on the profit bases (as other outsourcing companies) which results in more transparent prices for the dairy. The prices for transportation are usually comparable with competitors in the transportation service market. In this case the transportation price could be better traceable for the customer if searching for components of the purchasing price. The exhibit 16 illustrates the situation.

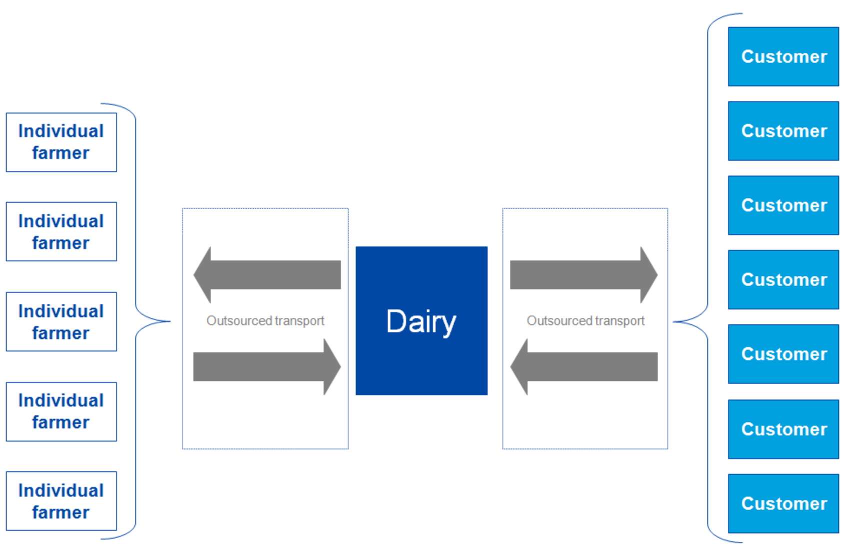
Exhibit 16 Subsidiary Providing Transportation



4.4.3 Outsourcing Transportation

Very frequent solution of transportation is outsourcing the transportation to a specialist which has the know-how of how to provide such service the most efficiently. Furthermore, dairy (when considering this project) does not have to manage fleet, or take risks of the vans / trucks that could stop functioning or even drivers when ill or on holiday. The other important factor is also the fact that dairy does not have to have its funds tied in fleet and other necessary equipment and can use its funds in its core business. The effect for the customer (dairy´s customer) could be a potential probability of the efficiency in transportation.

Exhibit 17 Outsourcing Transportation

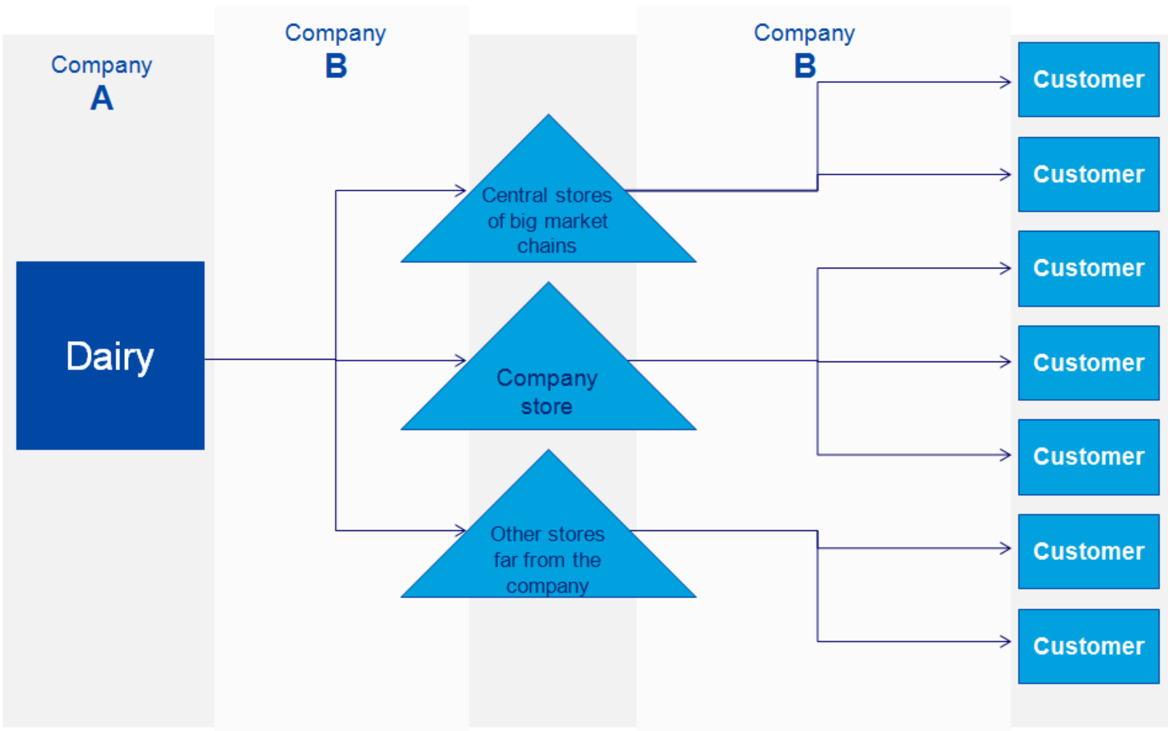


4.4.4 Depos within a Supply Chain

Dairies that are of a greater size have depos in between the dairy itself and its customers. This logistic solution allows the dairy to deliver milk and other milk products in trucks fully loaded to depos and from the depos the products are then distributed in smaller amounts to different customers. This solution represents significant costs reductions due to savings on the truck routes.

On the other hand, application of this solution is limited. The significant saving can be gained if trucks are applied. The petrol cost per an item is then very low.

Exhibit 18 Depos within a Supply Chain



5 Scenarios of Milk Distribution

Based on the discussions with the management of the company and brainstorming of ideas, various scenarios of milk distribution were identified. The overview of scenarios is presented in the following exhibit.

Exhibit 19 Scenarios Overview

[redacted]

5.1 Owning a Ford Transit Van

Among the first ideas how to solve the situation with very high milk distribution cost charged by the [redacted] dairy in [redacted] is to purchase a Ford Transit van.

Owning a Ford Transit van has advantages and disadvantages. Among the most important advantages is the flexibility that the company gets. The flexibility inheres in the fact that whenever the company needs to deliver or to distribute, they just take the van and distribute. The company do not have to solve with the business partner that does the distribution for the company whether the business partner has capacity to do the ad-hoc delivery. The company owning its own Ford Transit can deliver whenever and wherever the company needs to deliver.

This option, however, brings about a few disadvantages. One of the drawbacks is that the company has to manage and maintain the van / fleet. This, of course, enlarges the company´s scope of work. Nowadays the trend usually is that most of the companies rather cut out all activities that do not have direct relation to the core business of the company and they have all such activities more likely outsourced.

Further issue that can occur is when the van stops working. If the company is large enough and has its fleet, then this does not have to be an issue. However, if the company is small and owns only one van or one van for each area so the vans cannot be replaced by one another, this can bring an issue of the fact that the company cannot deliver to its customers or it finally delivers, however, with a delay which makes the customer unsatisfied. (At the beginning of this work, I talked about the CTQs and one of the CTQ was that the customer wishes to have its milk at disposal every school day at 9 am. The delay would cause not fulfilling the customer´s need and would cause defect[8] in the process.)

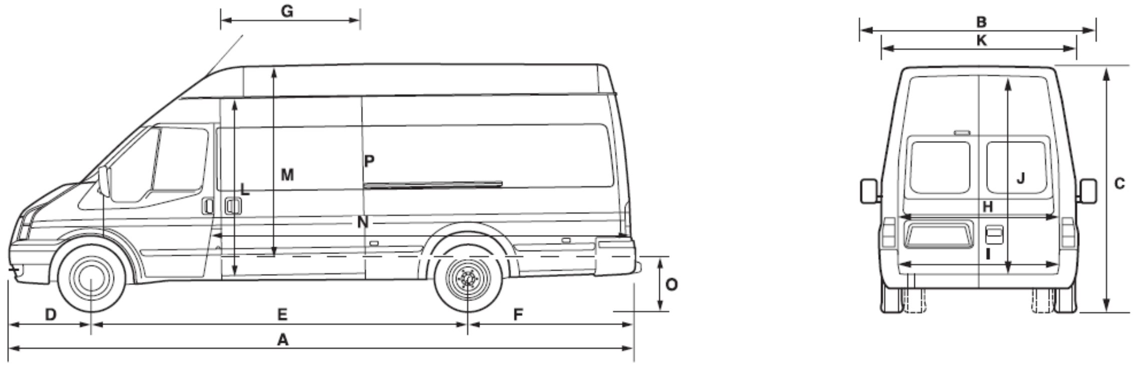
The very similar situation can occur with a van driver. Due to owning only one van, the company very likely employs only one van driver. The driver, however, has the right to have holiday and can also get ill. These situations can cause not having a driver to drive the van and though not delivering the products to customers. The situation can again end with defects[8] in the process.

The implication of owning a van / fleet that does not have to be very obvious at the beginning is the fact that the company´s funds are tied up in this van / fleet. Those funds could be used elsewhere regarding the company´s core business.

For the illustration of the van that is being mentioned in this work, the following exhibit presents the type of the van that will be considered here.

[8] Defects are unsatisfactory outputs of a process which cause not fulfilling customer needs. More detailed explanation of defects is in the Methodology part of this work.

Exhibit 20 Ford Transit Van



5.1.1 Scenario No. 1

The very first scenario that will be analysed in the chapter Optimization and Evaluation is owning one Ford Transit Van that would deliver all schools every school day in the entire [redacted] County. This means that milk would be purchased from the dairy [redacted] in [redacted] and would be delivered to not only schools that were delivered by [redacted] but also to schools that were delivered by the second dairy [redacted] from [redacted]. Due to the size of the whole county, two drivers would have to be employed. The route for delivering milk to schools with one own Ford Transit van would be starting in [redacted] where the dairy is located. For this option no fridges at schools are needed due to every-day deliveries.

5.1.2 Scenario No. 2

The second scenario is owning one Ford Transit Van that would deliver only some schools in the [redacted] County. These schools would be delivered every school day. The rest of the schools would continue to be delivered by [redacted] dairy from [redacted] as the distribution cost the dairy charges is bearable. The schools delivered by the Cool Tej own van would be those schools that used to be delivered by the [redacted] dairy itself from [redacted]. The reason for that, the expensive distribution cost, is obvious. For this scenario only one driver could be employed. The route for delivering milk to the mentioned schools would be starting in [redacted] where the dairy is located. For this option no fridges at schools are needed due to every-day deliveries.

5.1.3 Scenario No. 3

The third scenario regarding owning a Ford Transit van is that all schools in [redacted] County would be divided into two milk routes. This means that milk would be purchased from the dairy [redacted] in [redacted] and would be delivered to not only schools that were delivered by [redacted] but also to schools that were delivered by the second dairy [redacted] from [redacted]. However, dividing the county into two routes, the deliveries would be done either twice a week on each route which would mean that the route number one would be delivered every Monday and Wednesday and the route number two would be delivered every Tuesday and Thursday, or the deliveries would be done three times a week on each route which would mean that the route number one would be delivered every Monday, Wednesday and Friday and the route number two would be delivered every Tuesday, Thursday and Saturday. However, for such a solution, fridges at schools would be needed. For this scenario only one van driver could be employed. Both routes would be starting in [redacted] where the dairy [redacted] is located.

5.1.4 Scenario No. 4

The last scenario considering having own Ford Transit van is an option of owning two Ford Transit vans that would deliver milk every school day. For such scenario two van drivers would be needed. The two routes would divide the entire [redacted] County into two parts. The first route would be starting in Xxx and the second route would be starting in [redacted]. Due to the fact that schools would be delivered on every-school-day basis, fridges would not be needed.

5.2 Renting a Ford Transit Van

The other logistic option could be a long-term rent of a van. Comparing renting a van on the long-run basis to the financial or operation leasing, the renting price results in lower cost per year than any of the two leasing possibilities.

The benefit of long-run rent can be the fact that the company does not have to take care about any payments regarding the van maintenance. The car / van rental company pays the road tax, insurance, motorway stamp, service and maintenance of the car / van, summer and winter wheels and their storing, any other necessary fees connected with a car / van and other services.

The very significant benefit is that the entire payments / instalments are cost items in the accountancy. That means that the company can lower its revenues by this cost and thus significantly reduce the amount of tax that has to be paid from the profit. This benefit also has to do with the cash-flow of the company. The car / van instalments are regular and of the same amount which makes the company cash very transparent and balanced for future plans.

The other fact is that no advance payment is required when renting a car / van.

However, the most important factor of renting a car / van is that if the company does not need the car / van, it can be returned and the company does not pay anything. This can be either used in the case when the company decides to completely stop using car / van earlier than it planned (for example, the company plans to rent a van for 5 years, however, due to some circumstances, the company decides to stop renting a van already after the 3rd year) or the company (like Cool Tej) needs the van only for a few months in the year (for example 10 months a year). This is the major benefit in comparison with any leasing. Each leasing ties companies by signing the contract for a specific time period. The situation, however, can always change (seasonal fluctuation, a need of a bigger or smaller car / van, not properly working business, an employee walk-out of the company etc.). The rental company is able to adopt to a new situation very quickly (next month).

The other benefit can also be the assistance of the car rental company that is usually offered 24 hours a day, 365 days a year.

Further, such companies are also able to provide a substitutive car / van so the customer receives its delivery on time.

A key factor influencing if to rent or lease a car / van can also be the fact that leasing companies usually check its potential client if the client is capable to pay. The leasing company therefore has many requirements of documents that a potential client has to submit (for example Profit and Loss Account, Balance Sheet, Cash Flow and other documents). The rental company does not need any of those documents so the entire process is much less time consuming and therefore cheaper as time cost money.

The last benefit to mention is the absolute flexibility of the rental company to adopt to any wishes and needs of their customer.

Due to the fact that renting represents many important benefits which were mentioned above, however, the message of all the benefits could be lost in the amount of information, the renting benefits can be organized into a simple table for better orientation. The overview of the renting benefits can be seen in the exhibit 21.

Exhibit 21 Overview of Benefits from Renting a Van

- Car rental company pays the road tax, insurance, motorway stamp, service and maintenance of the van, summer and winter wheels and their storing, any other necessary fees connected with a van
- Car rental payments are cost items in the accountancy
- Monthly payments are regular and of the same amount – predictability of cash-flow
- No advance payments
- Renting a van can be finished anytime with no penalty payment
- 24-hours assistance service
- Provision of substitutive van if needed
- No need of time consuming checks of financial capability of the customer before renting the van
- Car rental company is flexible to any specific customer needs

On the other hand, there is no solution that would not have at least small drawback. The drawback can be found also if renting a car / van. In this case it is that the company has to still employ a driver. Having only one driver in the company brings some risk. The risk that was already mentioned in the first logistic option of owning a van was that a driver has the right to take holiday and the driver can also get ill. Therefore, a question rises of what to do if this situation happens.

5.2.1 Scenario No. 5

The fifth scenario is to rent two vans to service two routes in the entire [redacted] County. The rental would be long-term rental. The vans would be rented for the entire school year which takes 10 months. For the time of the two months of school holiday, the vans would be returned to the van rental company.

The two different routes in [redacted] County would be starting from [redacted] and from [redacted]. For the two routes, two van drivers would be employed. Due to every-school-day deliveries, no fridges at schools are needed. Milk for the entire [redacted] County would be bought from the [redacted] dairy in [redacted].

5.3 Outsourcing

The subject of outsourcing is usually areas or activities that are not very important to the company business itself. Those activities are necessary to be done (like accounting, IT) but it does not have a direct relation to the core business / the company´s product. This means that these activities do not necessarily have to bring any added value for which the customer wishes to pay a premium or any price.

The major benefits of outsourcing can be divided into two groups, economic and strategic. The economic are to do with saving on cost of management, maintenance and development. The saving can be especially gained on elimination of investment regarding the outsourced area, human resources and maintenance cost. The majority of customers find outsourcing more expensive than doing the activity within their own resources. However, this assumption is caused due to the fact that companies are not able to evaluate real cost. The cost like operation cost, search of new solutions, inefficient functioning of the activity, insurance, training, not fully used potential of employees, service and consulting cost are cost that are very frequently omitted because they are very often difficult to define and measure. Many of these cost can also be ad-hoc so they are very unpredictable and their frequency of occurrence and intensity is difficult to predict.

The second group of benefits are the strategic benefits. The company which outsources activities or some areas, can fully concentrate on its core business and its internal resources can be used to gain competitive advantage in its core activity. The outsourcing company employs experts for their area of business and they pose the know-how how to make their business in the efficient manner. The factor that should be also mentioned within the strategic benefits is that work of the company´s managers that have some activities outsourced rather than insourced, is much easier in coordination, responsibility and risk management.

Due to the fact that outsourcing represents many important benefits which were mentioned above, however, the message of all the benefits could be lost in the amount of information, the outsourcing benefits can be organized into a simple table for better orientation. The overview of the outsourcing benefits can be seen in the exhibit 22.

Exhibit 22 Overview of Outsourcing Benefits

- Managers can concentrate on the core business
- Expert availability
- Risk delegation to the outsourcing company
- Having at the company´s disposal and working with the state-of-the-art technology / equipment / facilities
- The quality and high-level service is guaranteed
- Reduction of total cost due to elimination of management, coordination and other unknown / hidden cost regarding the outsourced activity
- Decrease of investment cost which allows to increase funds for operation cost regarding company´s core business
- Reaction time on new requirements, needs is shorter and more flexible
- Transparent and exact planning of maintenance cost and development cost

On the other hand, outsourcing has also its drawbacks. Outsourcing is based on trust and communication between the business partners. If this is weak then both sides can be unsatisfied. This can happen due to the fact that outsourcing a service which, mainly at its very beginning, is difficult to specify the exact scope of outsourcing. The specification of obvious activities does not represent any risk, however, as it was mentioned before, there are many other activities that are not that much obvious at the beginning and they can occur later on. Therefore, at the very beginning it is recommended to agree with the outsourcing company on a service level agreement (commonly used abbreviation is SLA) which is a kind of contract which states and determines the level of service and its frequency with other important factors for the company. Such an agreement then is being later modified or completed based on already some experience with outsourcing.

Another negative factor could be the loss of experts. This can, however, happen only if the company has a particular department already established within the company and by outsourcing the activity the company will dismiss the entire department. Then the company loses the experts and their know-how and if a decision is made to re-establish the department after not being satisfied with the outsourced service, building the department can take some time.

To sum up, outsourcing has become a favourite way for companies to deal with the company´s support activities. Companies can focus on their core business and the support activities are left to outsourcing specialists who do the activities for them. The competition is becoming stronger and therefore, devoting the company´s precious time and resources to its core business is the only way to keep up.

5.3.1 Scenario No. 6

The sixth scenario is to outsource the milk distribution. Based on the proposed conditions, the choice of if to outsource the entire [redacted] County or a part of it would be made.

5.4 Dairies Distributing Milk to Schools

At present this is the way of how Cool Tej gets the milk to schools. Dairies have their areas, which they deliver with milk and other products, clearly specified. As it has been mentioned within this project, the dairy [redacted] in [redacted] delivers milk to schools for unbearable charge in the long run. Therefore, to lower the distribution price that is charged by the dairy, the effect of a change in conditions should be examined. So far, the dairy delivers schools every day which represents significant cost for petrol of the entire route the van has to go. The logistic option regarding the dairy can be a change of frequencies of deliveries taking into account, though, the CTQs mentioned at the beginning of this work. The first CTQ that has to be considered at this stage is that customers want their milk to be fresh. The freshness can be ensured if milk deliveries are at least twice a week, milk is stored in fridges (if the deliveries are not every day) and milk is consumed within the delivery week. The other CTQ is that the customer wants to have the milk at disposal for its consumption every school day at 9 am. This means that the deliveries have to be organized in volumes and in frequencies that milk will be at the customer disposal every school day at 9 am.

One of the benefits for Cool Tej regarding the logistic solution of changing the condition of every-day deliveries to non-every-day deliveries is that Cool Tej does not have to adopt new habits. Other benefit is that Cool Tej can still concentrate only on its core business and not on distribution management. The positive factor is also that the funds can be used for the core business and not for purchasing a van or paying a driver.

The drawback is, however, that this solution very depends on discussions with the dairy and explanation of the effect of changing the frequency of deliveries on the logistic cost.

5.4.1 Scenario No. 7

The seventh scenario considers a change in conditions with the dairy [redacted] in [redacted]. More precisely, some / all of the deliveries in a part of [redacted] County would not be delivered on the every-school-day basis. The schools that are included in this part of [redacted] County count for 18 schools. These schools are, at present, delivered by [redacted] dairy in [redacted]. The subsequence of not delivering some schools every school day is that fridges at those schools are needed.

This scenario has its sub-scenarios due to different options of changing the conditions which differently influences the results.

5.4.1.1 *Sub-Scenario(a)*

The first sub-scenario (a) considers deliveries three times a week to 5 schools and the every-school-day deliveries to the rest of the schools would be kept. The division into schools that would remain to be delivered on every-day basis and schools which will not, was made based on the total number of pupils registered to receive milk. Schools with the number of pupils receiving milk lower than 80 pupils would be delivered three times a week, the rest of the schools would remain to be delivered every school day. So far the total number of schools with less than 80 pupils is 5 schools.

5.4.1.2 *Sub-Scenario(b)*

The second sub-scenario (b) considers deliveries twice a week to 5 schools and the every-school-day deliveries to the rest of the schools would be kept. The division into schools that would remain to be delivered on every-day basis and schools which will not, was made based on the total number of pupils registered to receive milk. Schools with the number of pupils receiving milk lower than 80 pupils would be delivered twice a week, the rest of the schools would remain to be delivered every school day. So far the total number of schools with less than 80 pupils is 5 schools.

5.4.1.3 *Sub-Scenario(c)*

The third sub-scenario (c) considers deliveries twice a week to 9 schools and the every-school-day deliveries to the rest of the schools would be kept. The division into schools that would remain to be delivered on every-day basis and schools which will not, was made based on the total number of pupils registered to receive milk. Schools with the number of pupils receiving milk lower than 100 pupils would be delivered twice a week, the rest of the schools would remain to be delivered every school day. So far the total number of schools with less than 100 pupils is 9 schools.

5.4.1.4 *Sub-Scenario(d)*

The fourth sub-scenario (d) will deal with delivering milk three times a week to all considered schools. So far the total number of such schools is 18 schools.

5.4.1.5 *Sub-Scenario(e)*

The last sub-scenario (e) will deal with delivering milk twice a week to all considered schools. The total number of such schools remains the same as in the previous sub-scenario.

Exhibit 23 Overview of Sub-Scenarios of Deliveries by [redacted]

a	5 Schools delivered 3x a week	13 Schools delivered every school day
b	5 Schools delivered 2x a week	13 Schools delivered every school day
c	9 Schools delivered 2x a week	9 Schools delivered every school day
d	All schools delivered 3x a week	
e	All schools delivered 2x a week	

5.5 Food Wholesalers / School Feeding Companies

Another logistic solution could be through delivering milk with other foodstuffs that is delivered to schools. Schools usually have foodstuffs delivered a few times a week to school kitchens or small schools that do not have the facility to cook, they usually have a school feeding company that delivers already prepared food to schools.

The benefit out of this solution could be very significant savings on petrol. In the next section of optimization and evaluation of the scenarios the results will be presented and it will be clear that the most important factor that makes the milk deliveries to schools very expansive is the petrol. And that driving the route only with the milk deliveries makes the distribution cost very high. Therefore, it could be interesting to undertake research in the 18 schools that are delivered by [redacted] in [redacted] regarding which company is their foodstuffs supplier which delivers anything the school kitchen needs and who is the feeding company for those schools which do not have a school kitchen, therefore, the food is delivered to those schools already cooked.

After such research, it could be seen if one, two or more wholesalers / feeding companies are used in this area. Those companies could be contacted by Cool Tej and conditions of adding milk to their vans together with the other foodstuffs could be discussed.

A question about transporting different food together in the same van could be raised, the European REGULATION (EC) No 852/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on the hygiene of foodstuffs (AZ EURÓPAI PARLAMENT ÉS A TANÁCS 852/2004/EK RENDELETE az élelmiszer-higiéniáról) states, however, in the chapter IV. regarding transportation that „*Where conveyances and/or containers are used for transporting* *anything in addition to foodstuffs or for transporting different foodstuffs at the same time, there is, where necessary, to be effective separation of products.„* According to the statement, it seems that the milk could be transported with other food. Therefore, the possibility of delivering the milk bottles together with either ingredients/foodstuffs to the school kitchens, or with entirely cooked food (if schools do not cook themselves and have prepared food delivered), could be feasible.

The drawback of this solution could be the complication of delivering milk to the wholesaler´s depo if that is not in [redacted], the town where the dairy is located.

Another factor could be that if there are various wholesalers and / or feeding companies delivering foodstuffs to the schools then the effect of lowering transportation cost would not have to occur due to delivering milk to many wholesalers and / or feeding companies.

Any deeper analysis and evaluation of this option, however, is limited by the language and access of the schools.

5.6 Local Milkman

Satisfying the CTQ regarding fresh school milk could be done by purchasing milk from local milkmen. Such idea gives the advantage of delivering milk to pupils that is the most fresh that can, at all, be.

The other positive characteristic of such solution is the avoidance of driving relatively long distances as the milkman could supply its close neighbourhood and thus achieve saving on petrol.

On the other hand, the most crucial point to this solution is the expense for either milkmen or Cool Tej or Cool Milk of buying first of all machines to transform the raw milk into the milk that can be drunk by pupils, secondly machines to pack the milk.

The other constraint is that milkmen do not have yet the capacity to do all the work up to the actual reception of processed and bottled milk.

[redacted].

6 Optimization and Evaluation

6.1 General Statements

Each of the scenarios is based on several assumptions. Those assumptions will be mentioned within each relevant scenario.

Optimization of milk routes is based on method from Operation Research study area. This method is called Task of Business Traveller / Circular Transport Problem[9]. It finds an optimized route based on stated distances between all of the places / stops that are examined. This task was based on concrete input information. The first input was that the route should start in one place and should finish at the same place. The other information that was worked with in the method was that the route has to go to each stop only once. The last input was that all stops / places have to be included in the optimized route. The so called stops / places / drops represent towns in which always only one school is located.

Based on the input information the method produces an optimized route for which the number of kilometres will be stated. Besides the number of kilometres, the number of hours needed for the routes will be determined. Two types of time will be mentioned within the optimization. First time is so called netto time and the second time is entire time. The netto time is time that counts only the time needed for getting from one stop to another stop. The second entire time adds to the netto time also time that would approximately be needed for loading the milk bottles and for unloading the delivery at each school.

The final part of this chapter is evaluation of options which is based on calculations made from relevant factors that enter the scenarios and affect the distribution cost. The most important result from the calculation is the logistic cost per a 200 ml bottle of milk which is then compared with the cost that is charged by [redacted] dairy in [redacted] at present. The convenience of the logistic cost is also evaluated based on the information given in previous chapters of this work which is the amount of margin of [redacted] HUF which has to cover the fixed cost and the logistic cost.

6.2 Scenarios

Within this chapter, scenarios will be evaluated. The chapter consist of seven scenarios and the seventh scenario has five sub-scenarios.

[9] More details about this method are stated in the Methodology part of this work.

The first four scenarios deal with the option of purchasing own van. Based on differently designed routes, the scenarios will have different results of the logistic cost.

The rest of the scenarios consider renting a van, outsourcing and the seventh is about what effects can be achieved if existing conditions agreed with the dairy would be changed.

At the end of this chapter of Optimization and Evaluation the scenarios will be summed up to create an easy and clear overview of the logistics solutions and their effect on cost.

6.2.1 Scenario No. 1

The very first scenario is owning one Ford Transit Van that would deliver all schools every school day in the entire [redacted] County. This means that milk would be purchased from the dairy [redacted] in [redacted] and would be delivered to not only schools that were delivered by [redacted] but also to schools that were delivered by the second dairy [redacted] from [redacted]. Due to the size of the whole county, two drivers would have to be employed. The route for delivering milk to schools with one own Ford Transit van would be starting in [redacted] where the dairy is located. For this option no fridges at schools are needed due to every-day deliveries.

6.2.1.1 *Assumptions*

The optimization and evaluation of this scenario is based on the following input assumptions:

- Delivering the entire [redacted] County
- Deliveries every school day
- Milk must be delivered by 9 am
- 1 Ford Transit van owned by Cool Tej Foundation
- 2 van drivers
- No fridges needed
- The route starts in [redacted]
- Calculation of the capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm

6.2.1.2 *Optimization*

The route includes [redacted] drops / towns which would be delivered from [redacted] by [redacted] dairy. The total number of pupils that get milk on this route is [redacted]. The route has 516 km, its petrol cost is about 24,438 HUF when calculating 47.36 HUF/km and it all can be reached within 11 h 6 min netto time plus time needed for loading and unloading the milk. The estimation of the entire time needed is 15.5 hours. Operating this route with only one employed van driver would not be feasible due to every day deliveries. Therefore, this scenario counts with two van drivers.

The optimized route can be seen in the exhibit 24 which shows each of the milk drop and netto time. Due to the space limitation in the page, it is recommended to see the illustration in the attachment 2.

Exhibit 24 Scenario No. 1 Optimized Route – km and time

[redacted]

The optimized route can be illustrated in the way that the allocation of each of the town can be seen. This type of illustration is presented in the exhibit 25 (also in the attachment 3).

Exhibit 25 Scenario No. 1 Optimized Route – Milk Drops Allocation

[redacted]

6.2.1.3 *Calculation*

The calculation of this scenario counted with a bigger size of Ford Transit van due to its capacity limitation. The capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm. The chosen Ford Transit van type was VAN LWB. In the calculations, the cost of the Ford Transit van divided into 5 years of van´s depreciation was counted. Further, annual damage and annual accident insurance together with the annual service cost was added to the total cost of owning a van. Due to the fact that owning a Ford Transit van means that the financial funds are kept in this asset, the funds cannot be used anywhere else, the cost of the tied-up financial funds was also added into the cost of owning a van. The amount of tied-up financial funds was counted based on an assumption that the funds could earn interest that would be earned on 5-year fixed deposit with very low risk. The last item of the cost of owning a van is the road tax. The motorway stamp was not added as it is not needed based on the suggested route.

The second important cost that will influence the final logistic cost is the cost of petrol. For the cost of petrol the number of driven kilometres and the amount of fuel consumption is needed. Driven kilometres were based on the information from the optimization. The fuel consumption results from the van fuel consumption of 0.128 litres per kilometre. For the total cost of petrol, the information of petrol price of 370 HUF per litre was used.

The calculation works also with a specific time frame. The average number of Hungarian school days in a school year is 18 days a month. The number of school months is 10.

The last cost that influences the total logistics cost is the cost of van drivers. The driver wage per an hour was calculated as 519.15 HUF per hour and the number of hours per day was based on the information from the optimization.

Having all the components, the total logistic cost can be calculated. The cost of 200 ml bottle of milk can be derived from the total logistic cost.

The following exhibit shows the results of the calculation.

Exhibit 26 Scenario No. 1 Calculation Results

Logistic cost

Calculation	
• Cost of owning a Transit Van	2.4 mil HUF/year
• Total annual cost of petrol	4.4 mil HUF/year
• Cost of 2 drivers	1.5 mil HUF/year
Total ANNUAL cost of insourcing	8.3 mil HUF/year

[redacted]

The logistic cost in the table per a 200 ml bottle of milk of [redacted] HUF is too much in comparison with the existing distribution price that [redacted] offers ([redacted] HUF).

6.2.1.4 *Evaluation*

The entire delivery takes too long – 15 hours and 30 min together with the loading and unloading work. Driving every day the entire route significantly raises the petrol cost. The cost for employing the drivers for so many hours gets higher as well (two drivers would have to be used due to the length of the drive).

Such a long route is more likely not usable due to its time that is needed to deliver all schools. Driving such a long route every day very significantly raises petrol cost. Owning one Ford Transit Van and delivering the entire [redacted] County does not bring saving that is necessary. The logistic cost is even higher than it can be reached with [redacted] dairy delivering the milk to schools.

6.2.2 Scenario No. 2

The second scenario is owning one Ford Transit Van that would deliver only some schools in the [redacted] County. These schools would be delivered every school day. The rest of the schools would continue to be delivered by [redacted] dairy from [redacted] as the distribution cost the dairy charges is bearable. The schools delivered by the Cool Tej own van would be those schools that used to be delivered by the [redacted] dairy itself from [redacted]. The reason for that, which is expensive distribution cost, is obvious. For this scenario only one driver could be employed. The route for delivering milk to the mentioned schools would be starting in [redacted] where the dairy is located. For this option no fridges at schools are needed due to every-day deliveries.

6.2.2.1 *Assumptions*

The optimization and evaluation of this scenario is based on the following input assumptions:

- Delivering a part of [redacted] County
- Deliveries every school day
- Milk must be delivered by 9 am
- 1 Ford Transit van owned by Cool Tej Foundation
- 1 van driver
- No fridges needed
- The route starts in [redacted]
- Calculation of the capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm

6.2.2.2 *Optimization*

The route includes [redacted] drops / towns which are being delivered by [redacted] dairy from [redacted]. The total number of pupils that get milk is [redacted]. The route has 161.5 km, its petrol cost is about 7,649 HUF when calculating 47.36 HUF / km and it all can be reached within 4 h 51 min netto time plus time needed for loading and unloading the milk. The estimation of the entire time needed is 5.5 hours.

The optimized route can be seen in the exhibit 27 which shows each of the milk drop and netto time. Due to the space limitation in the page, it is recommended to see the illustration in the attachment 4.

Exhibit 27 Scenario No. 2 Optimized Route – km and time

[redacted]

The optimized route can be illustrated in the way that the allocation of each of the town can be seen. This type of illustration is presented in the exhibit 28 (also in the attachment 5).

Exhibit 28 Scenario No. 2 Optimized Route – Milk Drops Allocation

[redacted]

6.2.2.3 *Calculation*

The calculation of this scenario counted with a smaller size of Ford Transit van due to its sufficient capacity. The capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm. The chosen Ford Transit van type was VAN SWB. In the calculations, the cost of the Ford Transit van divided into 5 years of van´s depreciation was counted. Further, annual damage and annual accident insurance together with the annual service cost was added to the total cost of owning a van. Due to the fact that owning a Ford Transit van means that the financial funds are kept in this asset, the funds cannot be used anywhere else, the cost of the tied-up financial funds was also added into the cost of owning a van. The amount of tied-up financial funds was counted based on an assumption that the funds could earn interest that would be earned on 5-year fixed deposit with very low risk. The last item of the cost of owning a van is the road tax. The motorway stamp was not added as it is not needed based on the suggested route.

The second important cost that will influence the final logistic cost is the cost of petrol. For the cost of petrol the number of driven kilometres and the amount of fuel consumption is needed. Driven kilometres were based on the information from the optimization. The fuel consumption results from the van fuel consumption of 0.128 litres per kilometre. For the total cost of petrol, the information of petrol price of 370 HUF per litre was used.

The calculation works also with a specific time frame. The average number of Hungarian school days in a school year is 18 days a month. The number of school months is 10.

The last cost that influences the total logistics cost is the cost of a van driver. The driver wage per an hour was calculated as 519.15 HUF per hour and the number of hours per day was based on the information from the optimization.

Having all the components, the total logistic cost can be calculated. The cost of 200 ml bottle of milk can be derived from the total logistic cost.

The following exhibit shows the results of the calculation.

Exhibit 29 Scenario No. 2 Calculation Results

Logistic Cost

Calculation

• Cost of owning a Transit Van	2.2 mil HUF/year
• Total annual cost of petrol	1.4 mil HUF/year
• Cost of a driver	0.5 mil HUF/year
Total ANNUAL cost of insourcing	4 mil HUF/year

[redacted]

The logistic cost in the table per a 200 ml bottle of milk of [redacted] HUF is too much in comparison with the existing distribution price that [redacted] offers ([redacted] HUF).

6.2.2.4 *Evaluation*

Due to owning a Ford Transit Van which would not be used within the entire calendar year but only during the school days makes this option very inefficient. This inefficiency can be seen from the very high logistic cost per a bottle of milk. This option is not recommended.

6.2.3 Scenario No. 3

The third scenario regarding owning a Ford Transit van is that all schools in [redacted] County would be divided into two milk routes. This means that milk would be purchased from the dairy [redacted] in [redacted] and would be delivered to not only schools that were delivered by [redacted] but also to schools that were delivered by the second dairy [redacted] from [redacted]. However, dividing the county into two routes, the deliveries would be done either twice a week on each route which would mean that the route number one would be delivered every Monday and Wednesday and the route number two would be delivered every Tuesday and Thursday, or the deliveries would be done three times a week on each route which would mean that the route number one would be delivered every Monday, Wednesday and Friday and the route number two would be delivered every Tuesday, Thursday and Saturday. However, for such a solution, fridges at schools would be needed.

For this scenario only one van driver could be employed. Both routes would be starting in [redacted] where the dairy [redacted] is located.

6.2.3.1 *Assumptions*

The optimization and evaluation of this scenario is based on the following input assumptions:

- Delivering the entire [redacted] County
- Deliveries twice a week / three times a week
- Milk must be available for pupils every school day by 9 am
- 1 Ford Transit van owned by Cool Tej Foundation
- 1 van driver
- Fridges needed
- Both routes start in [redacted]
- Calculation of the capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm

6.2.3.2 *Optimization*

This scenario has two different routes, both starting in [redacted].

The first route includes [redacted] drops / towns which are being delivered by the [redacted] dairy from [redacted]. The total number of pupils that get milk on this route is about [redacted]. The route has 289.5 km, its petrol cost is about 13,711 HUF when calculating 47.36 HUF / km and it can be reached within 7 h 35 min netto time plus time needed for unloading the milk. The estimation of the entire time needed is 8 hours.

The first optimized route can be seen in the exhibit 30 (also in the attachment 6) which shows each of the milk drop and netto time.

Exhibit 30 Scenario No. 3 Optimized Route 1 – km and time

[redacted]

The optimized route can be illustrated in the way that the allocation of each of the town can be seen. This type of illustration is presented in the exhibit 31 (also in the attachment 7).

Exhibit 31 Scenario No. 3 Optimized Route 1 – Milk Drops Allocation

[redacted]

The second route includes [redacted] drops / towns which are being delivered from [redacted] by the dairy [redacted]. The total number of pupils that get milk on this route is about [redacted]. The route has 302 km, its petrol cost is about 14,303 HUF when calculating 47.36 HUF/km and it can be reached within 6 h 11 min netto time plus time needed for loading and unloading the milk. The estimation of the entire time needed is 9 hours.

The second optimized route can be seen in the exhibit 32 (also in the attachment 8) which shows each of the milk drop and netto time.

Exhibit 32 Scenario No. 3 Optimized Route 2 – km and time

The optimized route can be illustrated in the way that the allocation of each of the town can be seen. This type of illustration is presented in the exhibit 33 (also in the attachment 9).

Exhibit 33 Scenario No. 3 Optimized Route 2 – Milk Drops Allocation

6.2.3.3 *Calculation*

The calculation of this scenario counted with a bigger size of Ford Transit van due to its capacity limitation. The capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm. The chosen Ford Transit van type was VAN LWB. In the calculations, the cost of the Ford Transit van divided into 5 years of van´s depreciation was counted. Further, annual damage and annual accident insurance together with the annual service cost was added to the total cost of owning a van. Due to the fact that owning a Ford Transit van means that the financial funds are kept in this asset, the funds cannot be used anywhere else, the cost of the tied-up financial funds was also added into the cost of owning a van. The amount of tied-up financial funds was counted based on an assumption that the funds could earn interest that would be earned on 5-year fixed deposit with very low risk. The last item of the cost of owning a van is the road tax. The motorway stamp was not added as it is not needed based on the suggested routes.

The second important cost that will influence the final logistic cost is the cost of petrol. For the cost of petrol the number of driven kilometres and the amount of fuel consumption is needed. Driven kilometres were based on the information from the optimization. The fuel consumption results from the van fuel consumption of 0.128 litres per kilometre. For the total cost of petrol, the information of petrol price of 370 HUF per litre was used.

The calculation works also with a specific time frame. The average number of Hungarian school days in a school year is 18 days a month. The number of school months is 10.

Another cost that influences the total logistics cost are the cost of a van driver. The driver wage per an hour was calculated as 519.15 HUF per hour and the number of hours per day was based on the information from the optimization.

Having all the components, the total logistic cost can be calculated. The cost of 200 ml bottle of milk can be derived from the total logistic cost.

In this scenario an extra line with the real cost of logistics was added into the table with the calculation. That was made because of the fact that fridges are needed to be placed in schools due to non-every-day deliveries. The cost of fridges is low so from the accountancy point of view, the cost should not be spread among years. The cost should appear in the year when the fridge was bought. However, that would not give us the real cost per 200 ml bottle of milk based on which the management should make a decision. Therefore, in this scenario, the managerial way of counting the cost per item had to be used to get a real cost which can be compared with other scenarios. The estimated fridge life time of seven years was, therefore, added into the total cost.

The exhibit 34 shows the results of the calculation.

Exhibit 34 Scenario No. 3 Calculation Results

[redacted]

The calculations were made two. The first calculation considers that schools are delivered on each routes twice a week and the second calculation counts with deliveries on each route three times a week. Based on the real cost information per item including cost of fridges, it can be seen that reducing the frequency of deliveries to twice a week, the logistic cost per 200 ml bottle of milk is [redacted] HUF. This number gives the space for fixed cost of [redacted] HUF per item which is still very low.

6.2.3.4 *Evaluation*

Owning one Ford Transit Van delivering three times a week on each route reduced the burden of the logistic cost to very slightly better logistic cost that offered by [redacted] dairy. However, due to not reaching a significant reduction and because of the fact that Cool Tej would have to purchase fridges for schools (which gives the real cost per one 200 ml bottle of milk [redacted] HUF / pc), this solution was evaluated as negative, not recommended.

6.2.4 Scenario No. 4

The last scenario considering having own Ford Transit van is an option of owning two Ford Transit vans that would deliver milk every school day. For such scenario two van drivers would be needed. The two routes would divide the entire [redacted] County into two parts. The first route would be starting in [redacted] and the second route would be starting in [redacted]. Due to the fact that schools would be delivered on every-school-day basis, fridges would not be needed.

6.2.4.1 *Assumptions*

The optimization and evaluation of this scenario is based on the following input assumptions:

- Delivering the entire [redacted] County
- Deliveries every school day
- Milk must be delivered by 9 am
- 2 Ford Transit vans owned by Cool Tej Foundation
- 2 van drivers
- Fridges are not needed
- First route starts in [redacted], the second route starts in [redacted]
- Calculation of the capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm

6.2.4.2 *Optimization*

This scenario has two different routes, one starting in [redacted], the other one in [redacted].

The first route includes [redacted] drops / towns which would be delivered by [redacted] dairy from [redacted]. The total number of pupils that get milk on this route is [redacted]. The route has 218 km, its petrol cost is about 10,324 HUF when calculating 47.36 HUF / km and it can be reached within 4 h 32 min netto time plus time needed for loading and unloading the milk. The estimation of the entire time needed is 7.5 hours.

The first optimized route can be seen in the exhibit 35 (also in the attachment 10) which shows each of the milk drop and netto time.

Exhibit 35 Scenario No. 4 Optimized Route – km and time

The optimized route can be illustrated in the way that the allocation of each of the town can be seen. This type of illustration is presented in the exhibit 36 (also in the attachment 11).

Exhibit 36 Scenario No. 4 Optimized Route – Milk Drops Allocation

The second route includes [redacted] drops / towns which would probably be delivered by [redacted] dairy from [redacted]. The total number of pupils that get milk on this route is [redacted]. The route has 284 km, its petrol cost is about 13,450 HUF when calculating 47.36 HUF / km and it all can be reached within 6 h 19 min netto time plus time needed for loading and unloading the milk. The estimation of the entire time needed is 8.5 hours.

The second optimized route can be seen in the exhibit 37 (also in the attachment 12) which shows each of the milk drop and netto time.

Exhibit 37 Scenario No. 4 Optimized Route – km and time

[redacted]

Exhibit 38 Scenario No. 4 Optimized Route – Milk Drops Allocation

[redacted]

The second optimized route was also illustrated in the way that the allocation of each of the town could be seen. This type of illustration is presented in the exhibit 38 (also in the attachment 13).

6.2.4.3 *Calculation*

The calculation of this scenario counted with smaller size of Ford Transit vans due to their sufficient capacity. The capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm. The chosen Ford Transit vans type was VAN SWB. In the calculation, the cost of the two Ford Transit vans divided into 5 years of van´s depreciation was counted. Further, annual damage and annual accident insurance together with the annual service cost was added to the total cost of owning two vans. Due to the fact that owning Ford Transit vans means that the financial funds are kept in the assets, the funds cannot be used anywhere else, the cost of the tied-up financial funds was also added into the cost of owning vans. The amount of tied-up financial funds was counted based on an assumption that the funds could earn interest that would be earned on 5-year fixed deposit with very low risk. The last item of the cost of owning vans is the road tax. The motorway stamp was not added as it is not needed based on the suggested routes.

The second important cost that will influence the final logistic cost is the cost of petrol. For the cost of petrol the number of driven kilometres and the amount of fuel consumption is needed. Driven kilometres were based on the information from the optimization. The fuel consumption results from the van fuel consumption of 0.128 litres per kilometre. For the total cost of petrol, the information of petrol price of 370 HUF per litre was used.

The calculation works also with a specific time frame. The average number of Hungarian school days in a school year is 18 days a month. The number of school months is 10.

Another cost that influences the total logistics cost are the cost of two van drivers. The driver wage per an hour was calculated as 519.15 HUF per hour and the number of hours per day was based on the information from the optimization.

Having all the components, the total logistic cost can be calculated. The cost of 200 ml bottle of milk can be derived from the total logistic cost.

The exhibit 39 shows the results of the calculation.

Exhibit 39 Scenario No. 4 Calculation Results

Logistic Cost

Calculation

• Cost of owning 2 Transit Vans	4.7 mil HUF/year
• Total annual cost of petrol	4.3 mil HUF/year
• Cost of 2 drivers	1.5 mil HUF/year
Total ANNUAL cost of insourcing	10.6 mil HUF/year

[redacted]

The cost per 200 ml bottle of milk of [redacted] HUF is too expensive to consider this solution.

6.2.4.4 *Evaluation*

Owning two Ford Transit vans, which are used only within school days and not along the entire calendar year, makes this solution inefficient. Further, the fact that milk would have to be delivered to [redacted] every day by Cool Tej or by the dairy (most likely by [redacted] from [redacted]) would make the cost even higher. Therefore, when looking at the logistic cost per a 200 ml bottle of milk, it can be stated that this option is not recommended.

6.2.5 Scenario No. 5

The fifth scenario is to rent two vans to service two routes in the entire [redacted] County. The rental would be long-term rental. The vans would be rented for the entire school year which takes 10 months. For the time of the two months of school holiday, the vans would be returned to the van rental company.

The two different routes in [redacted] County would be starting from [redacted] and from [redacted]. For the two routes, two van drivers would be employed. Due to every-school-day deliveries, no fridges at schools are needed. Milk for the entire [redacted] County would be bought from the [redacted] dairy in [redacted].

6.2.5.1 *Assumptions*

The optimization and evaluation of this scenario is based on the following input assumptions:

- Long-Term Rental
- Renting vans for 10 months a year
- Delivering the entire [redacted] County
- Deliveries every school day

- Renting 2 Ford Transit vans
- Employing 2 van drivers
- Fridges are not needed
- First route starts in [redacted], the second route starts in [redacted]
- Calculation of the capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm

6.2.5.2 *Optimization*

The routes for the scenario of renting two vans could be starting in [redacted] and in [redacted]. The milk for the [redacted] route would be taken from [redacted] and the milk for the [redacted] route would be from [redacted] dairy.

Due to the fact that these two routes were already analysed previously in the chapter 6.2.4.2 (exhibits 35, 36, 37 and 38), the following exhibit is only to remind the routes.

Exhibit 40 Scenario No. 5 Renting Two Vans

[redacted]

6.2.5.3 *Calculation*

The calculation of this scenario counted with renting two smaller sized Ford Transit vans due to their sufficient capacity. The capacity of the Ford Transit van was based on the crates size information of 40 x 60 x 11.6 cm. The chosen Ford Transit vans type was VAN SWB.

The price of rent usually consists of two parts. The first part is a charge per month with 4 000 km that can be driven within that month. Each kilometre above the limit is paid extra. In this scenario the first route fits in the kilometre limit, therefore, only the month payment is charged. The second route is 1 169 kilometres above the limit and those kilometres are charged extra together with a month payment for the second van.

The second important cost that will influence the final logistic cost is the cost of petrol. For the cost of petrol the number of driven kilometres and the amount of fuel consumption is needed. Driven kilometres were based on the information from the optimization. The fuel consumption results from the van fuel consumption of 0.128 litres per kilometre. For the total cost of petrol, the information of petrol price of 370 HUF per litre was used.

The calculation works also with a specific time frame. The average number of Hungarian school days in a school year is 18 days a month. The number of school months is 10.

Another cost that influences the total logistics cost are the cost of two van drivers. The driver wage per an hour was calculated as 519.15 HUF per hour and the number of hours per day was based on the information from the optimization.

Having all the components, the total logistic cost can be calculated. The cost of 200 ml bottle of milk can be derived from the total logistic cost.

The exhibit 41 shows the results of the calculation.

Exhibit 41 Scenario No. 5 Calculation Results

Logistic Cost	
Calculation	
• Cost of renting 2 Transit vans	4.8 mil HUF/year
• Total annual cost of petrol	4.3 mil HUF/year
• Cost of 2 drivers	1.5 mil HUF/year
Total ANNUAL cost of insourcing	10.6 mil HUF/year

[redacted]

The logistic cost in the table per a 200 ml bottle of milk of [redacted] HUF is too much in comparison with the existing distribution price that [redacted] offers ([redacted] HUF).

6.2.5.4 *Evaluation*

Such option almost equals the option of having two own Ford Transit vans from the cost point of view. However, this solution gives the business flexibility and lowers risk which can be in some cases most important. This flexibility and lower risk comes from the fact that all fleet management and maintenance is done by the rental company. Nevertheless, due to the fact that the cost per a bottle of milk from this solution is high, this solution is not recommended.

6.2.6 Scenario No. 6

The sixth scenario is to outsource the milk distribution. Based on the proposed conditions, the choice of if to outsource the entire [redacted] County or a part of it would be made.

6.2.6.1 *Assumptions*

The optimization and evaluation of this scenario is based on the following input assumptions:

- Delivering the entire or a part of [redacted] County
- Deliveries every school day
- Milk must be delivered by 9 am
- Fridges are not needed

6.2.6.2 *Calculation*

The outsourcing price in [redacted] County varies in between [redacted] HUF / km. Based on this information the calculation for the entire [redacted] County and a part of [redacted] County was made.

The components that were needed for the calculation besides the outsourcing price were the number of kilometres and also a number of pupils that get the milk to derive the price for a 200 ml bottle of milk.

The interesting factor in this scenario was the comparison of the price that can be reached in [redacted] County with a price range that can be reached in the outsourcing market.

The exhibit 42 shows the results of the calculation.

It can be seen from the exhibit that cost based on outsourcing prices that can be reached in [redacted] County ([redacted] HUF / km) is lower if the outsourcing is provided only for a part of [redacted] County than if to the entire county. This part of [redacted] County consists of schools which are being delivered from [redacted] dairy at present. This part was chosen due to the [redacted] dairy´s too expensive distribution price. However, taking on own outsourcing company to distribute the milk for Cool Tej would not bring any improvements. The dairy offers lower price for the distribution ([redacted] HUF / pc).

On the other hand, an interesting comparison can be done based on outsourcing prices that were taken from the outsourcing market. Prices that can be reached in the market to distribute products range between [redacted] HUF / pc. This price range for 200 ml bottles of milk was counted based on benchmarked prices determined per kilos. The 200 ml bottle of milk was weighed and the result was 0.216 kg.

The range of prices that can be observed in the market is wide, however, based on the information of the length of the milk drive, the price that most fits 5 to 8-hour drive was [redacted] HUF / pc. This price, therefore, could be taken as benchmark to compare prices offered in [redacted] County with prices that could be reached under some conditions. One of the conditions could be for example, more competitive market.

Exhibit 42 Scenario No. 6 Calculation Results

[redacted]

6.2.6.3 *Evaluation*

The outsourcing cost depends very much on the competition in the market. Therefore, the price of [redacted] HUF / pc estimated as reachable, does not have to be in reality reached in [redacted] County. The real outsourcing price offered in [redacted] County recalculated for 200 ml bottles of milk varies between [redacted] HUF / pc (price that considers only 18 schools in [redacted] County). Therefore, it is recommended to have in mind the possible price range and the calculated logistic price that can be reached in the competitive market and to try to move the offered price towards the benchmarked price in negotiations with the distributor.

6.2.7 Scenario No. 7

The seventh scenario considers a change in conditions with the dairy [redacted] in [redacted]. More precisely, some / all of the deliveries in a part of [redacted] County would not be delivered on the every-school-day basis. The schools that are included in this part of [redacted] County count for 18 schools. These schools are, at present, delivered by [redacted] dairy in [redacted]. The subsequence of not delivering some schools every school day is that fridges at those schools are needed.

This scenario has its sub-scenarios due to different options of changing the conditions which differently influences the results.

Five sub-scenarios for solving the issue were analysed

- 5 schools being delivered 3x a week, the rest every school day
- 5 schools being delivered 2x a week, the rest every school day
- 9 schools being delivered 2x a week, the rest every school day
- All schools being delivered 3x a week
- All schools being delivered 2x a week.

6.2.7.1 *Assumptions*

The key assumptions for the following solutions of high logistic cost are

- The average logistic price per a 200 ml bottle of milk by [redacted] dairy is [redacted] HUF (the prices of [redacted] HUF / pc for 16 schools and of [redacted] HUF / pc for 2 schools were taken into account in the calculation)
- The average number of Hungarian school days a month is 18 days
- The number of school months is 10
- Milk must be available for pupils every school day by 9 am
- The limit which the logistic price per a bottle should not exceed is [redacted] HUF (due to the dairy´s milk selling price EXW [redacted] HUF and Cool Tej´s selling price of [redacted] HUF)
- The price of a fridge with 150 l volume is 60 000 HUF
- The estimated life time of a fridge is 7 years[10].

[10] The life of a fridge according to statistics is around 14 – 17 years. However, to be sure the fridge will work without any problems, the half of the statistical life time was taken into account.

6.2.7.2 *Calculation*

Due to the fact that the logistic price that the dairy counts with is set up for a bottle of milk being delivered every day, the logistic cost to a particular school was counted based on number of pupils receiving milk in the school, times the logistic price per a bottle for the particular school (some schools were evaluated as for [redacted] HUF/pc and some [redacted] HUF/pc for the distribution). Doing such a simple calculation, a price for distribution to each school was gained. Finally, a new distribution price per a school week based on new conditions (some schools delivered every day and some less than every day) was calculated based on determining which school would be delivered every day (the same distribution price appears each school day) and which school would be delivered less than every school day (the distribution price appears only on days when a delivery is made). This is illustrated in the picture below. Adding up all distribution prices, the distribution cost per week was received. Dividing the cost per week by the total number of pupils gives the logistic cost per a 200 ml bottle of milk.

Exhibit 43 Scenario No. 7 Calculation of Weekly Distribution Cost when Conditions Changed

[redacted]

The tables with calculations that will be presented within each sub-scenario will also show a real cost per a 200 ml bottle of milk. This real cost includes also the cost of fridges. As it was mentioned within the assumptions, it was calculated with the life time of a fridge of 7 years. Therefore, after calculating gained saving within 7 years from having lower logistic cost, the cost of the fridges was deducted. Having the saving cleared from the cost of the fridges, the price per a 200 ml bottle of milk could be calculated by dividing the real saving by the total number of sold bottles of milk within 7 years.

6.2.7.3 *Sub-Scenario (a)*

The first sub-scenario (a) considers deliveries three times a week to 5 schools and the every-school-day deliveries to the rest of the schools would be kept. The division into schools that would remain to be delivered on every-day basis and schools which would not, was made based on the total number of pupils registered to receive milk. Schools with the number of pupils receiving milk lower than 80 pupils would be delivered three times a week, the rest of the schools would remain to be delivered every school day. So far the total number of schools with less than 80 pupils is 5 schools.

6.2.7.3.1 Optimization

The optimized route can be seen in the following exhibit where the 5 schools which would be delivered three times a week are signed with orange circles.

Exhibit 44 Scenario No. 7 – Sub-scenario (a) Milk Route

[redacted]

6.2.7.3.2 Evaluation

Based on the cost of [redacted] HUF per 200 ml bottle of milk that is a result of counting the change in price if five schools are delivered three times a week, the reduction in distribution cost which can be seen in the exhibit 45 is more or less indifferent when applying this solution. Therefore, this solution is neutral that means it does not bring any improvements, nor worsening of the situation.

Exhibit 45 Scenario No. 7 – Sub-scenario (a) Calculation Results

[redacted]

6.2.7.4 *Sub-Scenario(b)*

The second sub-scenario (b) considers deliveries twice a week to 5 schools and the every-school-day deliveries to the rest of the schools would be kept. The division into schools that would remain to be delivered on every-day basis and schools which would not, was made based on the total number of pupils registered to receive milk. Schools with the number of pupils receiving milk lower than 80 pupils would be delivered twice a week, the rest of the schools would remain to be delivered every school day. So far the total number of schools with less than 80 pupils is 5 schools.

6.2.7.4.1 Optimization

The optimized route can be seen in the following exhibit where the 5 schools which would be delivered twice a week are signed with orange circles.

Exhibit 46 Scenario No. 7 – Sub-scenario (b) Milk Route

[redacted]

6.2.7.4.2 Evaluation

The reduction in distribution cost to [redacted] HUF / pc as presented in the exhibit 47 is more or less the same as in the sub-scenario (a), even though it is slightly better. However, this solution has still almost neutral influence on change of distribution price if applied.

Exhibit 47 Scenario No. 7 – Sub-scenario (b) Calculation Results

[redacted]

6.2.7.5 *Sub-Scenario(c)*

The third sub-scenario (c) considers deliveries twice a week to 9 schools and the every-school-day deliveries to the rest of the schools would be kept. The division into schools that would remain to be delivered on every-day basis and schools which would not, was made based on the total number of pupils registered to receive milk. Schools with the number of pupils receiving milk lower than 100 pupils would be delivered twice a week, the rest of the schools would remain to be delivered every school day. So far the total number of schools with less than 100 pupils is 9 schools.

6.2.7.5.1 Optimization

Exhibit 48 Scenario No. 7 – Sub-scenario (c) Milk Route

[redacted]

The optimized route can be seen in the exhibit 48 presented above, where the 9 schools which would be delivered twice a week are signed with orange circles.

6.2.7.5.2 Evaluation

Reduction of every-day deliveries in 9 schools already shows a positive trend that results in [redacted] HUF per 200 ml bottle of milk. This option already means a change. The distribution cost is lower than the limit of [redacted] HUF. However, it should be kept in mind that some margin should be kept for covering also fixed cost. Therefore, this option could be put in place which would improve the situation, however, better results can be reached in further sub-scenarios.

Exhibit 49 Scenario No. 7 – Sub-scenario (c) Calculation Results

[redacted]

6.2.7.6 *Sub-Scenario(d)*

The fourth sub-scenario (d) deals with delivering milk three times a week to all considered schools. So far the total number of such schools is 18 schools.

6.2.7.6.1 Optimization

Exhibit 50 Scenario No. 7 – Sub-scenario (d) Milk Route

[redacted]

The optimized route can be seen in the exhibit 50 presented above, where all the 18 schools that would be delivered three times a week are signed with orange circles.

6.2.7.6.2 Evaluation

Delivering all school three times a week significantly changes the logistic price per a 200 ml bottle of milk to [redacted] HUF / pc. Therefore, this option deserves to be thought through and considered as a potential solution of current situation.

Exhibit 51 Scenario No. 7 – Sub-scenario (d) Calculation Results

[redacted]

6.2.7.7 *Sub-Scenario(e)*

The last sub-scenario (e) deals with delivering milk twice a week to all considered schools. The total number of such schools remains the same as in the previous sub-scenario which is 18.

6.2.7.7.1 Optimization

Exhibit 52 Scenario No. 7 – Sub-scenario (e) Milk Route

[redacted]

The optimized route can be seen in the exhibit 52 presented above, where all the 18 schools that would be delivered twice a week are signed with orange circles.

6.2.7.7.2 Evaluation

The last option shows how much saving could be reached if all schools are delivered twice a week. If Cool Tej wants to succeed in this business and wants pupils to receive milk, then surviving loss is not sustainable in the long run. Therefore, this option deserves to be thought through and considered as a potential solution of current situation.

Exhibit 53 Scenario No. 7 – Sub-scenario (e) Calculation Results

[redacted]

6.3 Summary of Recommendations

Within this work nine scenarios were discussed and seven of them were analysed more in details due to data availability.

The options that consider buying own Ford Transit van showed very high cost due to inefficiencies of usage of the entire van capacity. The Ford Transit would be used only on the school days which is only 50 % of the capacity[11] of the van or even less if the deliveries would not be every school day.

The option of renting a van also did not show any positive change in distribution cost. The rent seems to have many advantages for the company, however, the most important factor which is the cost per a 200 ml bottle of milk is too high. This option is not relevant.

Outsourcing in a competitive market could be a solution, nevertheless, the competition is low in the [redacted] County which makes the outsourcing price expensive. Therefore, this option is not the right solution for the time being.

New negotiations with [redacted] dairy could be open to discuss a distribution price in the case that the distribution stays with the dairy but the frequency of the distribution would not be

[11] The capacity of a van is counted as 365 days a year the van can be in use. The number of school days is 18 days in average in a month. The number of school months is 10. Therefore, the capacity of a van is 180/365 which is 49.3 %.

every school day. This option showed some interesting changes in the distribution cost and therefore, this could be the solution for Cool Tej.

The other two option which, however, could not be measured due to above mentioned obstacles, were to try to find out which companies deliver foodstuffs to school and to try to join school milk with those companies. The last option was that the local milkman would supply the schools in surrounding. Nevertheless, this option is not relevant for the current milkmen capacities.

The following exhibit presents the overview of all scenarios that were mentioned within this work together with suggested recommendations that are illustrated by coloured arrows. Red arrow means that the scenario is not recommended, the yellow arrow stands for a solution that does not make any significant change to the existing situation and the last green arrow supports the scenario.

Exhibit 54 Summary of Scenarios and Their Recommendations

[redacted]

To sum up, the saving made by the option number seven which considers new distribution prices given by the dairy based on reducing the frequency of deliveries, would range between [redacted] mil HUF a year.

CONSLUSION

Through the entire work, the satisfaction of Cool Tej´s customer was taken into account. At the very beginning, three CTQs[12] were mentioned that were necessary for the considered options and then for the solutions of the project. These three CTQs referred to cost, time and quality.

The first CTQ concerned cost. The customer wants to receive the school milk for free. This fact means that taking into account the amount of subsidies from the state and from the EU which gives in total [redacted] HUF per a 200 ml bottle of milk when considering [redacted] County, the Cool Tej selling price cannot be higher than those [redacted] HUF / 200 ml. (200 ml bottle of milk is the amount that a child[13] is entitled to receive on a school day[14].)

The second CTQ refers to time. The customer wants to have the milk at disposal for its consumption every school day at 9 am. This means that the deliveries have to be organized in volumes and in frequencies that milk will be at the customer disposal every school day at 9 am.

The third CTQ refers to quality. The customer wants fresh milk. The freshness can be ensured if milk deliveries are at least twice a week, milk is stored in fridges (if the deliveries are not every day) and milk is consumed within the delivery week.

The above mentioned CTQs were the critical factors, according to which the option of opening new discussions with the [redacted] dairy about new price that take into account new delivery conditions, for recommending this option as the right solution.

The first CTQ considering cost would be accomplished with the distribution cost that range from [redacted] HUF/pc within this solution depending on how many schools would be delivered on non-every-school-day basis and on how many deliveries within a week would be done.

The second CTQ regarding time would also be fulfilled due to the fact, that the dairy already has the experience with delivering the school milk up to the required time limit ([redacted]).

The third CTQ would also be managed as the suggested delivery frequency was at least twice a week.

The final solution of the suggested options results in saving of [redacted] mil HUF a year.

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[12] CTQs are explained more in details in the Methodology part of this work.

[13] Each EU country has a slightly different rule of what child and of which age is entitled to receive milk for free. The EU regulations and the national regulations closely specify the rules and conditions.

[14] School day is more specifically defined in the national regulations.

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ATTACHMENTS

1 LIST OF PRODUCTS ELIGIBLE FOR COMMUNITY AID

2 SCENARIO NO. 1 OPTIMIZED ROUTE

3 SCENARIO NO. 1 OPTIMIZED ROUTE – MILK DROPS ALLOCATION

4 SCENARIO NO. 2 OPTIMIZED ROUTE – KM & NETTO TIME

5 SCENARIO NO. 2 OPTIMIZED ROUTE – MILK DROPS ALLOCATION

6 SCENARIO NO. 3 OPTIMIZED ROUTE 1 – KM & NETTO TIME

7 SCENARIO NO. 3 OPTIMIZED ROUTE 1 – MILK DROPS ALLOCATION

8 SCENARIO NO. 3 OPTIMIZED ROUTE 2 – KM & NETTO TIME

9 SCENARIO NO. 3 OPTIMIZED ROUTE 2 – MILK DROPS ALLOCATION

10 SCENARIO NO. 4 OPTIMIZED ROUTE 1 – KM & NETTO TIME

11 SCENARIO NO. 4 OPTIMIZED ROUTE 1 – MILK DROPS ALLOCATION

12 SCENARIO NO. 4 OPTIMIZED ROUTE 2 – KM & NETTO TIME

13 SCENARIO NO. 4 OPTIMIZED ROUTE 2 – MILK DROPS ALLOCATION

Attachment No. 1: LIST OF PRODUCTS ELIGIBLE FOR COMMUNITY AID

ANNEX I

LIST OF PRODUCTS ELIGIBLE FOR COMMUNITY AID

Category I

(a) heat-treated milk (1);

(b) heat-treated milk with chocolate, fruit juice (2) or flavoured, containing at least 90 % by weight of the milk indicated in point (a) and containing maximum 7 % of added sugar (3) and/or honey;

(c) fermented milk products with or without fruit juice (2), flavoured or non-flavoured, containing at least 90 % by weight of the milk indicated in point (a) and containing maximum 7 % of added sugar (3) and/or honey.

Category II

Flavoured and non-flavoured fermented milk products with fruit (4), containing at least 80 % by weight of the milk indicated in Category I point (a) and containing maximum 7 % added sugar (5) and/or honey.

Category III

Flavoured and non-flavoured fresh and processed cheeses containing at least 90 % by weight of cheese.

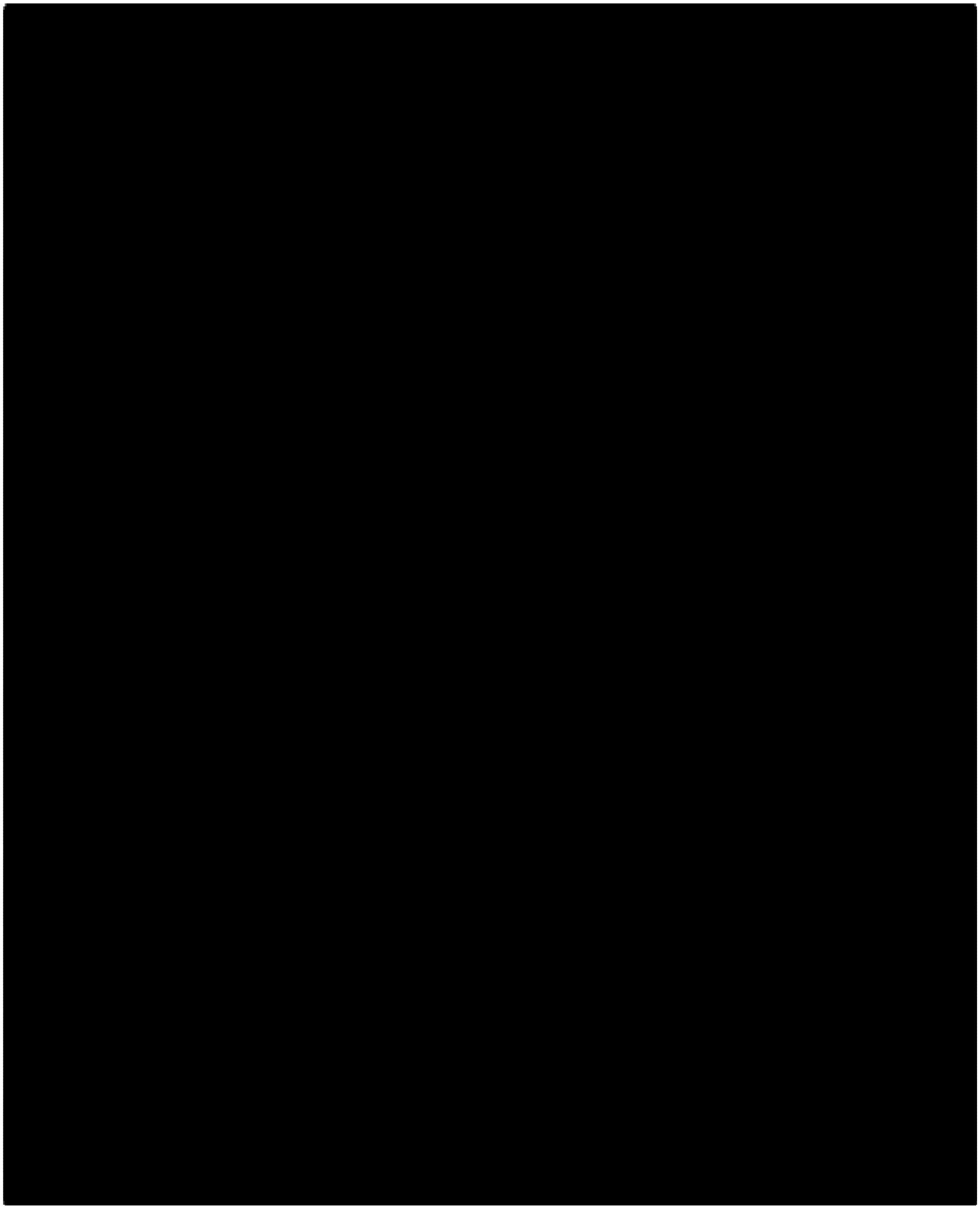
Category IV

Grana Padano cheese and Parmigiano Reggiano cheese.

Category V

Flavoured and non-flavoured cheeses, containing at least 90 % by weight of cheese, and not falling under categories III and IV.

Attachment No. 2: SCENARIO NO. 1 OPTIMIZED ROUTE – KM & NETTO TIME



Total distance	Costs in HUF (47 HUF/km)	Total time (netto)	Approx. TOTAL time
516 km	24 438 HUF	11h 06min	15.5 hours

Attachment No. 3: SCENARIO NO. 1 OPTIMIZED ROUTE – MILK DROPS ALLOCATION

Attachment No. 4: SCENARIO NO. 2 OPTIMIZED ROUTE – KM & NETTO TIME

Total distance	Costs in HUF (47 HUF/km)	Total time (netto)	Approx. TOTAL time
161.5 km	7 649 HUF	4 h 51 min	5.5 h

Attachment No. 5: SCENARIO NO. 2 OPTIMIZED ROUTE – MILK DROPS ALLOCATION

Attachment No. 6: SCENARIO NO. 3 OPTIMIZED ROUTE 1 – KM & NETTO TIME

Total distance	Costs in HUF (47 HUF/km)	Total time (netto)	Approx. TOTAL time
289.5 km	13 711 HUF	6 hours	8 hours

Attachment No. 7: SCENARIO NO. 3 OPTIMIZED ROUTE 1 – MILK DROPS ALLOCATION

Attachment No. 8: SCENARIO NO. 3 OPTIMIZED ROUTE 2 – KM & NETTO TIME

Total distance	Costs in HUF (47 HUF/km)	Total time (netto)	Approx. TOTAL time
302 km	14 303 HUF	6 h 11 min	9 hours

Attachment No. 9: SCENARIO NO. 3 OPTIMIZED ROUTE 2 – MILK DROPS ALLOCATION

Attachment No. 10: SCENARIO NO. 4 OPTIMIZED ROUTE 1 – KM & NETTO TIME

Total distance	Costs in HUF (47 HUF/km)	Total time (netto)	Approx. TOTAL time
218 km	10 324 HUF	4 h 32 min	7.5 h

Attachment No. 11: SCENARIO NO. 4 OPTIMIZED ROUTE 1 – MILK DROPS ALLOCATION

Attachment No. 12: SCENARIO NO. 4 OPTIMIZED ROUTE 2 – KM & NETTO TIME

Total distance	Costs in HUF (47 HUF/km)	Total time (netto)	Approx. TOTAL time
284 km	13 450 HUF	6 h 19 min	8 h 30 min

Attachment No. 13: SCENARIO NO. 4 OPTIMIZED ROUTE 2 – MILK DROPS ALLOCATION